621 Dundas Street East

Traffic Impact Study

2255718 Ontario Ltd.

25 January 2024

→ The Power of Commitment

Executive Summary

GHD Limited is pleased to provide the following Traffic Impact Study for a proposed residential development located on land with the municipal address of 621 Dundas Street East in the City of Belleville.

This report determines the site related traffic and subsequent traffic related impacts on the adjacent road network and site driveways during the weekday a.m. and p.m. peak hours. These impacts are based on the projected future background traffic and road network conditions derived for a 2025, 2027 2029, 2034, and 2039 future planning horizon years.

Based on the approved Terms of Reference, the following existing intersections were included in the study area:

- Dundas Street East and Haig Road/Proposed Site Access (unsignalized)

The proposed site plan consists of a total of 599 dwelling units proposed within nine blocks. The dwelling type and unit count per block are as follows:

- Block A: 185 dwelling units within 2 mid-rise buildings
- Block B: 80 stacked townhouse dwelling units
- Block C: 36 bungalow townhouse dwelling units
- Block D: 7 detached townhouse dwelling units
- Block E: 40 2-storey townhouse dwelling units and 36 bungalow townhouse dwelling units
- Block F: 72 back-to-back dwelling units
- Block G: 96 stacked townhouse dwelling units
- Block H: 29 detached dwelling units
- Block I: 18 2-storey townhouse dwelling units

Access to the subject site is proposed via a full-moves access on the south leg of the existing intersection of Dundas Street East and Haig Road.

Based on ITE Trip Generation rates using Land Use Codes 210, 215, 220, and 221, the full build-out of the subject site is expected to generate 342 two-way vehicle trips during the a.m. peak hour consisting of 82 inbound and 260 outbound trips. During the p.m. peak hour, it is expected to generate 388 new two-way vehicle trips consisting of 242 inbound and 146 outbound trips.

Under existing traffic conditions, the intersection of Dundas Street East and Haig Road is operating at acceptable v/c ratios and levels of service during the a.m. peak and p.m. peak hours.

Under future background 2025, 2027, 2029 and 2034 traffic conditions, including corridor growth, the intersection of Dundas Street East and Haig Road is reported to continue to operate at satisfactory levels of capacity and delays will all movements operating at LOS of E or better.

Under the future total 2025 condition, with the addition of site generated traffic from Blocks A and F, the intersection of Dundas Street East and Haig Road is reported to continue to operate at a satisfactory levels of capacity, delays and queuing. The highest v/c ratio is reported during the p.m. peak hour for the southbound left turn which is reported to operate at a v/c ratio of 0.55 LOS D.

Under the future total 2027 condition, with the addition of site generated traffic which also includes Block B, E, G and I, the intersection of Dundas Street East and Haig Road is reported to continue to operate at mostly satisfactory levels, with the exception of the northbound and southbound left-turn movements during the p.m. peak hour which are reported to operate at a v/c ratio of 0.80 LOS F and 0.95 LOS F respectively.

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Under the future total 2029 condition, with the addition of site generated traffic included for Blocks C, D and H, the intersection of Dundas Street East and Haig Road is reported to continue to operate at mostly satisfactory levels, however the northbound and southbound left-turn movements during the p.m. peak hour continue to report increased delays with the northbound left operating at 1.15 LOS F and the southbound left at 1.19 LOS F.

Despite signal warrants not being satisfied at the intersection of Dundas Street East and Haig Road, it is recommended that the intersection be signalized to provide the required capacity for both the north and south legs exiting onto Dunda Street. The intersection was analyzed using a 90-second cycle length which resulted in reduced delays at the intersection without any impacts of queuing on Dundas Street or the adjacent railway crossing.

Under the future total 2029, 2034 and 2039 traffic scenarios, the intersection of Dundas Street East and Haig Road is reported to operate at satisfactory v/c ratios, delays and queuing as a signalized intersection.

The reported queuing along Dundas Street from the introduction of the traffic signal control is not expected to negatively impact the adjacent railway crossing to the west of the intersection as the reported 95th percentile queue lengths are not reported to extend to the at-grade crossing.

Application of the City of Belleville By-Law parking rates to the subject site results in a requirement of a minimum of 737 vehicle parking spaces for the subject site.

The City of Belleville is currently undergoing a Zoning By-law Consolidation to update and consolidate the three existing By-laws currently governing the City. Application of the City's Draft By-law rates to the subject site results in a requirement of a minimum of 670 vehicle parking spaces (552 resident and 118 visitor spaces), 100 bicycle parking spaces, and two loading spaces for the mid-rise buildings.

The subject site provides a total of 846 vehicular parking spaces, exceeding the By-law requirement for the overall site. However, Block F falls short one parking space when reviewing the By-law requirement for each block with the shortfall being accommodated by sharing visitor parking between all blocks.

GHD assessed the site circulation for an emergency vehicle and waste collection vehicle and confirmed no issues with the site circulation.

The traffic study confirms that the proposed residential development is expected to have a minimal impact on the future capacity of the adjacent road network with the recommended signalization of the intersection of Dundas Street East and Haig Road.

We trust that this satisfies your requirements, but do not hesitate to contact the undersigned if you have any questions.

Sincerely,

GHD

Rafael Andrenacci, B.Eng
Transportation Planner

William Maria, P. Eng.
Transportation Planning Lead

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1. Introduction

1.1 Retainer and Objective

GHD Limited was retained to prepare a Traffic Impact Study for a proposed residential development located on land municipally known as 621 Dundas Street East in the City of Bellville

The site location is illustrated in **Figure 1**.

The purpose of this study is to:

- Establish baseline traffic conditions for the study area in 2023 and determine future background operating conditions for a future planning horizon in 2025, 2027, 2029, 2034, and 2039.
- Estimate the site trips generated by the proposed development and distribute the traffic to the adjacent road network.
- Determine future operating traffic conditions during the weekday peek periods through intersection capacity analysis.
- Conduct a site access and swept path review of the proposed site plan.

Figure 1 Site Location

1.2 Study Team

The GHD team involved in the preparation of the study are:

- William Maria, P. Eng., Transportation Planning Lead
- Rafael Andrenacci, B.Eng., Transportation Planner

2. Site Characteristics

2.1 Study Area

As per the agreed Terms of Reference for the study attached in **Appendix A**, the following intersections were included in the study area:

- Dundas Street East and Haig Road/Proposed Site Access

2.2 Proposed Development Content

A site plan prepared by Cynthia Zahoruk Architects is shown in **Figure 2** and provided in **Appendix B**. A total of 599 dwelling units are proposed within 8 blocks. The dwelling type and unit count are as follows:

- Block A: 185 dwelling units within 2 mid-rise buildings
- Block B: 80 stacked townhouse dwelling units
- Block C: 36 bungalow townhouse dwelling units
- Block D: 7 detached townhouse dwelling units
- Block E: 40 2-storey townhouse dwelling units and 36 bungalow townhouse dwelling units
- Block F: 72 back-to-back dwelling units
- Block G: 96 stacked townhouse dwelling units
- Block H: 29 detached dwelling units
- Block I: 18 2-storey townhouse dwelling units

Access to the subject site is proposed via a full-moves access which will form the south leg of the existing intersection of Dundas Street East and Haig Road.

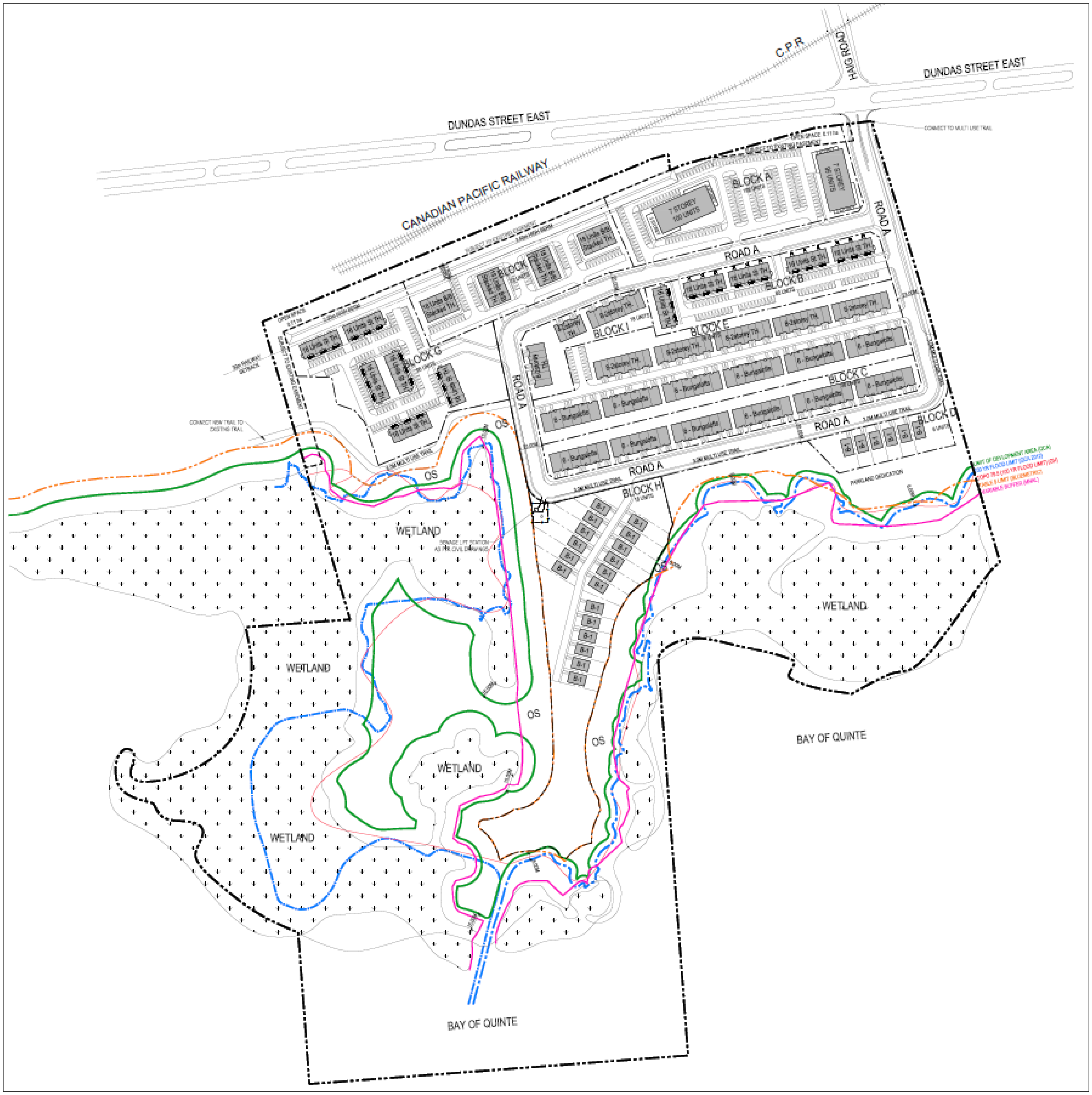

Figure 2 Proposed Site Plan

3. Existing Conditions

3.1 Existing Road Network

Dundas Street East is an east/west arterial road under the jurisdiction of the City of Belleville. Within the study area it has a four-lane cross-section with a wide landscaped centre median. Its intersection with Haig Road is unsignalized with the stop-control only provided along the minor approach. The posted speed limit along Dundas Street East is 60 km/h. The CP rail crosses Dundas Street East west of its intersection with Haig Road.

Haig Road is a north/south collector road under the jurisdiction of the City of Belleville. Within the study area it has a two-lane cross-section. Its intersection with Dundas Street East is unsignalized with an auxiliary left-turn lane in the southbound direction with stop-control provided along the minor approach. The assumed posted speed limit along Haig Road is 50 km/h. The CP rail crosses Haig Road north of its intersection with Dundas Street East.

The existing lane configurations and intersection control are shown in the figure below.

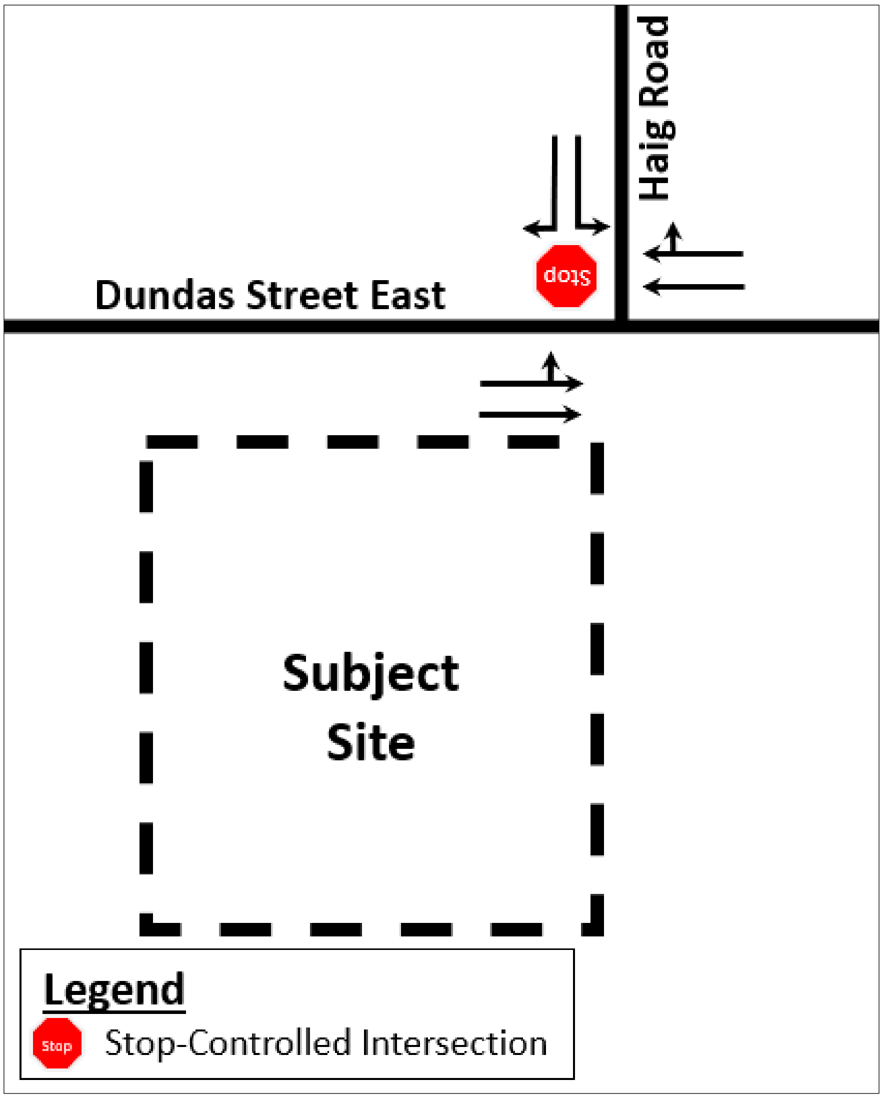

Figure 3 Existing Lane Configuration and Traffic Controls

East of the subject site is an existing vacant industrial building which has a right-in/out access located at the eastern property line of the subject site. This access will be restrained as part of this proposal given its proximity to the proposed full moves access opposite Haig Road and will be improved as needed as part of the detailed design of the future intersection.

3.2 Pedestrian and Bicycle Facilities

Pedestrian facilities are currently provided along both sides of Haig Road within the study area. The sidewalk on the north side of Dundas Street East is only provided to the west of the rail line.

There is currently no cycling infrastructure within the study area.

Figure 4 Existing Active Transportation Facilities

3.3 Transit Services

Belleville Transit operates a single transit route within the study area. Route 2 operates in a counter clockwise direction along a series of roads including Dundas Street East, Haig Road, Victoria Avenue, Humewood Drive, Pine Street, and Victoria Street. The route operates with a 30-minute headway during the a.m. and p.m. peak hours. The nearest transit stops are located to the west of the rail line along Dundas Street (250 metres) and to the north of the rail line on Haig Road (250 metres).

Figure 5 Existing Transit Routes and Transit Stops

3.4 Existing Traffic Data

GHD contracted Spectrum Traffic Inc. to conduct updated turning movement counts at all the study intersections in October 2023. The baseline 2023 volumes are summarized in **Figure 6** below with the full turning movement counts provided in **Appendix C.**

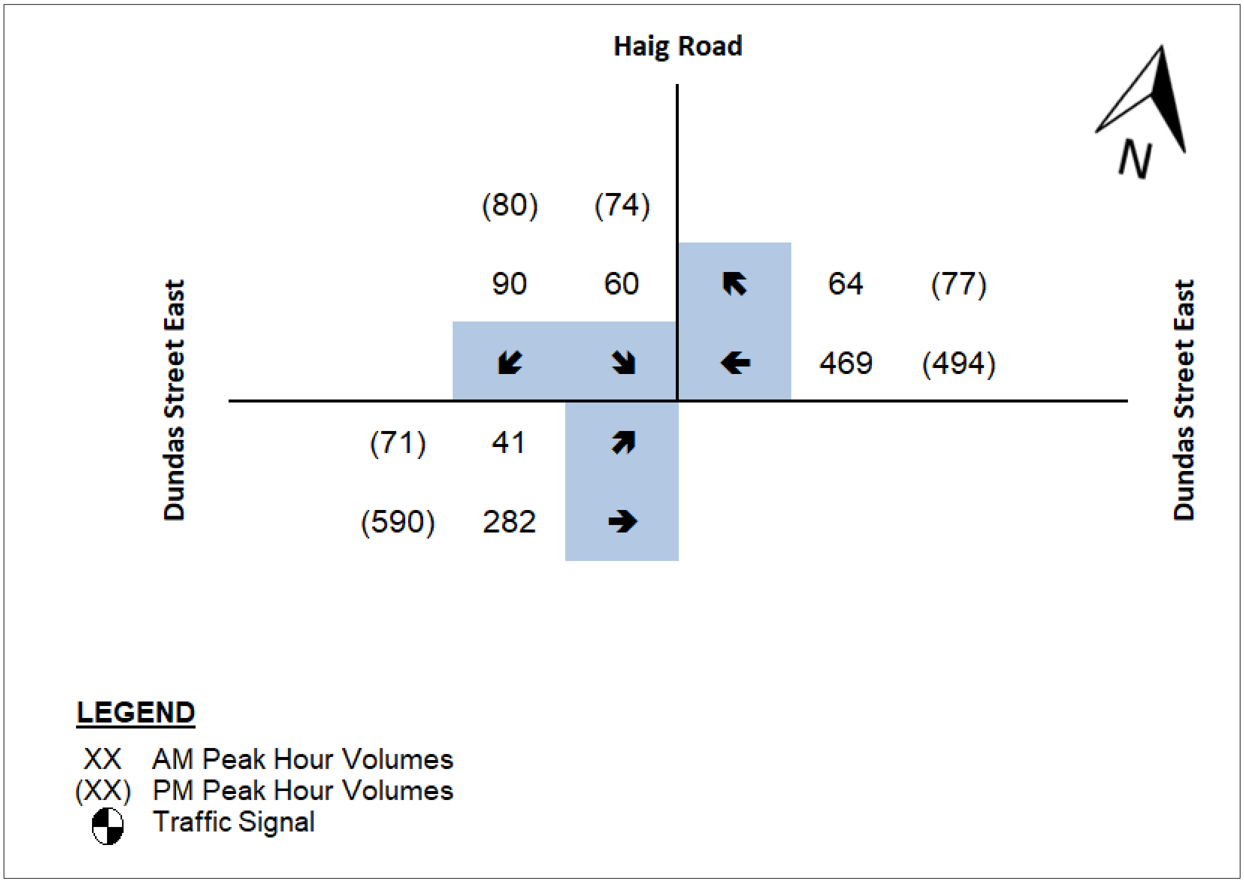

Figure 6 Baseline 2023 Traffic Volumes

4. Future Conditions

4.1 Study Horizon Year

As agreed with City staff in the Terms of Reference, future horizon years of 2025, 2027, 2039, 2034, and 2039 were selected for the analysis of future traffic conditions, consisting of the build-out years of each of the three phases in addition to a period of five and ten years post build-out.

4.2 Corridor Growth

GHD reviewed the census data for the City of Belleville in addition to population and employment projections outlined the City's Transportation Master Plan. Census data included 2011, 2016, and 2021 in addition to the population and employment projects for 2031. The growth rates ranged from 0.5% to 1.7% with the comparison between the 2021 census data and the 2031 population projection resulting in a 1.4% per annum growth rate. As the comparison between the 2021 population and the projected 2031 population (1.4% per annum) provides the closest representation of potential population growth during the horizon years, GHD used a 1.5% per annum growth rate to project the future traffic volumes along Dundas Street East and Haig Road up to the 2039 horizon year. This approach has been approved by City staff.

The various growth rates that were reviewed are summarized in the table below and provides information for both employment and population growth.

Table 1 Growth Rates

Type	Year 1	Year 2	Growth Rate, per annum
Employment	31,670 (2011)	41,870 (2031)	1.4%
Population	50,990 (2011)	63,450 (2031)	1.1%
Population	50,716 (2016)	55,071 (2021)	1.7%
Population	55,071 (2021)	63,450 (2031)	1.4%

4.3 Background Development Traffic

GHD completed a review of the City's current and active development applications and did not identify any planned background developments located near the subject site that would contribute traffic volumes to the study intersections.

4.4 Future Background Traffic Volumes

The background traffic volumes for the 2025, 2027, 20329, 2034, and 2039 horizon year were derived by applying the respective growth rates to the 2023 traffic volumes. The resulting 2025, 2027, 2029, 2034 and 2039 future background traffic volumes are summarized in the following figures.

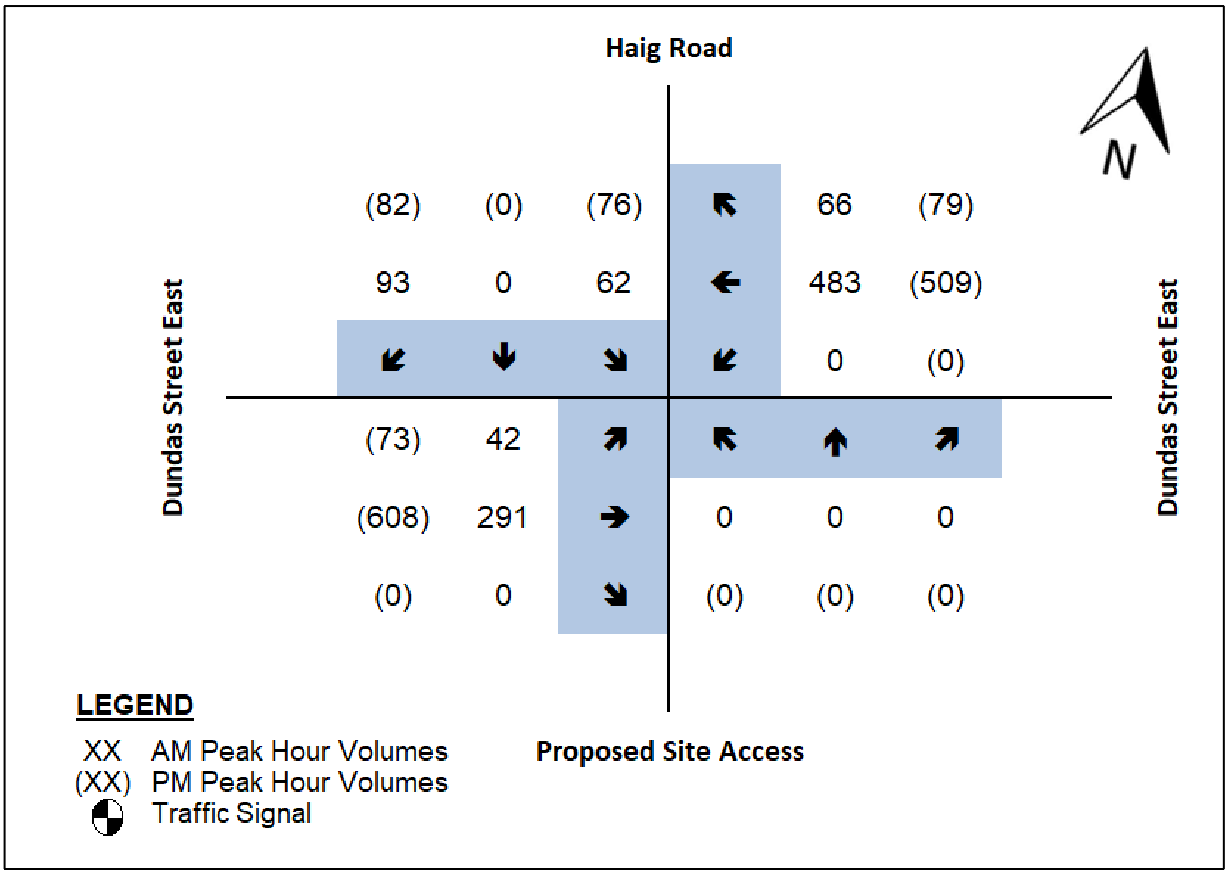

Figure 7 2025 Future Background Traffic Volumes

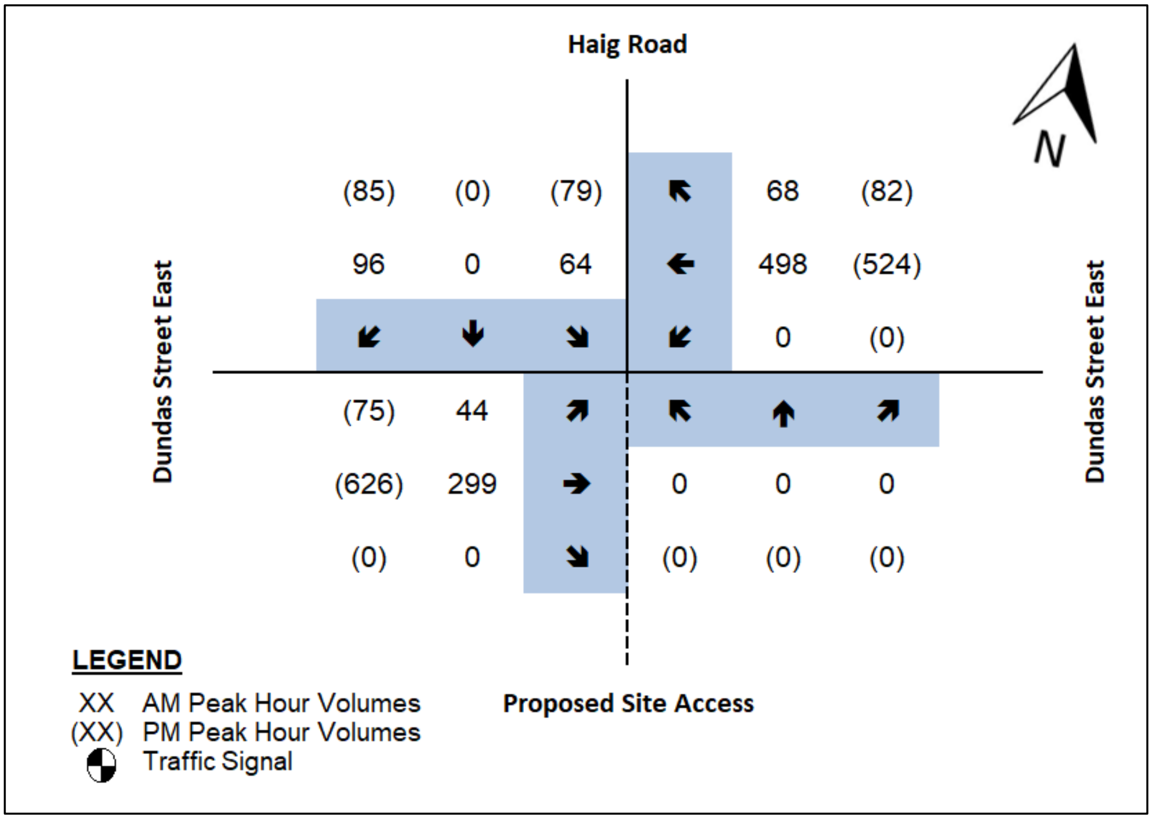

Figure 8 2027 Future Background Traffic Volumes

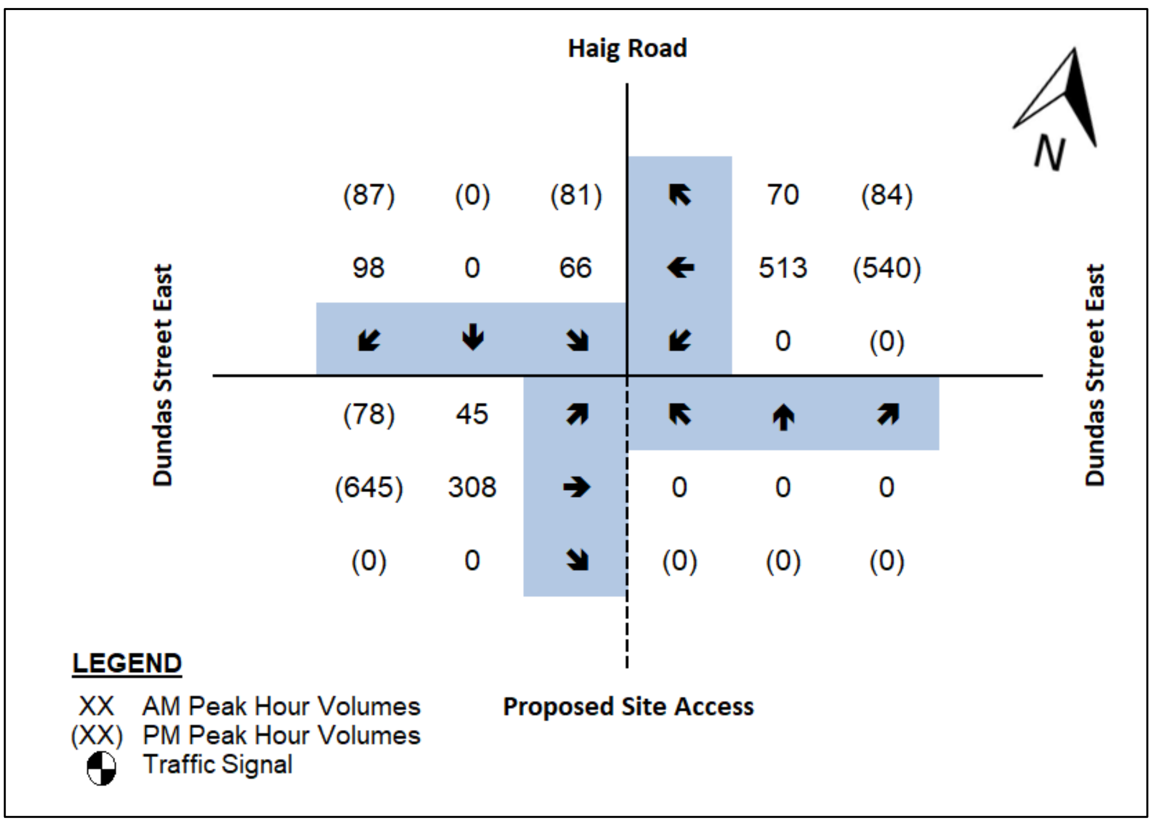

Figure 9 2029 Future Background Traffic Volumes

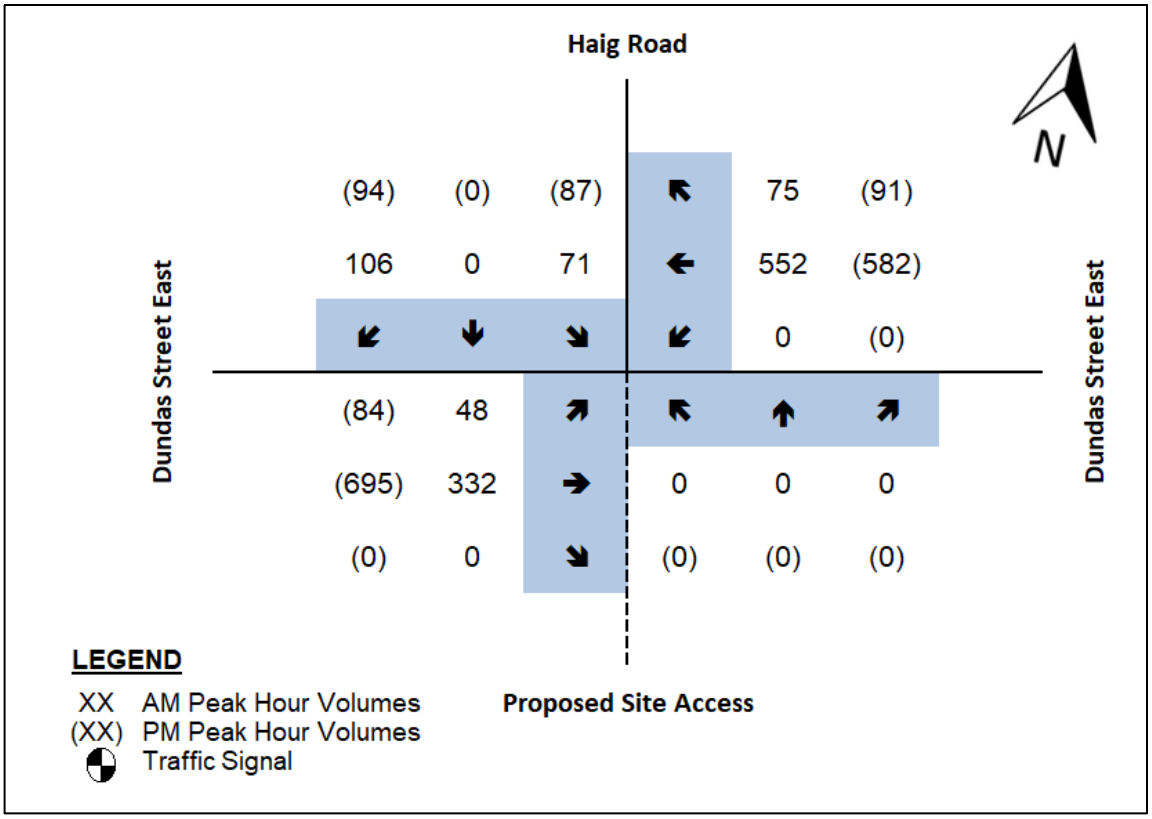

Figure 10 2034 Future Background Traffic Volumes

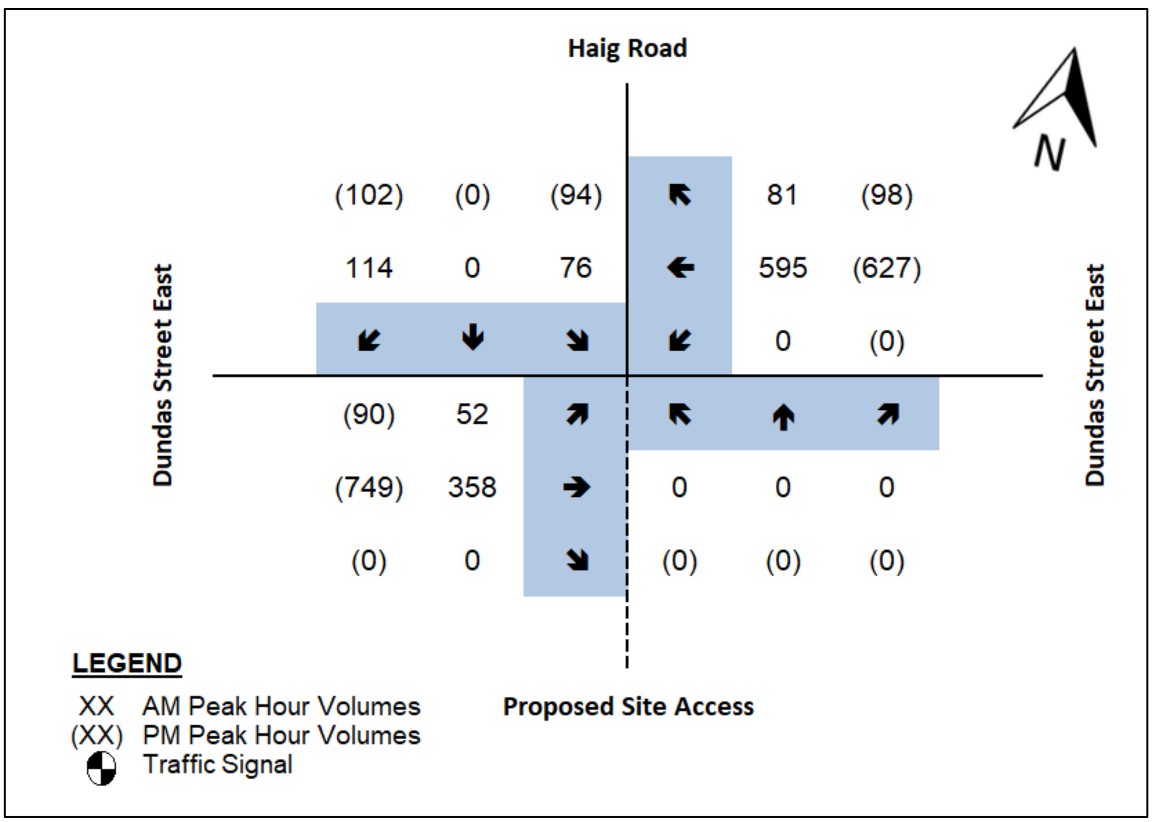

Figure 11 2039 Future Background Traffic Volumes

5. Site Generated Traffic

5.1 Site Trip Generation

The proposed development is comprised of a total of 599 dwelling units. The subject site consists of a series of nine blocks with various dwelling types. The unit type and unit breakdown for each block is as follows:

- Block A: 185 dwelling units within two mid-rise buildings
- Block B: 80 stacked townhouse dwelling units
- Block C: 36 bungalow townhouse dwelling units
- Block D: 6 detached townhouse dwelling units
- Block E: 36 bungalow townhouse dwelling units and 40 2-storey townhouse dwelling units
- Block F: 72 back-to-back dwelling units
- Block G: 96 stacked townhouse dwelling units
- Block H: 18 detached dwelling units
- Block I: 18 2-storey townhouse dwelling units

Site traffic generated by the proposed development for the weekday a.m. and p.m. peak hours was estimated by applying the trip rates provided by the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition. Based on the definitions provided by the ITE, Land Use Code (LUC) 210 (Single-Family Detached) was used for the detached dwelling units, LUC 215 (Single-family Attached) for the bungalow townhouse dwellings, LUC 220 (multifamily housing, low-rise) for all remaining townhouse dwellings, and LUC 221 (multifamily housing, mid-rise) was used for the units within the 6-storey apartments.

A comparison of the fitted curve equations and average rates for each individual Land Use Code was completed, whichever calculation resulted in a greater trip generation was used as a conservative measure.

As previously stated in **Section 4.1**., the subject site is anticipated to be built out in three phases. The first phase, assumed to be built-out by 2025, consists of blocks A and F. The second phase, assumed to be built-out by 2027, consists of Blocks B, E, G, and I. The third and final phase, assumed to be built-out by 2029, consists of the remaining Blocks C, D, and H. The assumed phasing is preliminary and subject to change.

No modal split was applied to the estimated trip generation.

Table 2 summarizes the estimated trip generation for the subject site.

Table 2   Total Site Trip Generation

Block and Land Use Code	Horizon Year	Dwelling Units	Parameters	Peak Hour Trip Generation					
				Weekday AM			Weekday PM		
				In	Out	Total	In	Out	Total
Block A - Multifamily Housing (Mid-Rise) – (LUC 221)	2025	185 units	Trip Rate	0.081	0.287	0.368	0.238	0.151	0.3892
			Trip Ratio	23%	77%	100%	61%	39%	100%
			Gross Trips	15	53	68	44	28	72
Block B - Multifamily Housing (Low-Rise) – (LUC 220)	2027	80 units	Trip Rate	0.150	0.450	0.600	0.438	0.250	0.688
			Trip Ratio	24%	76%	100%	63%	37%	100%
			Gross Trips	12	36	48	35	20	55
Block C - Single-Family Attached (LUC 215)	2029	36 units	Trip Rate	0.111	0.361	0.472	0.333	0.250	0.583
			Trip Ratio	25%	75%	100%	59%	41%	100%
			Gross Trips	4	13	17	12	9	21
Block D - Single-Family Detached (LUC 210)	2029	7 units	Trip Rate	0.286	0.714	1.000	0.714	0.429	1.143
			Trip Ratio	25%	75%	100%	63%	37%	100%
			Gross Trips	2	5	7	5	3	8
Block E - Single-Family Attached (LUC 215)	2027	36 units	Trip Rate	0.111	0.361	0.472	0.333	0.250	0.583
			Trip Ratio	25%	75%	100%	59%	41%	100%
			Gross Trips	4	13	17	12	9	21
Block E - Multifamily Housing (Low-Rise) – (LUC 220)	2027	40 units	Trip Rate	0.200	0.675	0.875	0.600	0.350	0.950
			Trip Ratio	24%	76%	100%	63%	37%	100%
			Gross Trips	8	27	35	24	14	38
Block F - Multifamily Housing (Low-Rise) – (LUC 220)	2025	72 units	Trip Rate	0.153	0.472	0.625	0.458	0.264	0.722
			Trip Ratio	24%	76%	100%	63%	37%	100%
			Gross Trips	11	34	45	33	19	52
Block G - Multifamily Housing (Low-Rise) – (LUC 220)	2027	96 units	Trip Rate	0.135	0.417	0.552	0.406	0.240	0.646
			Trip Ratio	24%	76%	100%	63%	37%	100%
			Gross Trips	13	40	53	39	23	62
Block H -	2029	29 units	Trip Rate	0.207	0.621	0.828	0.690	0.379	1.069

Single-Family Detached (LUC 210)			Trip Ratio	25%	75%	100%	63%	37%	100%
			Gross Trips	6	18	24	20	11	31
Block I - Multifamily Housing (Low-Rise) – (LUC 220)	2027	18 units	Trip Rate	0.389	1.167	1.556	1.000	0.556	1.556
			Trip Ratio	24%	76%	100%	63%	37%	100%
			Gross Trips	7	21	28	18	10	28
Total New Trips (2025)				**26**	**87**	**113**	**77**	**47**	**124**
Total New Trips (2027)				**70**	**224**	**294**	**205**	**123**	**328**
Total New Trips (2029. Full Build-Out)				**82**	**260**	**342**	**242**	**146**	**388**

The proposed development is expected to generate a total of 342 two-way vehicle trips during the a.m. peak hour consisting of 82 inbound and 260 outbound trips. During the p.m. peak hour, it is expected to generate 388 new two-way vehicle trips consisting of 242 inbound and 146 outbound trips.

5.2 Site Traffic Distribution and Assignment

The site generated traffic for the subject site was distributed based on the existing travel patterns at the intersection of Dundas Street East and Haig Road from the updated 2023 turning movement counts.

The directional distribution was completed for passenger vehicles and is provided in **Table 3** and with the site generated traffic assignment to the study area road network for the weekday a.m. and p.m. peak hours provided in **Figures 12** to **14.**

Table 3 Site Traffic Distribution – Passenger Vehicles

Peak Period	Direction	North (Jane Street)	South (Jane Street)	South (Cranston Park Avenue)
AM	Inbound	10%	25%	5%
	Outbound	10%	30%	5%
PM	Inbound	10%	20%	5%
	Outbound	10%	20%	5%

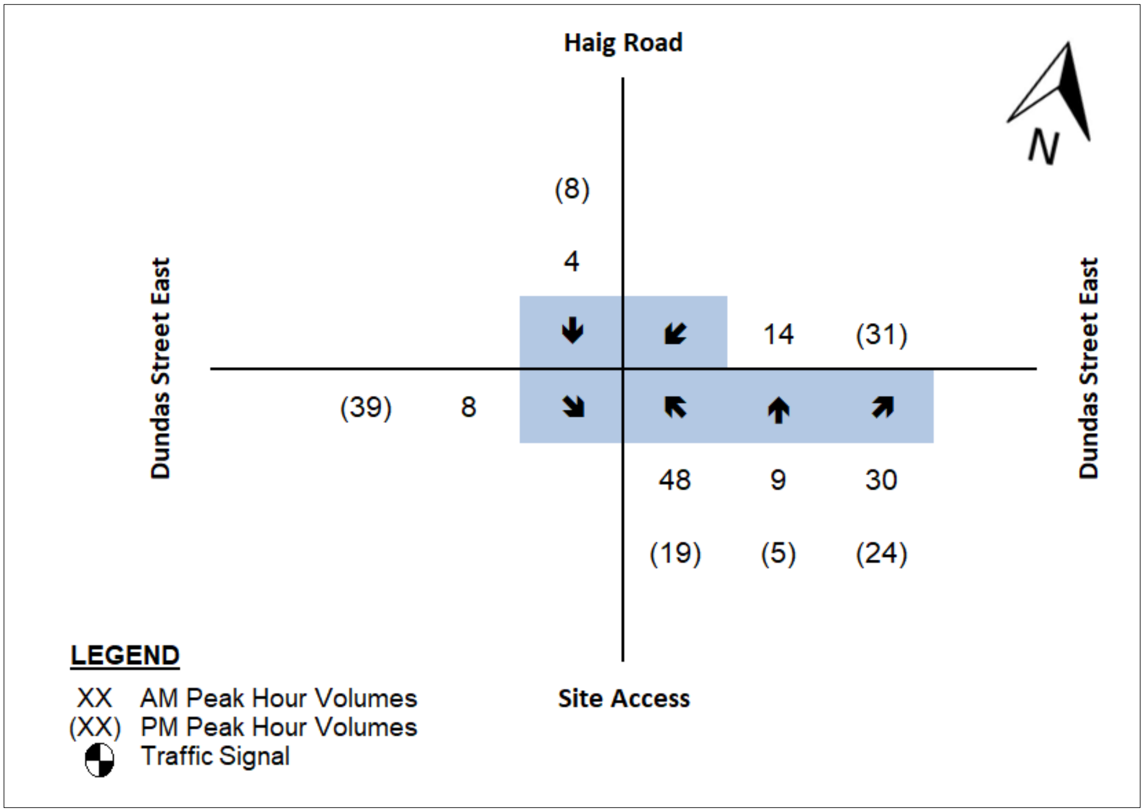

Figure 12 Total Site Trips (2025)

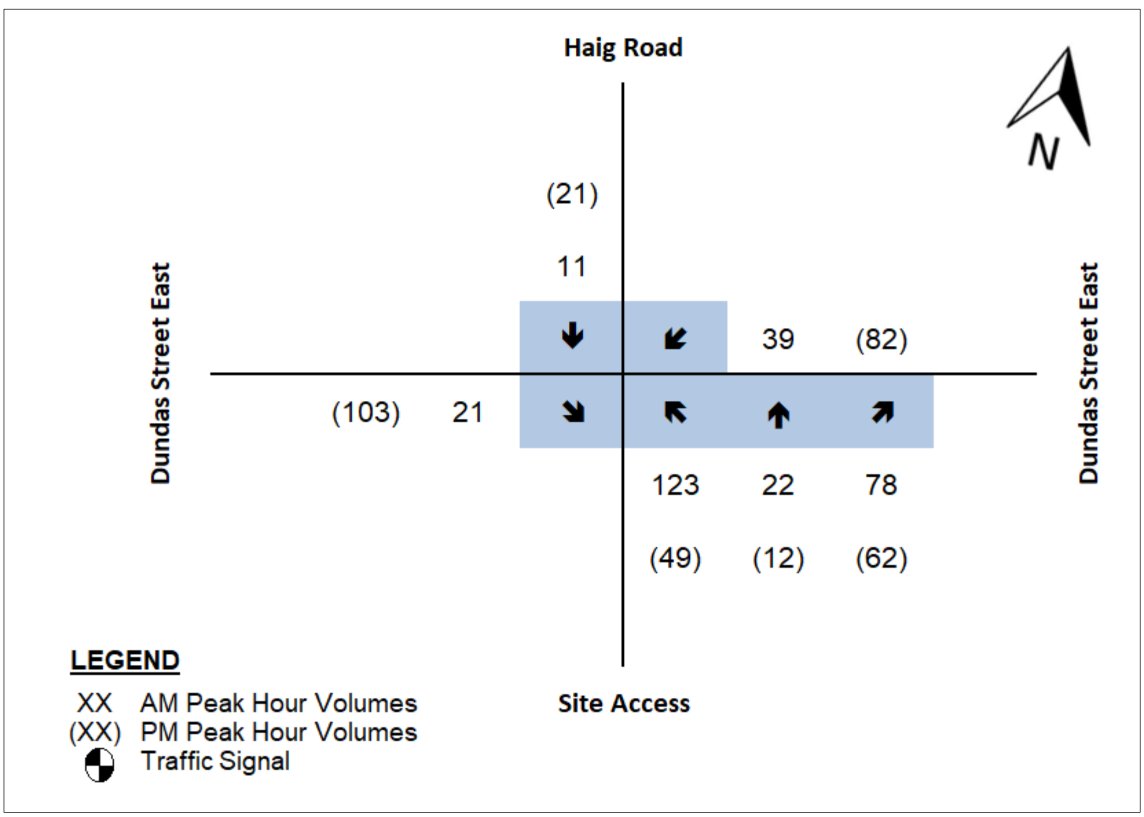

Figure 13 Total Site Trips (2027)

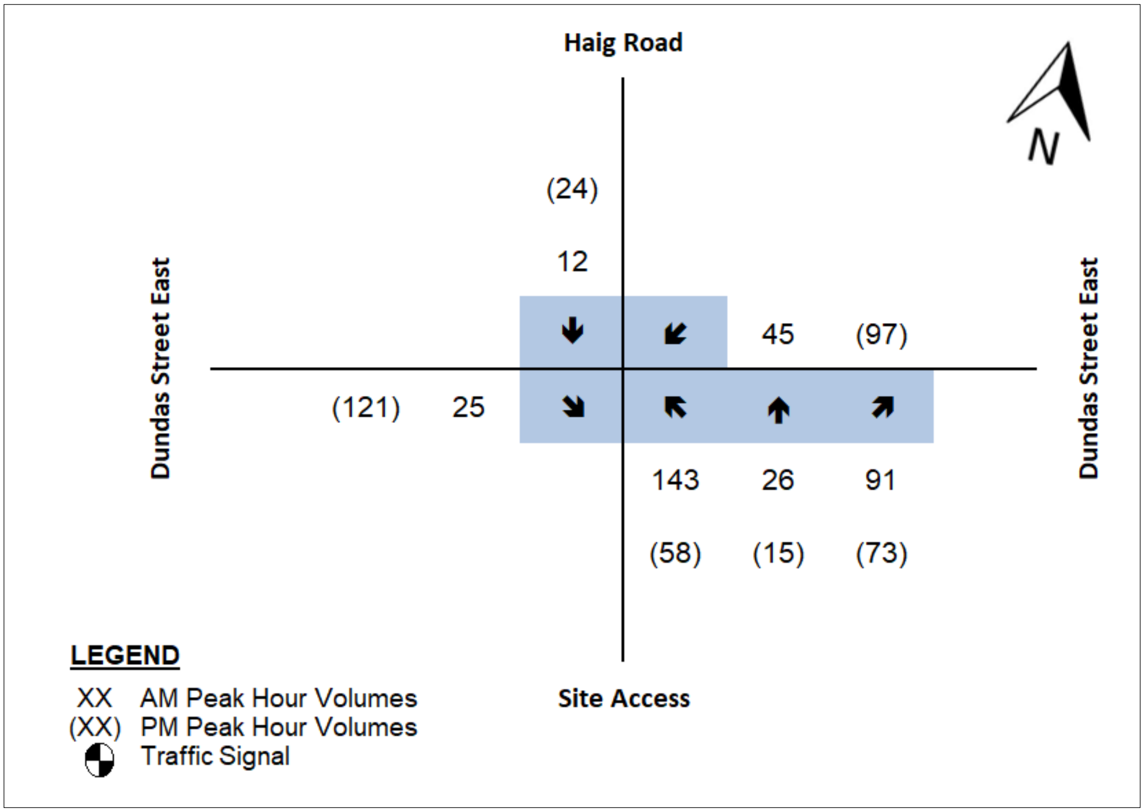

Figure 14 Total Site Trips (2029 – Full Build-Out)

6. Future Total Traffic

The future total traffic conditions in the weekday a.m. and p.m. peak hours for the 2025, 2027, 2029, 2034, and 2034 planning horizon was derived by combining the projected future background traffic with the corresponding estimated site generated traffic. The resulting traffic volumes are presented in the following figures.

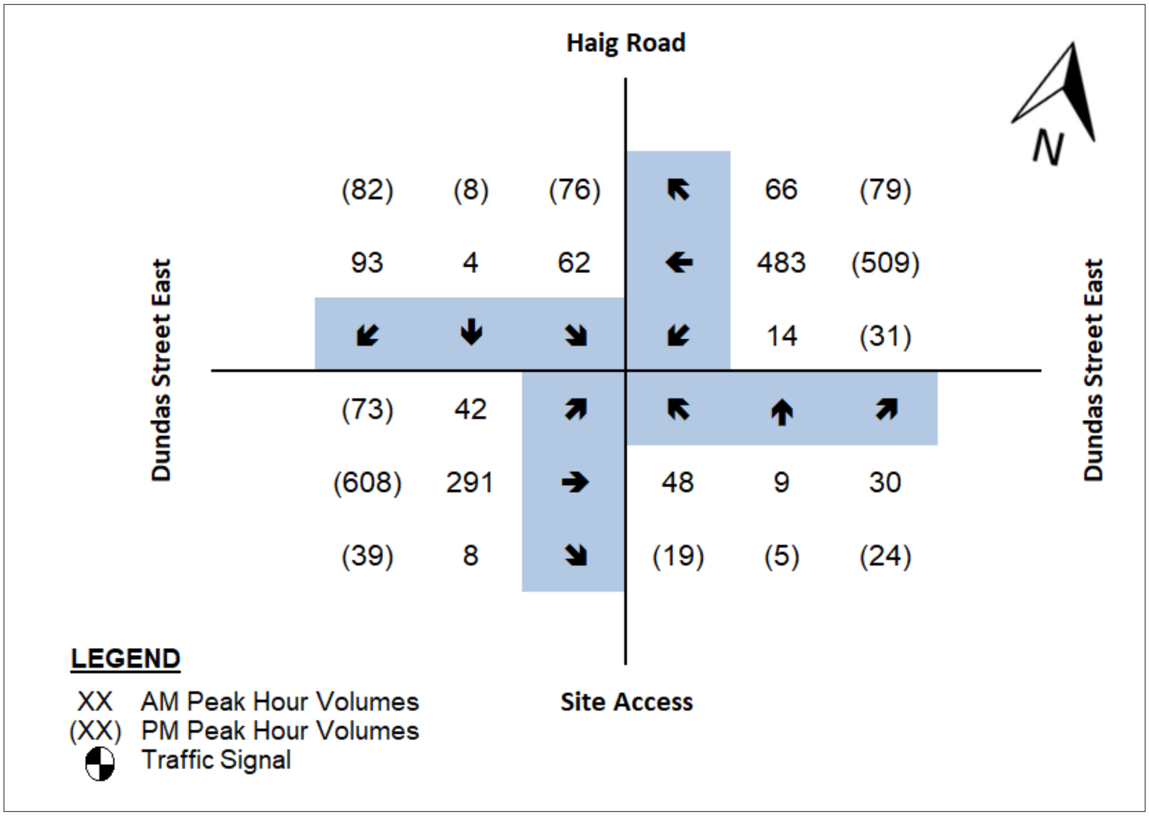

Figure 15 2025 Future Total Traffic Volumes

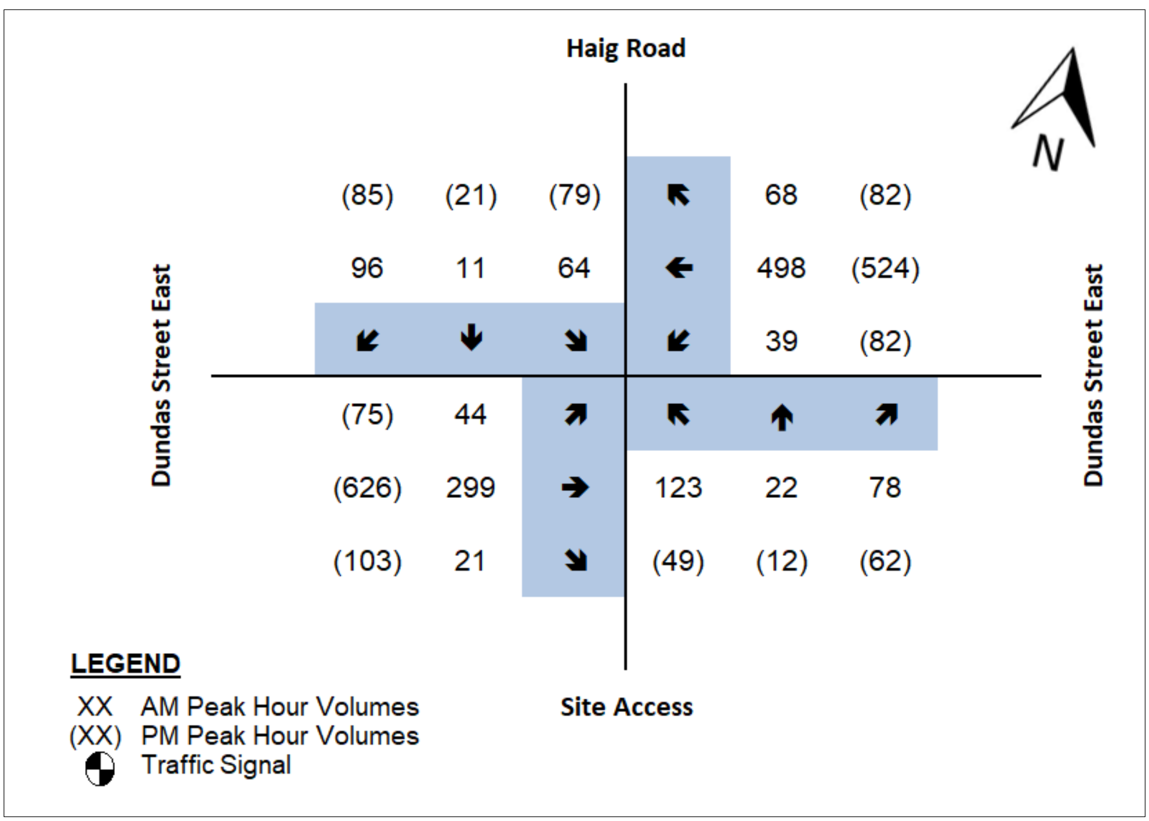

Figure 16 2027 Future Total Traffic Volumes

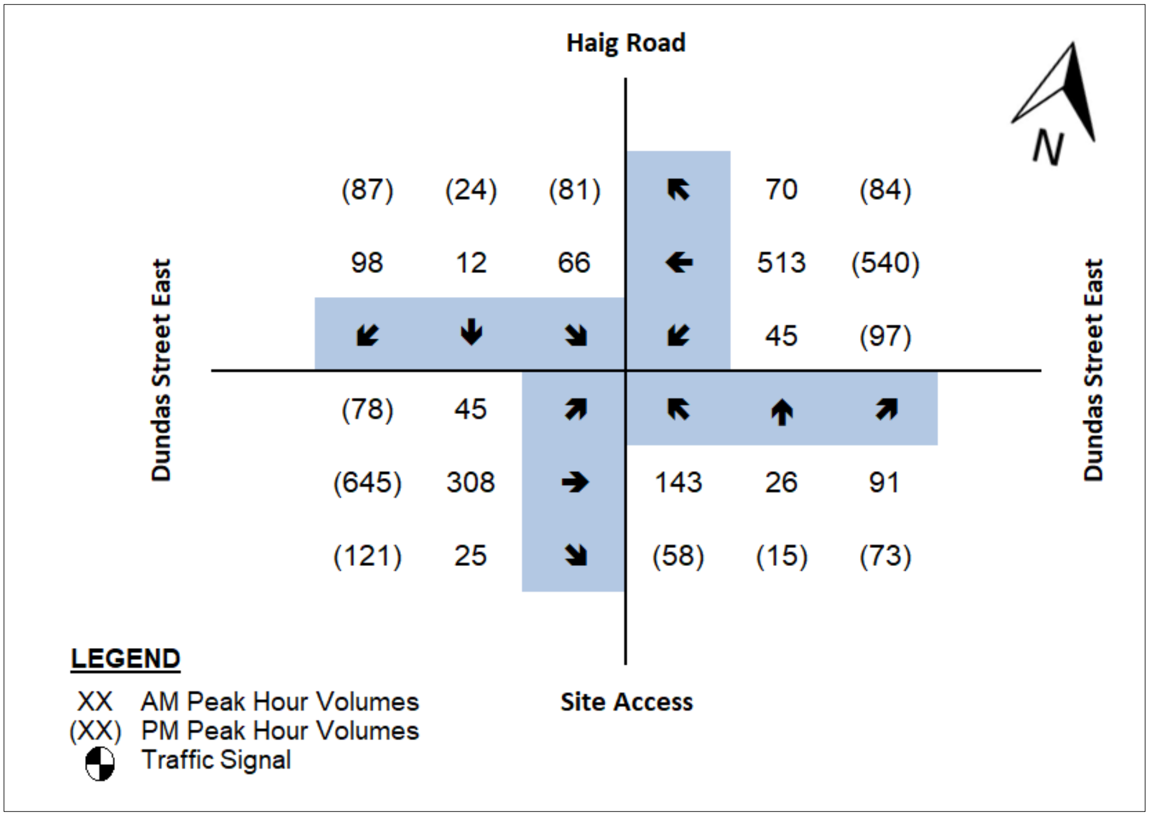

Figure 17 2029 Future Total Traffic Volumes

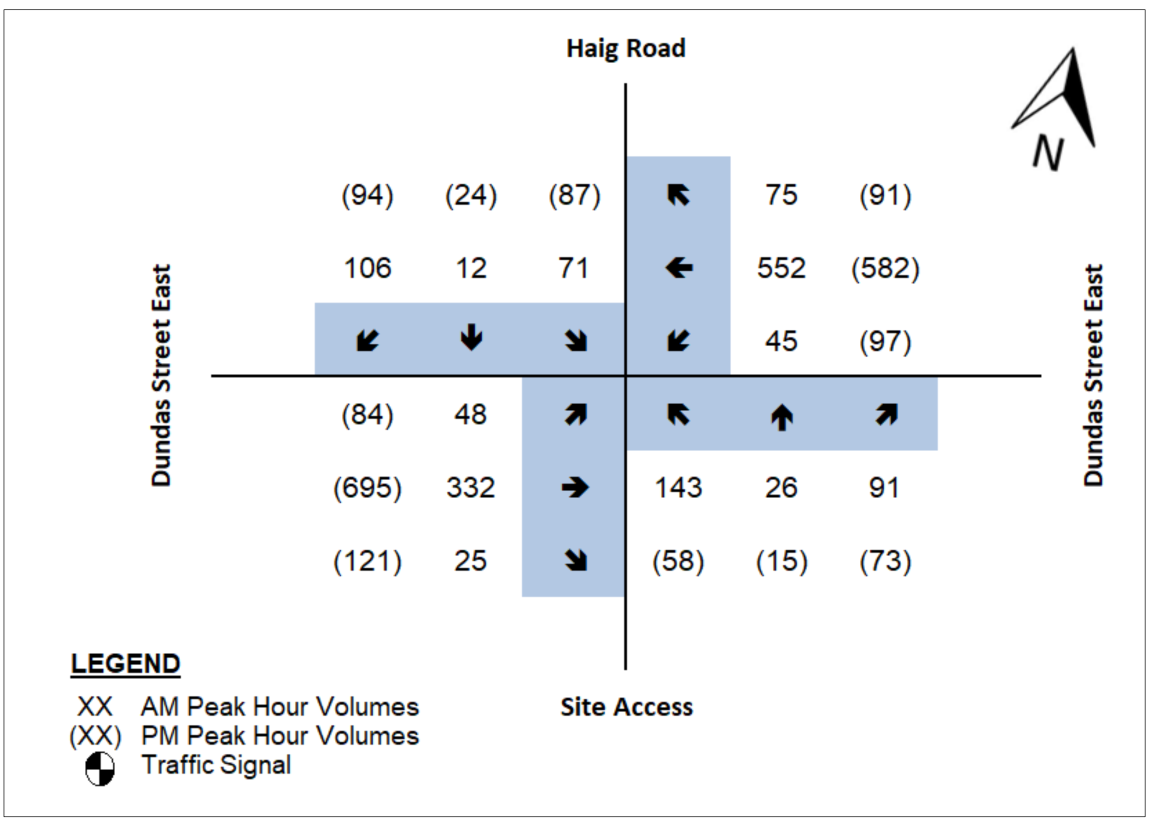

Figure 18 2034 Future Total Traffic Volumes

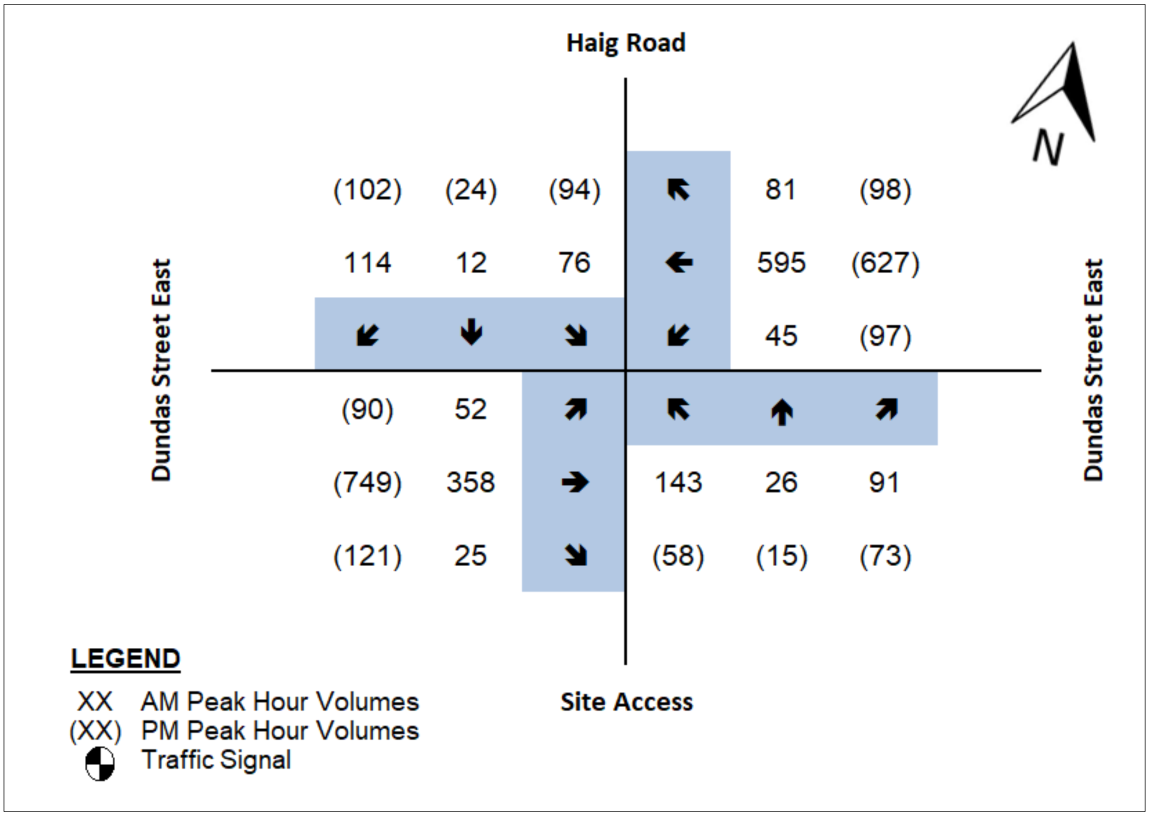

Figure 19 2039 Future Total Traffic Volumes

7. Capacity Analysis

The capacity analysis identifies how well the intersections and driveways are operating. The analysis contained within this report utilized the Highway Capacity Manual (HCM) 2000 procedure within the Synchro Version 11 Software package. The reported intersection volume-to-capacity ratios (v/c) are a measure of the saturation volume for each turning movement, while the levels-of-service (LOS) are a measure of the average delay for each turning movement. Queuing characteristics are reported as the predicted 95th percentile queue for each turning movement. Both pedestrian crossing volumes and heavy vehicle proportions are included in the analyses. The peak hour factors from the counts were used to analyze existing traffic conditions. Existing peak hour factors were also used for future traffic conditions.

The analysis includes identification and required modifications and improvements (if any) at intersections where the addition of background growth or background growth plus site-generated traffic volumes causes the following:

'Critical' intersections and movements for a signalized intersection include:

- V/C ratios for overall intersections operations, through movements, or shared through/turning movements increase to 0.85 or above;
- V/C ratios for exclusive movements increase to 0.95 or above; or
- 95th percentile queue length for individual movements that are projected to, or exceed, the storage length.

'Critical' intersections and movements for an unsignalized intersection include:

- Level of Services (LOS), based on average delay per vehicle, on individual movements exceeds LOS "E"; or
- Queue length for individual movements that exceeds the available queue storage.

The following tables summarize the HCM capacity results for the study intersections during the weekday a.m. and p.m. peak hours under existing (2023), future background (2025, 2027, 2029, 2034, 2039) and future total (2025, 2027, 2029, 2034, 2039) traffic conditions. The detailed calculation sheets are provided in **Appendix D**.

7.1 Dundas Street East and Haig Road/Proposed Site Access

Capacity analysis at this intersection during the weekday a.m. and p.m. peak hours for the existing, future background, and future total traffic conditions are summarized in the following table.

Table 4 Capacity analysis of Dundas Street East and Haig Road/Proposed Site Access

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95th % Que.	V/C (LOS) seconds	95th % Que
Existing 2023	EBL = 0.05 () 9 EBT = 0.12 () 0 EBTR = 0.06 () 0 WBL = 0 () 0 WBT = 0.2 () 0 WBTR = 0.14 () 0 NBL = 0.63 (A) 0 NBTR = 0.21 () 0 SBL = 0.25 (C) 23 SBTR = 0.14 () 11	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 0 m WBT = 0 m WBTR = 0 m NBL = 0 m NBTR = 0 m SBL = 10 m SBTR = 5 m	EBL = 0.07 () 9 EBT = 0.24 () 0 EBTR = 0.12 () 0 WBL = 0 () 0 WBT = 0.2 () 0 WBTR = 0.15 () 0 NBL = 0.63 (A) 0 NBTR = 0.21 () 0 SBL = 0.4 (C) 36 SBTR = 0.12 () 11	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 0 m WBT = 0 m WBTR = 0 m NBL = 0 m NBTR = 0 m SBL = 15 m SBTR = 5 m
Future Background 2025	EBL = 0.05 () 9 EBT = 0.12 () 0 EBTR = 0.06 () 0 WBL = 0 () 0 WBT = 0.21 () 0 WBTR = 0.14 () 0 NBL = 0.63 (A) 0 NBTR = 0.21 () 0 SBL = 0.26 (C) 24 SBTR = 0.14 () 11	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 0 m WBT = 0 m WBTR = 0 m NBL = 0 m NBTR = 0 m SBL = 10 m SBTR = 5 m	EBL = 0.08 () 9 EBT = 0.24 () 0 EBTR = 0.12 () 0 WBL = 0 () 0 WBT = 0.2 () 0 WBTR = 0.15 () 0 NBL = 0.63 (A) 0 NBTR = 0.21 () 0 SBL = 0.43 (C) 39 SBTR = 0.12 () 11	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 0 m WBT = 0 m WBTR = 0 m NBL = 0 m NBTR = 0 m SBL = 15 m SBTR = 5 m
Future Total 2025	EBL = 0.05 () 9 EBT = 0.12 () 0 EBTR = 0.07 () 0 WBL = 0.01 () 8 WBT = 0.21 () 0 WBTR = 0.14 () 0 NBL = 0.23 (C) 26 NBTR = 0.08 () 13 SBL = 0.32 (C) 31 SBTR = 0.16 () 12	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 5 m WBT = 0 m WBTR = 0 m NBL = 10 m NBTR = 5 m SBL = 10 m SBTR = 5 m	EBL = 0.08 () 9 EBT = 0.24 () 0 EBTR = 0.14 () 0 WBL = 0.03 () 9 WBT = 0.2 () 0 WBTR = 0.15 () 0 NBL = 0.17 (D) 45 NBTR = 0.08 () 16 SBL = 0.55 (D) 57 SBTR = 0.19 () 14	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 5 m WBT = 0 m WBTR = 0 m NBL = 5 m NBTR = 5 m SBL = 20 m SBTR = 5 m

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95th % Que.	V/C (LOS) seconds	95th % Que
Future Background 2027	EBL = 0.05 () 9 EBT = 0.13 () 0 EBTR = 0.06 () 0 WBL = 0 () 0 WBT = 0.21 () 0 WBTR = 0.15 () 0 NBL = 0.63 (A) 0 NBTR = 0.21 () 0 SBL = 0.28 (C) 26 SBTR = 0.15 () 11	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 0 m WBT = 0 m WBTR = 0 m NBL = 0 m NBTR = 0 m SBL = 10 m SBTR = 5 m	EBL = 0.08 () 9 EBT = 0.25 () 0 EBTR = 0.13 () 0 WBL = 0 () 0 WBT = 0.21 () 0 WBTR = 0.15 () 0 NBL = 0.63 (A) 0 NBTR = 0.21 () 0 SBL = 0.47 (D) 43 SBTR = 0.12 () 11	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 0 m WBT = 0 m WBTR = 0 m NBL = 0 m NBTR = 0 m SBL = 20 m SBTR = 5 m
Future Total 2027	EBL = 0.05 () 9 EBT = 0.13 () 0 EBTR = 0.08 () 0 WBL = 0.03 () 8 WBT = 0.21 () 0 WBTR = 0.15 () 0 NBL = 0.74 (E) 66 NBTR = 0.23 () 15 SBL = 0.49 (D) 53 SBTR = 0.21 () 13	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 5 m WBT = 0 m WBTR = 0 m NBL = 35 m NBTR = 10 m SBL = 20 m SBTR = 10 m	EBL = 0.08 () 9 EBT = 0.25 () 0 EBTR = 0.19 () 0 WBL = 0.1 () 10 WBT = 0.21 () 0 WBTR = 0.15 () 0 NBL = 0.77 (F) 157 NBTR = 0.24 () 20 SBL = 0.93 (F) 165 SBTR = 0.38 () 25	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 5 m WBT = 0 m WBTR = 0 m NBL = 30 m NBTR = 10 m SBL = 40 m SBTR = 15 m
Future Background 2029	EBL = 0.05 () 9 EBT = 0.13 () 0 EBTR = 0.07 () 0 WBL = 0 () 0 WBT = 0.22 () 0 WBTR = 0.15 () 0 NBL = 0.63 (A) 0 NBTR = 0.21 () 0 SBL = 0.31 (C) 28 SBTR = 0.16 () 11	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 0 m WBT = 0 m WBTR = 0 m NBL = 0 m NBTR = 0 m SBL = 10 m SBTR = 5 m	EBL = 0.09 () 9 EBT = 0.26 () 0 EBTR = 0.13 () 0 WBL = 0 () 0 WBT = 0.22 () 0 WBTR = 0.16 () 0 NBL = 0.63 (A) 0 NBTR = 0.21 () 0 SBL = 0.5 (D) 48 SBTR = 0.13 () 11	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 0 m WBT = 0 m WBTR = 0 m NBL = 0 m NBTR = 0 m SBL = 20 m SBTR = 5 m
Future Total 2029	EBL = 0.05 () 9 EBT = 0.13 () 0 EBTR = 0.08 () 0 WBL = 0.04 () 8 WBT = 0.22 () 0 WBTR = 0.15 () 0 NBL = 0.93 (F) 109 NBTR = 0.28 () 16 SBL = 0.59 (E) 71 SBTR = 0.23 () 14	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 5 m WBT = 0 m WBTR = 0 m NBL = 55 m NBTR = 10 m SBL = 25 m SBTR = 10 m	EBL = 0.09 () 9 EBT = 0.26 () 0 EBTR = 0.2 () 0 WBL = 0.12 () 10 WBT = 0.22 () 0 WBTR = 0.16 () 0 NBL = **1.15** (F) 304 NBTR = 0.33 () 24 SBL = **1.19** (F) 273 SBTR = 0.47 () 32	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 5 m WBT = 0 m WBTR = 0 m NBL = 40 m NBTR = 10 m SBL = 50 m SBTR = 20 m
Future Total 2029 – Signalized	Overall: 0.38 (A) 10 EBL = 0.22 (B) 10 EBTR = 0.31 (B) 10 WBL = 0.14 (A) 10 WBTR = 0.54 (B) 12 NBL = 0.26 (A) 8 NBTR = 0.09 (A) 7 SBL = 0.13 (A) 7 SBTR = 0.08 (A) 7	EBL = 10 m EBTR = 15 m WBL = 10 m WBTR = 30 m NBL = 20 m NBTR = 10 m SBL = 10 m SBTR = 10 m	Overall: 0.35 (B) 11 EBL = 0.34 (B) 11 EBTR = 0.6 (B) 12 WBL = 0.53 (B) 14 WBTR = 0.49 (B) 11 NBL = 0.1 (A) 7 NBTR = 0.06 (A) 7 SBL = 0.14 (A) 8 SBTR = 0.09 (A) 7	EBL = 15 m EBTR = 35 m WBL = 20 m WBTR = 30 m NBL = 10 m NBTR = 10 m SBL = 10 m SBTR = 10 m

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95^{th} % Que.	V/C (LOS) seconds	95^{th} % Que
Future Background 2034	EBL = 0.06 (A) 9 EBT = 0.14 (A) 0 EBTR = 0.07 (A) 0 WBL = 0 (A) 0 WBT = 0.24 (A) 0 WBTR = 0.17 (A) 0 NBL = 0.63 (A) 0 NBTR = 0.21 (A) 0 SBL = 0.37 (C) 33 SBTR = 0.17 (A) 12	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 0 m WBT = 0 m WBTR = 0 m NBL = 0 m NBTR = 0 m SBL = 15 m SBTR = 5 m	EBL = 0.1 (A) 10 EBT = 0.28 (A) 0 EBTR = 0.14 (A) 0 WBL = 0 (A) 0 WBT = 0.23 (A) 0 WBTR = 0.17 (A) 0 NBL = 0.63 (A) 0 NBTR = 0.21 (A) 0 SBL = 0.63 (E) 67 SBTR = 0.15 (A) 11	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 0 m WBT = 0 m WBTR = 0 m NBL = 0 m NBTR = 0 m SBL = 25 m SBTR = 5 m
Future Total 2034	EBL = 0.06 (A) 9 EBT = 0.14 (A) 0 EBTR = 0.09 (A) 0 WBL = 0.04 (A) 8 WBT = 0.24 (A) 0 WBTR = 0.17 (A) 0 NBL = **1.07** (F) 156 NBTR = 0.3 (A) 17 SBL = 0.73 (E) 101 SBTR = 0.26 (A) 15	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 5 m WBT = 0 m WBTR = 0 m NBL = 65 m NBTR = 10 m SBL = 30 m SBTR = 10 m	EBL = 0.1 (A) 10 EBT = 0.28 (A) 0 EBTR = 0.21 (A) 0 WBL = 0.12 (A) 10 WBT = 0.23 (A) 0 WBTR = 0.17 (A) 0 NBL = **1.46** (F) 460 NBTR = 0.35 (A) 27 SBL = **1.52** (F) 419 SBTR = 0.54 (A) 39	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 5 m WBT = 0 m WBTR = 0 m NBL = 45 m NBTR = 15 m SBL = 60 m SBTR = 25 m
Future Total 2034 – Signalized	<u>Overall: 0.4 (B) 10</u> EBL = 0.26 (B) 10 EBTR = 0.32 (B) 10 WBL = 0.14 (A) 10 WBTR = 0.58 (B) 12 NBL = 0.27 (A) 8 NBTR = 0.1 (A) 7 SBL = 0.14 (A) 7 SBTR = 0.09 (A) 7	EBL = 10 m EBTR = 20 m WBL = 10 m WBTR = 30 m NBL = 20 m NBTR = 10 m SBL = 10 m SBTR = 10 m	<u>Overall: 0.37 (B) 11</u> EBL = 0.38 (B) 11 EBTR = 0.62 (B) 12 WBL = 0.54 (B) 14 WBTR = 0.51 (B) 11 NBL = 0.11 (A) 8 NBTR = 0.06 (A) 8 SBL = 0.16 (A) 8 SBTR = 0.09 (A) 8	EBL = 15 m EBTR = 40 m WBL = 20 m WBTR = 30 m NBL = 10 m NBTR = 10 m SBL = 10 m SBTR = 10 m
Future Background 2039	EBL = 0.07 (A) 10 EBT = 0.15 (A) 0 EBTR = 0.08 (A) 0 WBL = 0 (A) 0 WBT = 0.25 (A) 0 WBTR = 0.18 (A) 0 NBL = 0.63 (A) 0 NBTR = 0.21 (A) 0 SBL = 0.47 (C) 42 SBTR = 0.2 (A) 12	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 0 m WBT = 0 m WBTR = 0 m NBL = 0 m NBTR = 0 m SBL = 20 m SBTR = 5 m	EBL = 0.11 (A) 10 EBT = 0.3 (A) 0 EBTR = 0.15 (A) 0 WBL = 0 (A) 0 WBT = 0.25 (A) 0 WBTR = 0.18 (A) 0 NBL = 0.63 (A) 0 NBTR = 0.21 (A) 0 SBL = 0.8 (F) 103 SBTR = 0.16 (A) 12	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 0 m WBT = 0 m WBTR = 0 m NBL = 0 m NBTR = 0 m SBL = 35 m SBTR = 5 m
Future Total 2039	EBL = 0.07 (A) 10 EBT = 0.15 (A) 0 EBTR = 0.09 (A) 0 WBL = 0.04 (A) 8 WBT = 0.25 (A) 0 WBTR = 0.18 (A) 0 NBL = **1.25** (F) 232 NBTR = 0.33 (A) 19 SBL = 0.93 (F) 161 SBTR = 0.29 (A) 16	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 5 m WBT = 0 m WBTR = 0 m NBL = 75 m NBTR = 10 m SBL = 40 m SBTR = 10 m	EBL = 0.11 (A) 10 EBT = 0.3 (A) 0 EBTR = 0.22 (A) 0 WBL = 0.13 (A) 10 WBT = 0.25 (A) 0 WBTR = 0.18 (A) 0 NBL = **1.97** (F) 738 NBTR = 0.4 (A) 32 SBL = **2.02** (F) 663 SBTR = 0.64 (A) 50	EBL = 5 m EBT = 0 m EBTR = 0 m WBL = 5 m WBT = 0 m WBTR = 0 m NBL = 55 m NBTR = 15 m SBL = 75 m SBTR = 30 m

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95^{th} % Que.	V/C (LOS) seconds	95^{th} % Que
Future Total 2039 – Signalized	Overall: 0.42 (B) 10 EBL = 0.3 (B) 11 EBTR = 0.34 (B) 10 WBL = 0.14 (A) 10 WBTR = 0.6 (B) 12 NBL = 0.28 (A) 9 NBTR = 0.1 (A) 7 SBL = 0.16 (A) 8 SBTR = 0.09 (A) 7	EBL = 10 m EBTR = 20 m WBL = 10 m WBTR = 35 m NBL = 20 m NBTR = 10 m SBL = 10 m SBTR = 10 m	Overall: 0.37 (A) 8 EBL = 0.19 (A) 4 EBTR = 0.34 (A) 4 WBL = 0.22 (A) 4 WBTR = 0.28 (A) 4 NBL = 0.33 (C) 31 NBTR = 0.1 (C) 29 SBL = 0.51 (C) 33 SBTR = 0.16 (C) 29	EBL = 10 m EBTR = 35 m WBL = 15 m WBTR = 30 m NBL = 20 m NBTR = 15 m SBL = 25 m SBTR = 20 m

Under existing traffic conditions, the intersection is operating at a satisfactory level with the largest delay occurring in the southbound left-turn movement with a 23 second delay during the a.m. peak hour and 36 second delay during the p.m. peak hour. The movement also operates a 95th percentile queue length of 10 metres and 15 metres during the a.m. and p.m. peak hour, respectively. Based on field observations, it was confirmed that vehicles in the eastbound direction turning left onto Haig Road would complete the turn in two stages due to the width of the median allowing them to wait for a gap without blocking through traffic. As a result, the Synchro was modeled with an exclusive left-turn lane with a 5-metre storage length to better represent the operation of the intersection.

With the addition of corridor growth under the 2025 future background condition, the intersection continues to operate at a satisfactory level with the southbound left-turn movement continuing to report the greatest delay with a 24 second delay during the a.m. peak hour and 39 second delay during the p.m. peak hour.

With the addition of site generated traffic and the site access as the southern leg of the intersection under the 2025 future total condition, the greatest delay continues to be reported in the southbound left-turn movement with a 31 and 57 second delay during the a.m. and p.m. peak hour, respectively.

With the addition of corridor growth under the 2027 future background condition, the intersection continues to operate at a satisfactory level with the southbound left-turn movement continuing to report the greatest delay with a 26 second delay during the a.m. peak hour and 43 second delay during the p.m. peak hour.

With the addition of site generated traffic and the site access as the southern leg of the intersection under the 2027 future total condition, the delays for the southbound left-turn movement are reported to be 53 and 165 seconds during the a.m. and p.m. peak hour, respectively. However, the northbound left-turn movement during the a.m. peak hour operates with the greatest delay and is reported at 66 seconds, while the p.m. peak hour reports a 157 second delay.

With the addition of corridor growth under the 2029 future background condition, the intersection continues to operate at a satisfactory level with the southbound left-turn movement continuing to report the greatest delay with a 28 second delay during the a.m. peak hour and 48 second delay during the p.m. peak hour.

With the addition of site generated traffic and the site access as the southern leg of the intersection under the 2029 future total condition, the intersection begins to report movements exceeding the theoretical capacity during the p.m. with v/c ratios over 1.00. During the p.m. peak hour, the northbound left-turn movement from the proposed site access reports a v/c ratio of 1.15 LOS F and a 304 second delay while the southbound left-turn movement reports a v/c ratio of 1.19 LOS F with a 273 second delay.

If the intersection is signalized with a 90 second delay, the future total 2029 condition is reporting the intersection operating with an overall v/c ratio of 0.38 LOS A during the a.m. peak hour and 0.35 LOS B during the p.m. peak hour. Additionally, the eastbound through/right-turn movement reports a 95th percentile queue length of 10 metres and 35 metres during the a.m. and p.m. peak hours, respectively. This projected queuing is acceptable and does not extend to the rail tracks.

With the addition of corridor growth under the 2034 future background condition, the intersection continues to operate at a satisfactory level with the southbound left-turn movement continuing to report the greatest delay with a 33 second delay during the a.m. peak hour and 67 second delay during the p.m. peak hour.

With the addition of site generated traffic, the intersection begins to report v/c ratios exceeding the theoretical capacity during the a.m. peak hour with the northbound left-turn movement reporting a v/c ratio of 1.07 LOS F and a 156 second delay, while the southbound left-turn movement reports a 101 second delay. During the p.m. peak hour, the intersection continues to report v/c ratios exceeding 1.00 during the p.m. peak hour (1.46 LOS F and 460 second delay for the northbound left-turn movement and 1.52 LOS F and 419 second delay for the southbound left-turn movement).

Like the 2029 future total scenario, the signalization of the intersection would improve and significantly reduce the v/c ratios and delays while not impacting the queueing in the eastbound movements towards the railway tracks.

With the addition of corridor growth under the 2039 future background condition, the intersection continues to operate at a satisfactory level with the southbound left-turn movement continuing to report the greatest delay with a 42 second delay during the a.m. peak hour while reporting a 103 second delay during the p.m. peak hour.

With the addition of site generated traffic, the v/c ratios continue to increase in the northbound and southbound left-turn movements during the p.m. peak hour while the northbound left-turn movement begins to exceed capacity during the a.m. peak hour.

As reported under the future total 2029 and 2034 scenarios, the signalization of the intersection provides the required capacity during the a.m. and p.m. peak hours.

It is recommended that the intersection be signalized after Phase 1 of construction to provide the necessary capacity for turning movements onto Dundas Street from the subject site.

8. Signal Warrant

A signal warrant was completed for the intersection of Dundas Street East and Haig Road/Site Access and is provided in **Appendix E**. Under the 2039 future total conditions, traffic signals are not warranted for the intersection. However, signalization is recommended to address capacity and delay issues. It is recommended that the City monitor the operation of the intersection and implement traffic signals once the delays and queuing along Haig Road/the site necessitate the change in traffic control.

9. Parking Review

GHD reviewed the City's current Zoning By-Law parking and loading requirements for the subject site.

9.1 City of Belleville Zoning By-law 10245

9.1.1 Vehicular Parking

Under the City of Belleville's Zoning By-law 10245, the minimum parking requirement are found in Section 14, The minimum By-law requirement for the subject site is as follows:

- a detached one family dwelling, a duplex or semi-detached dwelling, or horizontal multiple attached dwelling where each unit fronts on a public street and has its own garage and driveway and where not in the form of group housing

    - 1 parking space for each dwelling unit
- All other dwellings not listed
    - 1.25 parking spaces for each dwelling unit

The subject site consists of the following unit types:

- 185 mid-rise dwelling units
- 72 bungalow townhouse dwelling units
- 58 2-storey townhouse dwelling units
- 72 back-to-back dwelling units
- 176 stacked townhouse dwelling units
- 36 detached dwelling units

By definition, Blocks C, D, and I would fall under the first dwelling types, requiring 1 parking space per unit. All remaining Blocks would require 1.25 parking spaces per unit. The minimum By-law requirement for the subject site is as follows:

- a detached one family dwelling, a duplex or semi-detached dwelling, or horizontal multiple attached dwelling where each unit fronts on a public street and has its own garage and driveway and where not in the form of group housing
    - 1 parking space for each dwelling unit x 61 dwelling units = 61 parking spaces
- All other dwellings not listed
    - 1.25 parking spaces for each dwelling unit x 538 dwelling units = 673 parking spaces

In total, 734 vehicle parking spaces are required under the City's By-law 10245.

9.2 Consolidated Zoning By-law Draft

The City of Belleville is currently undergoing a Zoning By-law Consolidation to update and Consolidate the City's three existing By-laws. GHD also reviewed the City's draft consolidated Zoning By-Law parking and loading requirements for the subject site.

9.2.1 Vehicular Parking

Under the City's draft Consolidated Zoning By-law, the minimum parking requirement are found in Section 15.2, Table 15-2A. The minimum By-law requirement for the subject site is as follows:

- One-unit dwelling
    - 1.0 parking spaces per dwelling unit
- Townhouse dwelling
    - 1.0 parking spaces per dwelling unit, plus
    - 1.0 parking spaces per for every 5 townhouses
- Multi-unit dwelling (greater than 4 units)
    - 0.75 dwelling units, plus
    - 1.0 parking space per 5 units for visitors

The minimum parking required for the subject site is as follows:

- One-unit dwelling
    - 1.0 parking spaces per dwelling unit x 36 units = 36 parking spaces
- Townhouse dwelling
    - 1.0 parking spaces per dwelling unit, x 378 units = 378 spaces, plus
    - 1.0 parking spaces per for every 5 townhouses x 378 units = 76 spaces
- Multi-unit dwelling (greater than 4 units)
    - 0.75 dwelling units, x 185 units = 139 spaces, plus
    - 1.0 parking space per 5 units x 185 spaces = 37 spaces, for visitors

In total, 666 vehicle parking spaces are required under the City's Draft By-law, consisting of 553 resident spaces and 113 visitor spaces.

9.2.2 Bicycle Parking

Under the City's draft Consolidated Zoning By-law, the minimum bicycle parking requirements are found in Section 15.7. The minimum By-law requirement for the subject site is as follows:

- Multi-unit dwelling
    - 0.5 spaces per dwelling unit

The minimum bicycle parking required for the subject site is as follows:

- Multi-unit dwelling
    - 0.5 spaces per dwelling unit x 199 dwelling units = 100 bicycle parking spaces

In total, 100 bicycle parking spaces are required under the City's Draft By-law.

9.2.3 Loading Space

Under the City's draft Consolidated Zoning By-law, the minimum loading space requirements are found in Section 15.5. The minimum requirement for multi-unit buildings is provided in Section 15.5.(2), which require at least one off-street loading space per mixed used or multi-unit building exceed four storeys in height. With two proposed 7-storey mid-rise buildings proposed in Block A, the subject site is required to provide 2 loading spaces (1 per building).

9.3 Proposed Site Parking

Parking is provided for the subject site as follows:

- Block A: 211 spaces (1.14 spaces per unit)
- Block B: 96 spaces (1.2 spaces per unit)
- Block C: 72 spaces (2 spaces per unit)
- Block D: 14 spaces (2 spaces per unit)
- Block E: 172 spaces (2 spaces per unit, plus 22 visitor spaces)
- Block F: 86 spaces (1.19 spaces per unit)
- Block G: 125 spaces (1.30 spaces per unit)
- Block H: 58 spaces (2 spaces per unit)
- Block I: 36 spaces (2 spaces per unit)

In total, the subject site proposes to provide 892 parking spaces which exceeds the minimum requirements based on Bylaw 10245 and the City's draft consolidated Zoning By-Law.

The following table summarizes the minimum By-law requirements and the proposed parking supply for the subject site.

Table 5 Parking Requirements and Provisions

Block	Provision	By-law Requirement	Draft By-law Requirement
Block A	211 spaces (1.14 spaces per unit)	1.25 spaces per unit	0.95 spaces per unit (0.75 spaces per unit – residents, 0.2 spaces per unit – visitors)
Block B	96 spaces (1.2 spaces per unit)	1.25 spaces per unit	1.2 spaces per unit (1.0 spaces per unit – residents, 0.2 spaces per unit – visitors) 96 spaces
Block C	72 spaces (2 spaces per unit)	1.00 spaces per unit	1.2 spaces per unit (1.0 spaces per unit – residents, 0.2 spaces per unit – visitors)
Block D	14 spaces (2 spaces per unit)	1.00 spaces per unit	1.0 spaces per unit
Block E	172 spaces (2 spaces per unit, plus 22 spaces)	1.25 spaces per unit	1.2 spaces per unit (1.0 spaces per unit – residents, 0.2 spaces per unit – visitors)
Block F	86 spaces (1.19 spaces per unit)	1.25 spaces per unit	1.2 spaces per unit (1.0 spaces per unit – residents, 0.2 spaces per unit – visitors) 87 spaces
Block G	125 spaces (1.30 spaces per unit)	1.25 spaces per unit	1.2 spaces per unit (1.0 spaces per unit – residents, 0.2 spaces per unit – visitors)
Block H	58 spaces (2 spaces per unit)	1.25 spaces per unit	1.0 spaces per unit
Block I	36 spaces (2 spaces per unit)	1.00 spaces per unit	1.2 spaces per unit (1.0 spaces per unit – residents, 0.2 spaces per unit – visitors)

The proposed parking supply meets or exceeds the City's Draft Zoning Bylaw requirement for vehicle parking with the exception of Block F which is short one parking space. However, the overall parking supply for all blocks exceeds the total parking supply required and therefore, the shortfall can be accommodated by sharing visitor parking between all blocks.

9.4 Vehicle Swept Path Analysis

GHD undertook a vehicle swept path analysis to assess the site plan circulation for an emergency and waste collection vehicles within the site. The results of the analysis are provided in **Appendix F** and illustrate that the site can sufficiently accommodate the aforementioned design vehicles with no issues.

A fire truck was analyzed entering the site from the driveway and circulating the site in drawing AT-101. Drawing AT-102 illustrates the path of the fire truck exiting the site. No conflicts were found with the manoeuvres.

The front-load waste collection vehicle was analyzed entering the site and circulating the site for the mid-rise buildings in drawing AT-103. Drawing AT-104 illustrates the path of the waste truck exiting the site. No conflicts were found with the manoeuvres.

The rear-load waste collection vehicle was analyzed entering the site and circulating the site for the remaining dwelling units in drawing AT-105 and AT 106. No conflicts were found with the manoeuvres.

10. Conclusion

The proposed site plan consists of a total of 599 dwelling units proposed within 9 blocks. The dwelling type and unit count per block are as follows:

- Block A: 185 dwelling units within 2 mid-rise buildings
- Block B: 80 stacked townhouse dwelling units
- Block C: 36 bungalow townhouse dwelling units
- Block D: 7 detached townhouse dwelling units
- Block E: 36 bungalow townhouse dwelling units and 40 2-storey townhouse dwelling units
- Block F: 72 back-to-back dwelling units
- Block G: 96 stacked townhouse dwelling units
- Block H: 29 detached dwelling units
- Block I: 18 2-storey townhouse dwelling units

Access to the subject site is proposed via a full-moves access on the south leg of the existing intersection of Dundas Street East and Haig Road.

Based on ITE Trip Generation rates using Land Use Codes 210, 215, 220, and 221, the full build-out of the subject site is expected to generate 342 two-way vehicle trips during the a.m. peak hour consisting of 82 inbound and 260 outbound trips. During the p.m. peak hour, it is expected to generate 388 new two-way vehicle trips consisting of 242 inbound and 146 outbound trips.

Under existing traffic conditions, the intersection of Dundas Street East and Haig Road is operating at acceptable v/c ratios and levels of service during the a.m. peak and p.m. peak hours.

Under future background 2025, 2027, 2029 and 2034 traffic conditions, including corridor growth, the intersection of Dundas Street East and Haig Road is reported to continue to operate at satisfactory levels of capacity and delays will all movements operating at LOS of E or better.

Under the future total 2025 condition, with the addition of site generated traffic from Blocks A and F, the intersection of Dundas Street East and Haig Road is reported to continue to operate at a satisfactory levels of capacity, delays and queuing. The highest v/c ratio is reported during the p.m. peak hour for the southbound left turn which is reported to operate at a v/c ratio of 0.55 LOS D.

Under the future total 2027 condition, with the addition of site generated traffic which also includes Block B, E, G and I, the intersection of Dundas Street East and Haig Road is reported to continue to operate at mostly satisfactory levels, with the exception of the northbound and southbound left-turn movements during the p.m. peak hour which are reported to operate at a v/c ratio of 0.80 LOS F and 0.95 LOS F respectively.

Under the future total 2029 condition, with the addition of site generated traffic included for Blocks C, D and H, the intersection of Dundas Street East and Haig Road is reported to continue to operate at mostly satisfactory levels, however the northbound and southbound left-turn movements during the p.m. peak hour continue to report increased delays with the northbound left operating at 1.14 LOS F and the southbound left at 1.16 LOS F.

Despite signal warrants not being satisfied at the intersection of Dundas Street East and Haig Road, it is recommended that the intersection be signalized to provide the required capacity for both the north and south legs exiting onto Dunda Street. The intersection was analyzed using a 90-second cycle length which resulted in reduced delays at the intersection without any impacts of queuing on Dundas Street or the adjacent railway crossing.

Under the future total 2029, 2034 and 2039 traffic scenarios, the intersection of Dundas Street East and Haig Road is reported to operate at satisfactory v/c ratios, delays and queuing as a signalized intersection.

The reported queuing along Dundas Street from the introduction of the traffic signal control is not expected to negatively impact the adjacent railway crossing to the west of the intersection as the reported 95th percentile queue lengths are not reported to extend to the at-grade crossing.

Application of the City of Belleville By-Law parking rates to the subject site results in a requirement of a minimum of 734 vehicle parking spaces for the subject site.

The City of Belleville is currently undergoing a Zoning By-law Consolidation to update and consolidate the three existing By-laws currently governing the City. Application of the City's Draft By-law rates to the subject site results in a requirement of a minimum of 666 vehicle parking spaces (553 resident and 113 visitor spaces), 100 bicycle parking spaces, and two loading spaces for the mid-rise buildings.

Based on the consolidation of all development blocks, the subject site proposes to provide 892 parking spaces which exceeds the minimum requirements based on By-law 10245 and the City's draft consolidated Zoning By-Law. However, on an individual block basis, Block F is short one parking space. However, the since overall parking supply for all blocks exceeds the total parking supply required, the shortfall can be accommodated by sharing visitor parking between all blocks.

GHD assessed the site circulation for an emergency vehicle and waste collection vehicle and confirmed no issues with the site circulation.

The traffic study confirms that the proposed residential development is expected to have a minimal impact on the future capacity of the adjacent road network with the recommended signalization of the intersection of Dundas Street East and Haig Road.

Appendices

Appendix A

Terms of Reference

Raf Andrenacci

From: Will Maria
Sent: Tuesday, October 10, 2023 8:42 AM
To: Raf Andrenacci
Subject: FW: FW: Terms of Reference for Traffic Study - 621 Dundas Street East

DISABLEFILINGSTATUS: 0

Will

William C. Maria, P.Eng.
Transportation Planning Lead

GHD Ltd.
T: 905 814 4397 | C: 647 229 8541 | F: 905 890 8499 | E: will.maria@ghd.com
100 Milverton Drive Suite 404, Mississauga, ON L5R 4H1 | **www.ghd.com**

WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

From: Kim Harrison-McMillan <gracisondev@gmail.com>
Sent: Monday, September 25, 2023 9:09 AM
To: Will Maria <william.maria@ghd.com>
Cc: Roland Roovers <Roland.Roovers@ghd.com>
Subject: Fwd: FW: Terms of Reference for Traffic Study - 621 Dundas Street East

Hi Will,

See email below and advise if you have any concerns with the items listed below. Is a 10 year build out typical?

Kim

---------- Forwarded message ---------
From: **Gliddon, Jarrod** <JGliddon@belleville.ca>
Date: Mon, Sep 25, 2023 at 9:04 AM
Subject: RE: FW: Terms of Reference for Traffic Study - 621 Dundas Street East
To: Kim Harrison-McMillan <gracisondev@gmail.com>
Cc: Jianopoulos, Nathan <njianopoulos@belleville.ca>

Hi Kim,

Please add the following to the scope of work for the Traffic Impact Study:

- Due to the proximity of the CP Rail crossings on Haig Rd and on Dundas St, the new intersection shall be reviewed, and rationale shall be included to support the location of the new intersection and what impacts it will have on queue lengths when a train is crossing at peak hours.
- Include a 10-year projection post-build out, with growth assumptions supported by historic traffic data.

Any questions, let me know.

Thanks,

Jarrod

From: Gliddon, Jarrod
Sent: Friday, September 15, 2023 4:29 PM
To: Reid, Joseph <jreid@belleville.ca>; Kim Harrison-McMillan <gracisondev@gmail.com>
Subject: RE: FW: Terms of Reference for Traffic Study - 621 Dundas Street East

Hi Kim/Joe,

Approvals department is reviewing the TOR and will follow up next week with our comments.

Have a great weekend.

Thanks,

Jarrod

From: Reid, Joseph <jreid@belleville.ca>
Sent: Friday, September 15, 2023 2:10 PM
To: Kim Harrison-McMillan <gracisondev@gmail.com>
Cc: Gliddon, Jarrod <JGliddon@belleville.ca>; Chan, Andrew <achan@belleville.ca>
Subject: RE: FW: Terms of Reference for Traffic Study - 621 Dundas Street East

Question, why am I being asked to approve the TOR?

From: Kim Harrison-McMillan <gracisondev@gmail.com>
Sent: Thursday, September 14, 2023 10:31 AM
To: Reid, Joseph <jreid@belleville.ca>
Cc: Gliddon, Jarrod <JGliddon@belleville.ca>; Chan, Andrew <achan@belleville.ca>
Subject: Fwd: FW: Terms of Reference for Traffic Study - 621 Dundas Street East

Hi Joseph,

Please see the email below.

We are eager to commence the traffic counts and receive approval of the TOR as we are targeting a submission to the City next month.

If you can please advise on your timing, it would be appreciated.

Thank you,

Kim

---------- Forwarded message ---------
From: **Will Maria** <William.Maria@ghd.com>
Date: Wed, Sep 13, 2023 at 1:53 PM
Subject: FW: Terms of Reference for Traffic Study - 621 Dundas Street East
To: Kim Harrison-McMillan <gracisondev@gmail.com>

As requested, attached is our Terms of Reference for the project.

It was originally sent last Wednesday however, it did bounce back to us the first time and was resent again.

Will

William C. Maria, P.Eng.

Transportation Planning Lead

GHD Ltd.

T: 905 814 4397 | C: 647 229 8541 | F: 905 890 8499 | E: will.maria@ghd.com

100 Milverton Drive Suite 404, Mississauga, ON L5R 4H1 | **www.ghd.com**

From: Will Maria
Sent: Wednesday, September 6, 2023 4:04 PM
To: jreid@belleville.ca
Cc: Raf Andrenacci <Raf.Andrenacci@ghd.com>
Subject: Terms of Reference for Traffic Study - 621 Dundas Street East

Hi Joseph, GHD has been retained to prepare a traffic study for a proposed residential development located 621 Dundas Street East.

Please review the attached terms of reference and let us know if you require any additional scope.

Thanks,

Will

William C. Maria, P.Eng.

Transportation Planning Lead

GHD Ltd.

T: 905 814 4397 | C: 647 229 8541 | F: 905 890 8499 | E: will.maria@ghd.com

100 Milverton Drive Suite 404, Mississauga, ON L5R 4H1 | **www.ghd.com**

--

Kim Harrison-McMillan, BES, MCIP, RPP

President

Gracison Developments Incorporated

T: 647-808-3955

E: gracisondev@gmail.com

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Kim Harrison-McMillan, BES, MCIP, RPP
President

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140 Allstate Parkway, Unit 210
Markham, Ontario L3R 5Y8
Canada
www.ghd.com

Our ref: TPP-23-049

August 21, 2023

Joseph Reid
General Manager, Transportation & Operational Services
169 Front Street
Belleville, Ontario K8N 2Y8
613-967-3200 x3313
joseph.reid@belleville.ca

Subject: **Terms of Reference for Traffic Impact Study for Proposed Residential Development at 621 Dundas Street East, Belleville**

Dear Mr. Reid,

GHD Limited is pleased to provide the following Terms of Reference to prepare a Traffic Impact Study report / Services for the proposed residential development. The subject development is located at 621 Dundas Street, generally south of Dundas Street in the vicinity of Haig Road in the City of Belleville.

The assignment is to estimate the development site traffic and determine the impact of site and future total traffic on the study intersections. The current site plan consists of approximately 600 residential units consisting of apartments, townhouses, and single unit dwellings. Access to the development is provided to Dundas Street via the extension of Haig Road. The preliminary site plan is provided in Appendix A.

1. Scope of Work / Terms of Reference

Traffic Impact Study

The study procedures and analytical methods used in the TIS will comply with the accepted guidelines for preparation of traffic impact studies from the City of Belleville and will involve input from City staff. As is common practice, we will further define our approach and review with staff any technical assumptions and analytical parameters before commencement.

Based on the latest information provided, our preliminary investigation, and our interpretation of what is required for the study, our proposed scope of work is as follows:

1. Consult with City staff to confirm technical assumptions to including study intersections be used in the analysis (Terms of Reference) and to obtain needful background data.

2. Confirm with the Project Team all pertinent site statistics to be used in the analysis including number and type of residential units. The site plan identifies apartments, townhouses and single detached units.

3. Confirm with staff the study intersections to be included in the study. Our proposed study intersections for analysis include:

   Existing intersection:

   - Dundas Street East and Haig Road (STOP controlled).

   Future intersection:

   - Dundas Street East and Haig Road and the proposed development access.

4. Recent (within 1-2 years old) traffic counts of the Dundas Street East and Haig Road intersection will be requested from the City. If the age of data is not acceptable to the City (ie. too old) then GHD will collect new traffic counts at the existing study intersection during the weekday am and pm peak hours (anticipated to be between 7 to 9 am and 4 to 6 pm. We will confirm the hours and timing of the traffic data collection with staff prior to commencing the work.

5. Prepare a baseline (2023) model of traffic operations of the study intersections using Synchro software for the critical peak hours.

6. Future background traffic volumes will be assessed for future planning horizons consistent with Belleville's requirements.

   For example, Project Team deems first occupancies in 2025, then the planning horizons are 2025 and 2030. However, due to the large number of units (approximately 600 units), the Project Team realistically will have a phased approach. Again, example, 200 units by 2025, next 200 units by 2027 and the final 200 units by 2029. If this is the case, that the development will be constructed in phases, then we will allow for 3 phases.

   - Year of Phase 1 occupancy ("opening day")
   - Year of Phase 2 occupancy
   - Year of Phase 3 occupancy, and
   - 5-years beyond Phase 3 occupancy.

7. Trip generation estimates for the proposed development will be completed using rates published by the ITE Trip Generation 11th Edition for each of the 3 phases.

8. The directional distribution of traffic approaching and departing the site will be determined based on existing local travel patterns and first principles, and site traffic will be assigned in accordance with our interpretation of these various patterns.

9. Conduct intersection capacity analysis using Synchro software for existing and future (background and total) traffic conditions during the critical peak hours. The site impact analysis will be performed at the study intersections and will examine operating characteristics including standing queue lengths.

10. Identify the transportation system requirements and other measures required to ensure the acceptable operation of the study intersections, including auxiliary turning lanes and other transportation infrastructure improvements. We will consider if traffic signals are required and

when. The objectives are to ensure that sufficient intersection capacity is available to accommodate the additional site generated traffic on the adjacent road network so that the adjacent lands/activities are not adversely affected.

2. Acceptance/Approval

Should you find these Terms of Reference acceptable in its current form or with comments, please communicate as such in an email to the undersigned.

If you wish to discuss any aspect of the Terms of Reference, please feel free to contact Mr. Roland Roovers. We appreciate the opportunity to present this scope of work. We trust that the above noted information is suitable for your purposes at this time and look forward to your comments / acceptance of the Terms of Reference on this project.

Sincerely,

GHD

Roland Roovers, P.Eng.
Senior Manager, Transportation Planning

+1 905 752-4348
roland.roovers@ghd.com

Attach. Appendix A

RR/NC

Appendix B

Site Plan

1 PROPOSED SITE PLAN

SCALE: 1:1800

PROPOSED LAND USE LEGEND

- CONDO APARTMENTS - 185 UNITS
- CONDO STACKED TOWNHOUSES (2 ½ STOREY) - 176 UNITS
- FREEHOLD TOWNHOUSES - 54 UNITS
- FREEHOLD DETACHED BUNGALOWS - 36 UNITS
- CONDO TOWNHOUSES - 76 UNITS
- CONDO BACK TO BACK STACKED TOWNHOUSES - 72 UNITS
- NON-DEVELOPABLE AREA OUTSIDE OF TABLE 9 LIMIT

PROPERTY AREA	
LANDS OUT OF TABLE 9 LIMIT (TOTAL) OUTSIDE MNAL VARIABLE BUFFER = 15.44 Ha INSIDE MNAL VARIABLE BUFFER = 0.01 Ha AREA OF EXISTING EASEMENT INCLUDED = 0.85 Ha	16.30 Ha
LANDS WITHIN TABLE '9' LIMIT (INCLUDING WETLAND AND BAY) AREA OF EXISTING EASEMENT INCLUDED = 0.05 Ha	21.05 Ha
TOTAL PROPERTY AREA	37.35 Ha

OPEN SPACE AREA	
OPEN SPACE WITHIN DEVELOPABLE AREA AREA OF EXISTING EASEMENT INCLUDED = 0.07 Ha	0.64Ha
OPEN SPACE OUT OF DEVELOPABLE AREA AREA OF EXISTING EASEMENT INCLUDED = 0.08 Ha	3.34 Ha
TOTAL OPEN SPACE AREA	3.98 Ha

DEVELOPABLE AREA (AS PER TABLE 9 LIMIT & QCA DEVELOPMENT LIMIT)		
MUNICIPAL ROAD ALLOWANCE (EXCLUDING TRAIL) AREA OF EXISTING EASEMENT WITHIN ROAD ALLOWANCE = 0.01 Ha AREA OF TRAIL ON ROAD ALLOWANCE = 0.10 Ha (INCLUDED IN PARKLAND)		2.20 Ha
OPEN SPACE WITHIN DEVELOPABLE AREA		0.65 Ha
BLOCK 'A'	UNIT WIDTH - N/A AREA OF EXISTING EASEMENT WITHIN BLOCK 'A' = 0.21 Ha	1.74 Ha
BLOCK 'B'	APPROXIMATE UNIT WIDTH - 5.99 M [19'-8"]	0.98 Ha
BLOCK 'C'	APPROXIMATE UNIT WIDTH - 8.31 M [27'-3"]	1.0 Ha
BLOCK 'D'	APPROXIMATE UNIT WIDTH - 9.40 M [30'-10"]	0.40 Ha
BLOCK 'E'	APPROXIMATE UNIT WIDTH - 6.28 M [20'-7"]	2.34 Ha
BLOCK 'F'	APPROXIMATE UNIT WIDTH - 7.50 M [24'-7"] AREA OF EXISTING EASEMENT WITHIN BLOCK 'F' = 0.29 Ha	1.50 Ha
BLOCK 'G'	UNIT WIDTH - TBD AREA OF EXISTING EASEMENT WITHIN BLOCK 'G' = 0.25 Ha	1.70 Ha
BLOCK 'H'	APPROXIMATE UNIT WIDTH - 6.28 M [30'-10"]	2.22 Ha
BLOCK 'I'	APPROXIMATE UNIT WIDTH - 6.28 M [30'-10"]	0.48 Ha
PARKLAND DEDICATION (INCLUDING TRAIL ON ROAD A)		0.85 Ha
6.0M WIDE TRAIL AREA		0.12 Ha
TOTAL DEVELOPABLE AREA		16.17 Ha

AREA FOR E-FILE COMMENTS

NOT FOR CONSTRUCTION

CYNTHIA ZAHORUK ARCHITECTS
3077 NEW STREET,
BURLINGTON, ON L7N1M6
905.331.4480

ONTARIO ASSOCIATION OF ARCHITECTS
CYNTHIA ZAHORUK
LICENCE
4488
ONTARIO ASSOCIATION OF ARCHITECTS

NOTES:
1.THE CONTRACTOR OR PROJECT MANAGER WILL CHECK AND VERIFY ALL DIMENSIONS AND JOB CONDITIONS ON THE JOB AND REPORT ANY DISCREPANCIES TO THE ARCHITECT PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. COORDINATION OF WORK IS THE RESPONSIBILITY OF THE CONTRACTOR OR OWNER/CONTRACTOR
2.THIS DRAWING MUST NOT BE USED FOR CONSTRUCTION PURPOSES UNTIL SIGNED BY THE ARCHITECT.
3.ALL DRAWINGS ARE THE PROPERTY OF THE ARCHITECT AND MAY NOT BE COPIED, REPRODUCED OR ALTERED WITHOUT WRITTEN PERMISSION FROM THE ARCHITECT.
4.DO NOT SCALE THE DRAWINGS.

DD/MM/YY	REVISION
19/04/2023	ISSUED FOR PRECONSULT.
24/10/2023	ISSUED FOR COORDINATION
28/11/2023	ISSUED FOR COORDINATION

SCALE: AS NOTED
DRAWN BY: KR/EM
PRINT DATE: 15/12/2023

BELLEVILLE DEVELOPMENT
PROPOSED DEVELOPMENT
DUNDAS STREET EAST
BELLEVILLE, ONTARIO

PROPOSED SITE PLAN

A0.1

Appendix C

Traffic Data

GHD
UNIT 1 705 MILLCREEK DRIVE
MISSISSAUGA ONTARIO, L5N 5M4
CANADA

Turning Movement Count (1 . DUNDAS ST E & HAIG RD)

Start Time	N Approach HAIG RD						E Approach DUNDAS ST E						S Approach SOUTH DRIVEWAY						W Approach DUNDAS ST E						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:00:00	17	0	13	0	0	30	6	52	0	0	0	58	0	0	0	0	0	0	0	52	4	1	0	57	145	
07:15:00	30	0	8	0	1	38	9	94	0	0	0	103	0	0	0	0	0	0	0	62	7	1	0	70	211	
07:30:00	22	0	16	0	0	38	15	125	0	0	0	140	0	0	0	0	0	0	0	52	7	0	0	59	237	
07:45:00	24	0	12	1	0	37	22	133	0	0	0	155	0	0	0	0	0	0	0	72	9	1	0	82	274	867
08:00:00	24	0	15	0	0	39	12	98	0	0	0	110	0	0	0	0	0	0	0	82	9	3	0	94	243	965
08:15:00	20	0	16	0	0	36	15	113	0	0	0	128	0	0	0	0	0	0	0	76	11	1	0	88	252	1006
08:30:00	15	0	16	0	1	31	14	97	0	0	0	111	0	0	0	0	0	0	0	78	5	0	0	83	225	994
08:45:00	25	0	13	0	0	38	12	97	0	0	0	109	0	0	0	0	1	0	0	94	11	0	0	105	252	972
BREAK																										
16:00:00	15	0	23	0	0	38	18	117	0	0	0	135	0	0	0	0	0	0	0	160	14	3	0	177	350	
16:15:00	17	0	16	0	0	33	14	120	0	0	0	134	0	0	0	0	1	0	0	153	14	0	0	167	334	
16:30:00	27	0	19	0	1	46	21	134	0	0	0	155	0	1	0	0	0	1	0	128	18	2	0	148	350	
16:45:00	21	0	16	0	0	37	24	123	0	0	0	147	0	0	0	0	0	0	0	149	17	3	1	169	353	1387
17:00:00	14	0	17	0	1	31	11	106	0	0	0	117	0	0	0	0	0	0	0	116	16	3	0	135	283	1320
17:15:00	22	0	27	0	0	49	16	110	0	0	0	126	0	0	0	0	0	0	0	132	21	1	0	154	329	1315
17:30:00	15	0	14	0	0	29	21	108	0	0	0	129	0	1	0	0	2	1	0	97	9	3	1	109	268	1233
17:45:00	13	0	10	0	0	23	22	89	0	0	0	111	0	0	0	0	0	0	0	96	13	4	0	113	247	1127
Grand Total	321	0	251	1	4	573	252	1716	0	0	0	1968	0	2	0	0	4	2	0	1599	185	26	2	1810	**4353**	-
Approach%	56%	0%	43.8%	0.2%		-	12.8%	87.2%	0%	0%		-	0%	100%	0%	0%		-	0%	88.3%	10.2%	1.4%		-	-	-
Totals %	7.4%	0%	5.8%	0%		13.2%	5.8%	39.4%	0%	0%		45.2%	0%	0%	0%	0%		0%	0%	36.7%	4.2%	0.6%		41.6%	-	-
Heavy	2	0	7	0		-	19	34	0	0		-	0	0	0	0		-	0	43	9	0		-	-	-
Heavy %	0.6%	0%	2.8%	0%		-	7.5%	2%	0%	0%		-	0%	0%	0%	0%		-	0%	2.7%	4.9%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Turning Movement Count
Location Name: DUNDAS ST E & HAIG RD
Date: Thu, Oct 12, 2023 Deployment Lead: David Chu

GHD
UNIT 1 705 MILLCREEK DRIVE
MISSISSAUGA ONTARIO, L5N 5M4
CANADA

Peak Hour: 07:30 AM - 08:30 AM Weather: Broken Clouds (6.87 °C)

Start Time	N Approach HAIG RD						E Approach DUNDAS ST E						S Approach SOUTH DRIVEWAY						W Approach DUNDAS ST E						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:30:00	22	0	16	0	0	38	15	125	0	0	0	140	0	0	0	0	0	0	0	52	7	0	0	59	237
07:45:00	24	0	12	1	0	37	22	133	0	0	0	155	0	0	0	0	0	0	0	72	9	1	0	82	274
08:00:00	24	0	15	0	0	39	12	98	0	0	0	110	0	0	0	0	0	0	0	82	9	3	0	94	243
08:15:00	20	0	16	0	0	36	15	113	0	0	0	128	0	0	0	0	0	0	0	76	11	1	0	88	252
Grand Total	90	0	59	1	0	150	64	469	0	0	0	533	0	0	0	0	0	0	0	282	36	5	0	323	**1006**
Approach%	60%	0%	39.3%	0.7%		-	12%	88%	0%	0%		-	0%	0%	0%	0%		-	0%	87.3%	11.1%	1.5%		-	-
Totals %	8.9%	0%	5.9%	0.1%		14.9%	6.4%	46.6%	0%	0%		53%	0%	0%	0%	0%		0%	0%	28%	3.6%	0.5%		32.1%	-
PHF	0.94	0	0.92	0.25		0.96	0.73	0.88	0	0		0.86	0	0	0	0		0	0	0.86	0.82	0.42		0.86	-
Heavy	1	0	5	0		6	12	21	0	0		33	0	0	0	0		0	0	18	2	0		20	-
Heavy %	1.1%	0%	8.5%	0%		4%	18.8%	4.5%	0%	0%		6.2%	0%	0%	0%	0%		0%	0%	6.4%	5.6%	0%		6.2%	-
Lights	89	0	54	1		144	52	448	0	0		500	0	0	0	0		0	0	264	34	5		303	-
Lights %	98.9%	0%	91.5%	100%		96%	81.3%	95.5%	0%	0%		93.8%	0%	0%	0%	0%		0%	0%	93.6%	94.4%	100%		93.8%	-
Single-Unit Trucks	1	0	2	0		3	2	12	0	0		14	0	0	0	0		0	0	7	0	0		7	-
Single-Unit Trucks %	1.1%	0%	3.4%	0%		2%	3.1%	2.6%	0%	0%		2.6%	0%	0%	0%	0%		0%	0%	2.5%	0%	0%		2.2%	-
Buses	0	0	3	0		3	10	8	0	0		18	0	0	0	0		0	0	9	2	0		11	-
Buses %	0%	0%	5.1%	0%		2%	15.6%	1.7%	0%	0%		3.4%	0%	0%	0%	0%		0%	0%	3.2%	5.6%	0%		3.4%	-
Articulated Trucks	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	0	2	0	0		2	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0.2%	0%	0%		0.2%	0%	0%	0%	0%		0%	0%	0.7%	0%	0%		0.6%	-
Bicycles on Road	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-

Turning Movement Count
Location Name: DUNDAS ST E & HAIG RD
Date: Thu, Oct 12, 2023   Deployment Lead: David Chu

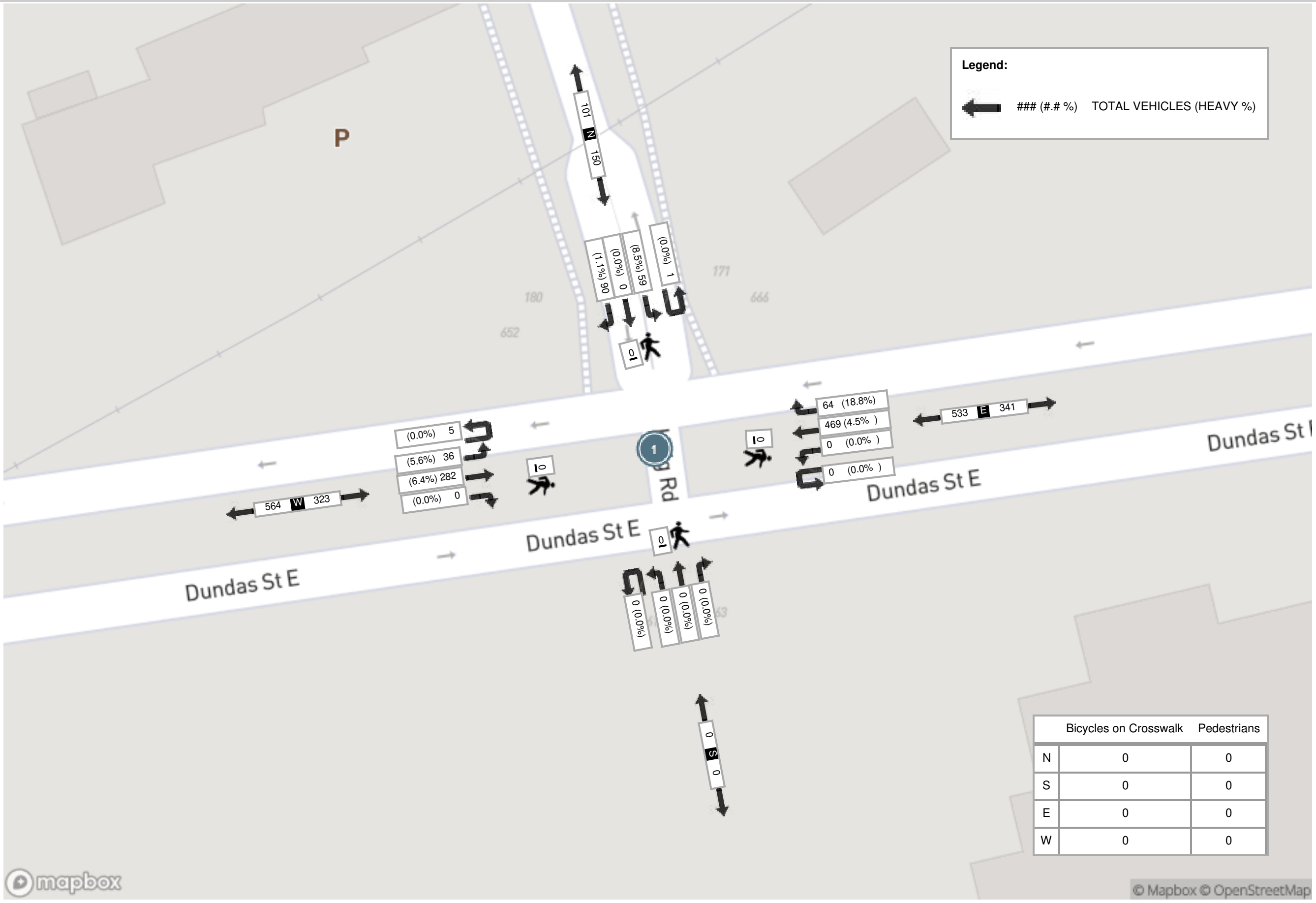
GHD
UNIT 1 705 MILLCREEK DRIVE
MISSISSAUGA ONTARIO, L5N 5M4
CANADA

Peak Hour: 04:00 PM - 05:00 PM   Weather: Few Clouds (15.35 °C)

Start Time	N Approach HAIG RD						E Approach DUNDAS ST E						S Approach SOUTH DRIVEWAY						W Approach DUNDAS ST E						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:00:00	15	0	23	0	0	38	18	117	0	0	0	135	0	0	0	0	0	0	0	160	14	3	0	177	350
16:15:00	17	0	16	0	0	33	14	120	0	0	0	134	0	0	0	0	1	0	0	153	14	0	0	167	334
16:30:00	27	0	19	0	1	46	21	134	0	0	0	155	0	1	0	0	0	1	0	128	18	2	0	148	350
16:45:00	21	0	16	0	0	37	24	123	0	0	0	147	0	0	0	0	0	0	0	149	17	3	1	169	353
Grand Total	80	0	74	0	1	154	77	494	0	0	0	571	0	1	0	0	1	1	0	590	63	8	1	661	**1387**
Approach%	51.9%	0%	48.1%	0%		-	13.5%	86.5%	0%	0%		-	0%	100%	0%	0%		-	0%	89.3%	9.5%	1.2%		-	-
Totals %	5.8%	0%	5.3%	0%		11.1%	5.6%	35.6%	0%	0%		41.2%	0%	0.1%	0%	0%		0.1%	0%	42.5%	4.5%	0.6%		47.7%	-
PHF	0.74	0	0.8	0		0.84	0.8	0.92	0	0		0.92	0	0.25	0	0		0.25	0	0.92	0.88	0.67		0.93	-
Heavy	0	0	0	0		0	3	4	0	0		7	0	0	0	0		0	0	4	3	0		7	-
Heavy %	0%	0%	0%	0%		0%	3.9%	0.8%	0%	0%		1.2%	0%	0%	0%	0%		0%	0%	0.7%	4.8%	0%		1.1%	-
Lights	80	0	74	0		154	74	490	0	0		564	0	0	0	0		0	0	586	60	8		654	-
Lights %	100%	0%	100%	0%		100%	96.1%	99.2%	0%	0%		98.8%	0%	0%	0%	0%		0%	0%	99.3%	95.2%	100%		98.9%	-
Single-Unit Trucks	0	0	0	0		0	1	0	0	0		1	0	0	0	0		0	0	1	1	0		2	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	1.3%	0%	0%	0%		0.2%	0%	0%	0%	0%		0%	0%	0.2%	1.6%	0%		0.3%	-
Buses	0	0	0	0		0	2	3	0	0		5	0	0	0	0		0	0	2	2	0		4	-
Buses %	0%	0%	0%	0%		0%	2.6%	0.6%	0%	0%		0.9%	0%	0%	0%	0%		0%	0%	0.3%	3.2%	0%		0.6%	-
Articulated Trucks	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	0	1	0	0		1	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0.2%	0%	0%		0.2%	0%	0%	0%	0%		0%	0%	0.2%	0%	0%		0.2%	-
Bicycles on Road	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	-
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	100%	0%	0%		100%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	33.3%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	1	-	-
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	33.3%		-	-	-	-	33.3%		-

GHD
UNIT 1 705 MILLCREEK DRIVE
MISSISSAUGA ONTARIO, L5N 5M4
CANADA

Peak Hour: 07:30 AM - 08:30 AM Weather: Broken Clouds (6.87 °C)

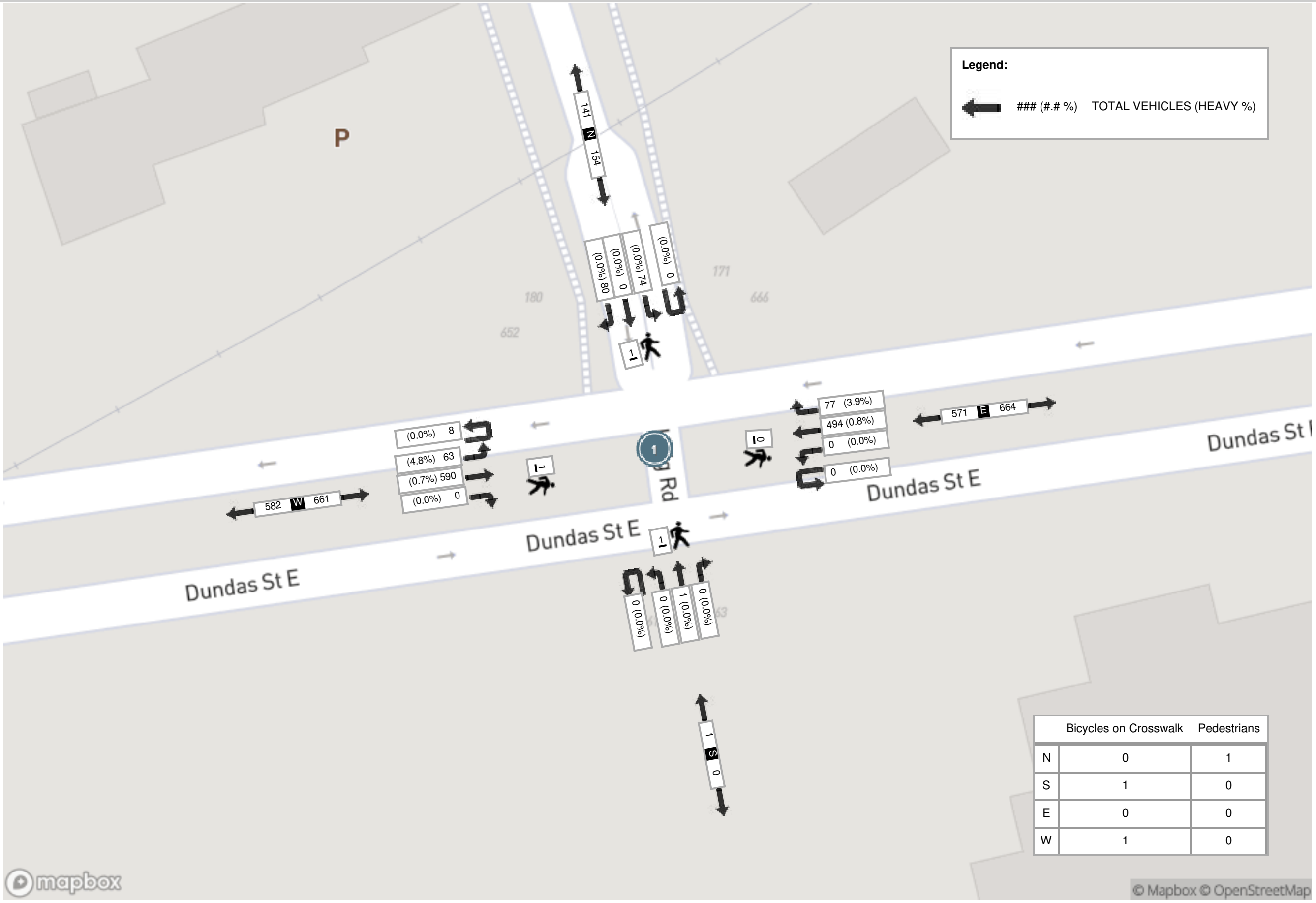


	Bicycles on Crosswalk	Pedestrians
N	0	0
S	0	0
E	0	0
W	0	0

Spectrum

GHD
UNIT 1 705 MILLCREEK DRIVE
MISSISSAUGA ONTARIO, L5N 5M4
CANADA

Peak Hour: 04:00 PM - 05:00 PM Weather: Few Clouds (15.35 °C)



	Bicycles on Crosswalk	Pedestrians
N	0	1
S	1	0
E	0	0
W	1	0

Appendix D

Synchro Outputs

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↱		↰	↱	
Traffic Volume (vph)	41	282	0	0	469	64	0	0	0	60	0	90
Future Volume (vph)	41	282	0	0	469	64	0	0	0	60	0	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.982						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1722	3444	0	1921	3360	0	1921	1921	0	1674	1617	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1722	3444	0	1921	3360	0	1921	1921	0	1674	1617	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
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
Heavy Vehicles (%)	6%	6%	0%	0%	5%	19%	0%	0%	0%	9%	0%	1%
Adj. Flow (vph)	45	307	0	0	510	70	0	0	0	65	0	98
Shared Lane Traffic (%)												
Lane Group Flow (vph)	45	307	0	0	580	0	0	0	0	65	98	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 33.9%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	41	282	0	0	469	64	0	0	0	60	0	90
Future Volume (Veh/h)	41	282	0	0	469	64	0	0	0	60	0	90
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)	45	307	0	0	510	70	0	0	0	65	0	98
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	580			307			750	977	154	788	942	290
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	580			307			750	977	154	788	942	290
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.7	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	95			100			100	100	100	75	100	86
cM capacity (veh/h)	963			1265			252	241	871	260	253	710

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	45	205	102	0	340	240	0	0	65	98
Volume Left	45	0	0	0	0	0	0	0	65	0
Volume Right	0	0	0	0	0	70	0	0	0	98
cSH	963	1700	1700	1700	1700	1700	1700	1700	260	710
Volume to Capacity	0.05	0.12	0.06	0.00	0.20	0.14	1.26	0.33	0.25	0.14
Queue Length 95th (m)	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.3	3.6
Control Delay (s)	8.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.4	10.9
Lane LOS	A						A	A	C	B
Approach Delay (s)	1.1			0.0			0.0		15.9	
Approach LOS							A		C	

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	33.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	590	0	0	494	77	0	0	0	74	0	80
Future Volume (vph)	71	590	0	0	494	77	0	0	0	74	0	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.980						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1738	3614	0	1921	3527	0	1921	1921	0	1825	1633	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1738	3614	0	1921	3527	0	1921	1921	0	1825	1633	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
Confl. Peds. (#/hr)	1		1	1		1	1					1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	1%	0%	0%	1%	4%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	72	602	0	0	504	79	0	0	0	76	0	82
Shared Lane Traffic (%)												
Lane Group Flow (vph)	72	602	0	0	583	0	0	0	0	76	82	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 35.4%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	590	0	0	494	77	0	0	0	74	0	80
Future Volume (Veh/h)	71	590	0	0	494	77	0	0	0	74	0	80
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	72	602	0	0	504	79	0	0	0	76	0	82
Pedestrians		1						1			1	
Lane Width (m)		3.7						3.7			3.7	
Walking Speed (m/s)		1.1						1.1			1.1	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	584			603			1082	1331	302	990	1292	294
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	584			603			1082	1331	302	990	1292	294
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	93			100			100	100	100	60	100	88
cM capacity (veh/h)	965			983			145	144	699	192	152	708

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	72	401	201	0	336	247	0	0	76	82
Volume Left	72	0	0	0	0	0	0	0	76	0
Volume Right	0	0	0	0	0	79	0	0	0	82
cSH	965	1700	1700	1700	1700	1700	1700	1700	192	708
Volume to Capacity	0.07	0.24	0.12	0.00	0.20	0.15	2.01	0.43	0.40	0.12
Queue Length 95th (m)	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.4	3.0
Control Delay (s)	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.6	10.8
Lane LOS	A						A	A	E	B
Approach Delay (s)	1.0			0.0			0.0		22.7	
Approach LOS							A		C	

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	35.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	290	0	0	483	65	0	0	0	61	0	92
Future Volume (vph)	42	290	0	0	483	65	0	0	0	61	0	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.982						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1722	3444	0	1921	3360	0	1921	1921	0	1674	1617	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1722	3444	0	1921	3360	0	1921	1921	0	1674	1617	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
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
Heavy Vehicles (%)	6%	6%	0%	0%	5%	19%	0%	0%	0%	9%	0%	1%
Adj. Flow (vph)	46	315	0	0	525	71	0	0	0	66	0	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	46	315	0	0	596	0	0	0	0	66	100	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 34.5%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	290	0	0	483	65	0	0	0	61	0	92
Future Volume (Veh/h)	42	290	0	0	483	65	0	0	0	61	0	92
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)	46	315	0	0	525	71	0	0	0	66	0	100
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	596			315			770	1003	158	810	968	298
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	596			315			770	1003	158	810	968	298
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.7	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	95			100			100	100	100	74	100	86
cM capacity (veh/h)	949			1257			243	232	866	250	244	701

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	46	210	105	0	350	246	0	0	66	100
Volume Left	46	0	0	0	0	0	0	0	66	0
Volume Right	0	0	0	0	0	71	0	0	0	100
cSH	949	1700	1700	1700	1700	1700	1700	1700	250	701
Volume to Capacity	0.05	0.12	0.06	0.00	0.21	0.14	1.26	0.33	0.26	0.14
Queue Length 95th (m)	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.8	3.8
Control Delay (s)	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.5	11.0
Lane LOS	A						A	A	C	B
Approach Delay (s)	1.1			0.0			0.0		16.4	
Approach LOS							A		C	

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	34.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	607	0	0	508	79	0	0	0	76	0	82
Future Volume (vph)	73	607	0	0	508	79	0	0	0	76	0	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.980						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1738	3614	0	1921	3528	0	1921	1921	0	1825	1633	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1738	3614	0	1921	3528	0	1921	1921	0	1825	1633	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
Confl. Peds. (#/hr)	1		1	1		1	1					1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	1%	0%	0%	1%	4%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	74	619	0	0	518	81	0	0	0	78	0	84
Shared Lane Traffic (%)												
Lane Group Flow (vph)	74	619	0	0	599	0	0	0	0	78	84	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 36.1% ICU Level of Service A

Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	607	0	0	508	79	0	0	0	76	0	82
Future Volume (Veh/h)	73	607	0	0	508	79	0	0	0	76	0	82
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	74	619	0	0	518	81	0	0	0	78	0	84
Pedestrians		1						1			1	
Lane Width (m)		3.7						3.7			3.7	
Walking Speed (m/s)		1.1						1.1			1.1	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	600			620			1112	1368	310	1017	1328	302
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	600			620			1112	1368	310	1017	1328	302
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	92			100			100	100	100	57	100	88
cM capacity (veh/h)	952			969			137	136	691	183	144	699

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	74	413	206	0	345	254	0	0	78	84
Volume Left	74	0	0	0	0	0	0	0	78	0
Volume Right	0	0	0	0	0	81	0	0	0	84
cSH	952	1700	1700	1700	1700	1700	1700	1700	183	699
Volume to Capacity	0.08	0.24	0.12	0.00	0.20	0.15	2.01	0.43	0.43	0.12
Queue Length 95th (m)	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.8	3.1
Control Delay (s)	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.7	10.9
Lane LOS	A						A	A	E	B
Approach Delay (s)	1.0			0.0			0.0		24.2	
Approach LOS							A		C	

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	290	8	14	483	65	48	9	30	61	4	92
Future Volume (vph)	42	290	8	14	483	65	48	9	30	61	4	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.982			0.885			0.856	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1722	3435	0	1825	3360	0	1825	1700	0	1674	1629	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1722	3435	0	1825	3360	0	1825	1700	0	1674	1629	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
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
Heavy Vehicles (%)	6%	6%	0%	0%	5%	19%	0%	0%	0%	9%	0%	1%
Adj. Flow (vph)	46	315	9	15	525	71	52	10	33	66	4	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	46	324	0	15	596	0	52	43	0	66	104	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 38.8% ICU Level of Service A

Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	290	8	14	483	65	48	9	30	61	4	92
Future Volume (Veh/h)	42	290	8	14	483	65	48	9	30	61	4	92
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)	46	315	9	15	525	71	52	10	33	66	4	100
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	596			324			806	1038	162	878	1006	298
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	596			324			806	1038	162	878	1006	298
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.7	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	95			99			77	95	96	68	98	86
cM capacity (veh/h)	949			1247			223	219	861	205	228	701

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	46	210	114	15	350	246	52	43	66	104
Volume Left	46	0	0	15	0	0	52	0	66	0
Volume Right	0	0	9	0	0	71	0	33	0	100
cSH	949	1700	1700	1247	1700	1700	223	512	205	649
Volume to Capacity	0.05	0.12	0.07	0.01	0.21	0.14	0.23	0.08	0.32	0.16
Queue Length 95th (m)	1.2	0.0	0.0	0.3	0.0	0.0	6.6	2.1	10.1	4.3
Control Delay (s)	9.0	0.0	0.0	7.9	0.0	0.0	25.9	12.7	30.7	11.6
Lane LOS	A			A			D	B	D	B
Approach Delay (s)	1.1			0.2			19.9		19.0	
Approach LOS							C		C	

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	607	39	31	508	79	19	5	24	76	8	82
Future Volume (vph)	73	607	39	31	508	79	19	5	24	76	8	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.991			0.980			0.876			0.863	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1738	3584	0	1825	3528	0	1825	1683	0	1825	1658	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1738	3584	0	1825	3528	0	1825	1683	0	1825	1658	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
Confl. Peds. (#/hr)	1		1	1		1	1					1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	1%	0%	0%	1%	4%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	74	619	40	32	518	81	19	5	24	78	8	84
Shared Lane Traffic (%)												
Lane Group Flow (vph)	74	659	0	32	599	0	19	29	0	78	92	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 42.3%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	607	39	31	508	79	19	5	24	76	8	82
Future Volume (Veh/h)	73	607	39	31	508	79	19	5	24	76	8	82
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	74	619	40	32	518	81	19	5	24	78	8	84
Pedestrians		1						1			1	
Lane Width (m)		3.7						3.7			3.7	
Walking Speed (m/s)		1.1						1.1			1.1	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	600			660			1200	1452	330	1108	1432	302
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	600			660			1200	1452	330	1108	1432	302
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	92			97			83	96	96	45	93	88
cM capacity (veh/h)	952			937			109	117	670	143	121	699

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	74	413	246	32	345	254	19	29	78	92
Volume Left	74	0	0	32	0	0	19	0	78	0
Volume Right	0	0	40	0	0	81	0	24	0	84
cSH	952	1700	1700	937	1700	1700	109	370	143	493
Volume to Capacity	0.08	0.24	0.14	0.03	0.20	0.15	0.17	0.08	0.55	0.19
Queue Length 95th (m)	1.9	0.0	0.0	0.8	0.0	0.0	4.6	1.9	20.6	5.2
Control Delay (s)	9.1	0.0	0.0	9.0	0.0	0.0	44.8	15.6	57.1	14.0
Lane LOS	A			A			E	C	F	B
Approach Delay (s)	0.9			0.5			27.1		33.8	
Approach LOS							D		D	

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	299	0	0	497	67	0	0	0	63	0	95
Future Volume (vph)	43	299	0	0	497	67	0	0	0	63	0	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.982						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1722	3444	0	1921	3360	0	1921	1921	0	1674	1617	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1722	3444	0	1921	3360	0	1921	1921	0	1674	1617	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
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
Heavy Vehicles (%)	6%	6%	0%	0%	5%	19%	0%	0%	0%	9%	0%	1%
Adj. Flow (vph)	47	325	0	0	540	73	0	0	0	68	0	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	47	325	0	0	613	0	0	0	0	68	103	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 35.1% ICU Level of Service A

Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	43	299	0	0	497	67	0	0	0	63	0	95
Future Volume (Veh/h)	43	299	0	0	497	67	0	0	0	63	0	95
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)	47	325	0	0	540	73	0	0	0	68	0	103
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	613			325			792	1032	162	833	996	306
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	613			325			792	1032	162	833	996	306
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.7	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	95			100			100	100	100	72	100	85
cM capacity (veh/h)	935			1246			232	223	860	240	234	692

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	47	217	108	0	360	253	0	0	68	103
Volume Left	47	0	0	0	0	0	0	0	68	0
Volume Right	0	0	0	0	0	73	0	0	0	103
cSH	935	1700	1700	1700	1700	1700	1700	1700	240	692
Volume to Capacity	0.05	0.13	0.06	0.00	0.21	0.15	1.26	0.33	0.28	0.15
Queue Length 95th (m)	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.6	4.0
Control Delay (s)	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.8	11.1
Lane LOS	A						A	A	D	B
Approach Delay (s)	1.1			0.0			0.0		17.0	
Approach LOS							A		C	

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	35.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	626	0	0	524	81	0	0	0	78	0	84
Future Volume (vph)	75	626	0	0	524	81	0	0	0	78	0	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.980						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1738	3614	0	1921	3528	0	1921	1921	0	1825	1633	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1738	3614	0	1921	3528	0	1921	1921	0	1825	1633	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
Confl. Peds. (#/hr)	1		1	1		1	1					1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	1%	0%	0%	1%	4%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	77	639	0	0	535	83	0	0	0	80	0	86
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	639	0	0	618	0	0	0	0	80	86	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 36.8% ICU Level of Service A

Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	626	0	0	524	81	0	0	0	78	0	84
Future Volume (Veh/h)	75	626	0	0	524	81	0	0	0	78	0	84
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	77	639	0	0	535	83	0	0	0	80	0	86
Pedestrians		1						1			1	
Lane Width (m)		3.7						3.7			3.7	
Walking Speed (m/s)		1.1						1.1			1.1	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	619			640			1148	1413	320	1051	1372	311
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	619			640			1148	1413	320	1051	1372	311
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	92			100			100	100	100	53	100	88
cM capacity (veh/h)	936			953			128	127	680	172	135	689

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	77	426	213	0	357	261	0	0	80	86
Volume Left	77	0	0	0	0	0	0	0	80	0
Volume Right	0	0	0	0	0	83	0	0	0	86
cSH	936	1700	1700	1700	1700	1700	1700	1700	172	689
Volume to Capacity	0.08	0.25	0.13	0.00	0.21	0.15	2.01	0.43	0.47	0.12
Queue Length 95th (m)	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	3.2
Control Delay (s)	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.0	11.0
Lane LOS	A						A	A	E	B
Approach Delay (s)	1.0			0.0			0.0		26.4	
Approach LOS							A		D	

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	299	21	39	497	67	123	22	78	63	11	95
Future Volume (vph)	43	299	21	39	497	67	123	22	78	63	11	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.982			0.883			0.866	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1722	3422	0	1825	3360	0	1825	1696	0	1674	1649	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1722	3422	0	1825	3360	0	1825	1696	0	1674	1649	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
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
Heavy Vehicles (%)	6%	6%	0%	0%	5%	19%	0%	0%	0%	9%	0%	1%
Adj. Flow (vph)	47	325	23	42	540	73	134	24	85	68	12	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	47	348	0	42	613	0	134	109	0	68	115	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 42.7% ICU Level of Service A

Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	43	299	21	39	497	67	123	22	78	63	11	95
Future Volume (Veh/h)	43	299	21	39	497	67	123	22	78	63	11	95
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)	47	325	23	42	540	73	134	24	85	68	12	103
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	613			348			894	1128	174	1014	1102	306
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	613			348			894	1128	174	1014	1102	306
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.7	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	95			97			26	87	90	51	94	85
cM capacity (veh/h)	935			1222			182	189	846	140	196	692

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	47	217	131	42	360	253	134	109	68	115
Volume Left	47	0	0	42	0	0	134	0	68	0
Volume Right	0	0	23	0	0	73	0	85	0	103
cSH	935	1700	1700	1222	1700	1700	182	479	140	547
Volume to Capacity	0.05	0.13	0.08	0.03	0.21	0.15	0.74	0.23	0.49	0.21
Queue Length 95th (m)	1.2	0.0	0.0	0.8	0.0	0.0	35.7	6.6	17.3	6.0
Control Delay (s)	9.1	0.0	0.0	8.1	0.0	0.0	65.9	14.7	53.2	13.3
Lane LOS	A			A			F	B	F	B
Approach Delay (s)	1.1			0.5			42.9		28.1	
Approach LOS							E		D	

Intersection Summary			
Average Delay	11.1		
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	626	103	82	524	81	49	12	62	78	21	84
Future Volume (vph)	75	626	103	82	524	81	49	12	62	78	21	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.979			0.980			0.874			0.879	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1738	3543	0	1825	3528	0	1825	1679	0	1825	1689	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1738	3543	0	1825	3528	0	1825	1679	0	1825	1689	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
Confl. Peds. (#/hr)	1		1	1		1	1					1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	1%	0%	0%	1%	4%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	77	639	105	84	535	83	50	12	63	80	21	86
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	744	0	84	618	0	50	75	0	80	107	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary		
Area Type:	Other	
Control Type: Unsignalized		
Intersection Capacity Utilization 46.2%		ICU Level of Service A
Analysis Period (min) 15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	626	103	82	524	81	49	12	62	78	21	84
Future Volume (Veh/h)	75	626	103	82	524	81	49	12	62	78	21	84
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	77	639	105	84	535	83	50	12	63	80	21	86
Pedestrians		1						1			1	
Lane Width (m)		3.7						3.7			3.7	
Walking Speed (m/s)		1.1						1.1			1.1	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	619			745			1380	1634	373	1288	1644	311
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	619			745			1380	1634	373	1288	1644	311
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	92			90			23	86	90	7	75	88
cM capacity (veh/h)	936			871			65	85	630	86	83	689

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	77	426	318	84	357	261	50	75	80	107
Volume Left	77	0	0	84	0	0	50	0	80	0
Volume Right	0	0	105	0	0	83	0	63	0	86
cSH	936	1700	1700	871	1700	1700	65	310	86	284
Volume to Capacity	0.08	0.25	0.19	0.10	0.21	0.15	0.77	0.24	0.93	0.38
Queue Length 95th (m)	2.0	0.0	0.0	2.4	0.0	0.0	26.6	7.1	38.9	12.8
Control Delay (s)	9.2	0.0	0.0	9.6	0.0	0.0	157.2	20.3	164.6	25.2
Lane LOS	A			A			F	C	F	D
Approach Delay (s)	0.9			1.1			75.0		84.8	
Approach LOS							F		F	

Intersection Summary				
Average Delay	14.6			
Intersection Capacity Utilization	46.2%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	308	0	0	512	69	0	0	0	65	0	98
Future Volume (vph)	44	308	0	0	512	69	0	0	0	65	0	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.982						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1722	3444	0	1921	3361	0	1921	1921	0	1674	1617	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1722	3444	0	1921	3361	0	1921	1921	0	1674	1617	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
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
Heavy Vehicles (%)	6%	6%	0%	0%	5%	19%	0%	0%	0%	9%	0%	1%
Adj. Flow (vph)	48	335	0	0	557	75	0	0	0	71	0	107
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	335	0	0	632	0	0	0	0	71	107	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 35.8%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	308	0	0	512	69	0	0	0	65	0	98
Future Volume (Veh/h)	44	308	0	0	512	69	0	0	0	65	0	98
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)	48	335	0	0	557	75	0	0	0	71	0	107
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	632			335			816	1063	168	858	1026	316
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	632			335			816	1063	168	858	1026	316
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.7	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	95			100			100	100	100	69	100	84
cM capacity (veh/h)	920			1236			220	213	854	230	224	683

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	48	223	112	0	371	261	0	0	71	107
Volume Left	48	0	0	0	0	0	0	0	71	0
Volume Right	0	0	0	0	0	75	0	0	0	107
cSH	920	1700	1700	1700	1700	1700	1700	1700	230	683
Volume to Capacity	0.05	0.13	0.07	0.00	0.22	0.15	1.26	0.33	0.31	0.16
Queue Length 95th (m)	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.6	4.2
Control Delay (s)	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.5	11.3
Lane LOS	A						A	A	D	B
Approach Delay (s)	1.1			0.0			0.0		17.7	
Approach LOS							A		C	

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	645	0	0	540	84	0	0	0	80	0	87
Future Volume (vph)	77	645	0	0	540	84	0	0	0	80	0	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.980						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1738	3614	0	1921	3528	0	1921	1921	0	1825	1633	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1738	3614	0	1921	3528	0	1921	1921	0	1825	1633	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
Confl. Peds. (#/hr)	1		1	1		1	1					1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	1%	0%	0%	1%	4%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	79	658	0	0	551	86	0	0	0	82	0	89
Shared Lane Traffic (%)												
Lane Group Flow (vph)	79	658	0	0	637	0	0	0	0	82	89	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 37.6%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	645	0	0	540	84	0	0	0	80	0	87
Future Volume (Veh/h)	77	645	0	0	540	84	0	0	0	80	0	87
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	79	658	0	0	551	86	0	0	0	82	0	89
Pedestrians		1						1			1	
Lane Width (m)		3.7						3.7			3.7	
Walking Speed (m/s)		1.1						1.1			1.1	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	638			659			1182	1455	330	1082	1412	320
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	638			659			1182	1455	330	1082	1412	320
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	91			100			100	100	100	50	100	87
cM capacity (veh/h)	921			938			119	120	671	163	127	680

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	79	439	219	0	367	270	0	0	82	89
Volume Left	79	0	0	0	0	0	0	0	82	0
Volume Right	0	0	0	0	0	86	0	0	0	89
cSH	921	1700	1700	1700	1700	1700	1700	1700	163	680
Volume to Capacity	0.09	0.26	0.13	0.00	0.22	0.16	2.01	0.43	0.50	0.13
Queue Length 95th (m)	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.6	3.4
Control Delay (s)	9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	47.7	11.1
Lane LOS	A						A	A	E	B
Approach Delay (s)	1.0			0.0			0.0		28.7	
Approach LOS							A		D	

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	308	25	45	512	69	143	26	91	65	12	98
Future Volume (vph)	44	308	25	45	512	69	143	26	91	65	12	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.989			0.982			0.883			0.866	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1722	3420	0	1825	3361	0	1825	1696	0	1674	1649	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1722	3420	0	1825	3361	0	1825	1696	0	1674	1649	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
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
Heavy Vehicles (%)	6%	6%	0%	0%	5%	19%	0%	0%	0%	9%	0%	1%
Adj. Flow (vph)	48	335	27	49	557	75	155	28	99	71	13	107
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	362	0	49	632	0	155	127	0	71	120	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 44.3% ICU Level of Service A
Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	308	25	45	512	69	143	26	91	65	12	98
Future Volume (Veh/h)	44	308	25	45	512	69	143	26	91	65	12	98
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)	48	335	27	49	557	75	155	28	99	71	13	107
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	632			362			934	1174	181	1069	1150	316
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	632			362			934	1174	181	1069	1150	316
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.7	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	95			96			7	84	88	41	93	84
cM capacity (veh/h)	920			1208			166	176	837	120	182	683

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	48	223	139	49	371	261	155	127	71	120
Volume Left	48	0	0	49	0	0	155	0	71	0
Volume Right	0	0	27	0	0	75	0	99	0	107
cSH	920	1700	1700	1208	1700	1700	166	458	120	526
Volume to Capacity	0.05	0.13	0.08	0.04	0.22	0.15	0.93	0.28	0.59	0.23
Queue Length 95th (m)	1.3	0.0	0.0	1.0	0.0	0.0	53.0	8.5	22.3	6.6
Control Delay (s)	9.1	0.0	0.0	8.1	0.0	0.0	108.6	15.9	71.0	13.9
Lane LOS	A			A			F	C	F	B
Approach Delay (s)	1.1			0.6			66.8		35.1	
Approach LOS							F		E	

Intersection Summary				
Average Delay	16.9			
Intersection Capacity Utilization	44.3%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	645	121	97	540	84	58	15	73	80	24	87
Future Volume (vph)	77	645	121	97	540	84	58	15	73	80	24	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.976			0.980			0.875			0.882	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1738	3533	0	1825	3528	0	1825	1681	0	1825	1694	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1738	3533	0	1825	3528	0	1825	1681	0	1825	1694	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
Confl. Peds. (#/hr)	1		1	1		1	1					1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	1%	0%	0%	1%	4%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	79	658	123	99	551	86	59	15	74	82	24	89
Shared Lane Traffic (%)												
Lane Group Flow (vph)	79	781	0	99	637	0	59	89	0	82	113	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 48.3% ICU Level of Service A

Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	645	121	97	540	84	58	15	73	80	24	87
Future Volume (Veh/h)	77	645	121	97	540	84	58	15	73	80	24	87
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	79	658	123	99	551	86	59	15	74	82	24	89
Pedestrians		1						1			1	
Lane Width (m)		3.7						3.7			3.7	
Walking Speed (m/s)		1.1						1.1			1.1	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	638			782			1454	1714	392	1362	1733	320
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	638			782			1454	1714	392	1362	1733	320
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	91			88			0	80	88	0	66	87
cM capacity (veh/h)	921			844			51	73	612	69	72	680

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	79	439	342	99	367	270	59	89	82	113
Volume Left	79	0	0	99	0	0	59	0	82	0
Volume Right	0	0	123	0	0	86	0	74	0	89
cSH	921	1700	1700	844	1700	1700	51	274	69	242
Volume to Capacity	0.09	0.26	0.20	0.12	0.22	0.16	1.15	0.33	1.19	0.47
Queue Length 95th (m)	2.1	0.0	0.0	3.0	0.0	0.0	39.6	10.4	48.8	17.5
Control Delay (s)	9.3	0.0	0.0	9.8	0.0	0.0	303.6	24.4	272.9	32.2
Lane LOS	A			A			F	C	F	D
Approach Delay (s)	0.9			1.3			135.7		133.4	
Approach LOS							F		F	

Intersection Summary			
Average Delay	24.7		
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	332	0	0	552	75	0	0	0	70	0	106
Future Volume (vph)	48	332	0	0	552	75	0	0	0	70	0	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.982						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1722	3444	0	1921	3360	0	1921	1921	0	1674	1617	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1722	3444	0	1921	3360	0	1921	1921	0	1674	1617	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
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
Heavy Vehicles (%)	6%	6%	0%	0%	5%	19%	0%	0%	0%	9%	0%	1%
Adj. Flow (vph)	52	361	0	0	600	82	0	0	0	76	0	115
Shared Lane Traffic (%)												
Lane Group Flow (vph)	52	361	0	0	682	0	0	0	0	76	115	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 37.5% ICU Level of Service A
Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	332	0	0	552	75	0	0	0	70	0	106
Future Volume (Veh/h)	48	332	0	0	552	75	0	0	0	70	0	106
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)	52	361	0	0	600	82	0	0	0	76	0	115
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	682			361			880	1147	180	926	1106	341
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	682			361			880	1147	180	926	1106	341
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.7	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	94			100			100	100	100	63	100	83
cM capacity (veh/h)	880			1209			193	189	837	204	200	658

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	52	241	120	0	400	282	0	0	76	115
Volume Left	52	0	0	0	0	0	0	0	76	0
Volume Right	0	0	0	0	0	82	0	0	0	115
cSH	880	1700	1700	1700	1700	1700	1700	1700	204	658
Volume to Capacity	0.06	0.14	0.07	0.00	0.24	0.17	1.26	0.33	0.37	0.17
Queue Length 95th (m)	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.3	4.8
Control Delay (s)	9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.8	11.6
Lane LOS	A						A	A	D	B
Approach Delay (s)	1.2			0.0			0.0		20.1	
Approach LOS							A		C	

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	37.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	83	694	0	0	581	90	0	0	0	87	0	94
Future Volume (vph)	83	694	0	0	581	90	0	0	0	87	0	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.980						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1738	3614	0	1921	3528	0	1921	1921	0	1825	1633	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1738	3614	0	1921	3528	0	1921	1921	0	1825	1633	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
Confl. Peds. (#/hr)	1		1	1		1	1					1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	1%	0%	0%	1%	4%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	85	708	0	0	593	92	0	0	0	89	0	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	708	0	0	685	0	0	0	0	89	96	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 39.7%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	83	694	0	0	581	90	0	0	0	87	0	94
Future Volume (Veh/h)	83	694	0	0	581	90	0	0	0	87	0	94
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	85	708	0	0	593	92	0	0	0	89	0	96
Pedestrians		1						1			1	
Lane Width (m)		3.7						3.7			3.7	
Walking Speed (m/s)		1.1						1.1			1.1	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	686			709			1272	1565	355	1164	1519	344
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	686			709			1272	1565	355	1164	1519	344
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	90			100			100	100	100	37	100	85
cM capacity (veh/h)	883			898			100	101	647	140	108	656

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	85	472	236	0	395	290	0	0	89	96
Volume Left	85	0	0	0	0	0	0	0	89	0
Volume Right	0	0	0	0	0	92	0	0	0	96
cSH	883	1700	1700	1700	1700	1700	1700	1700	140	656
Volume to Capacity	0.10	0.28	0.14	0.00	0.23	0.17	2.01	0.43	0.63	0.15
Queue Length 95th (m)	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.8	3.9
Control Delay (s)	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.9	11.4
Lane LOS	A						A	A	F	B
Approach Delay (s)	1.0			0.0			0.0		38.1	
Approach LOS							A		E	

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	332	25	45	552	75	143	26	91	70	12	106
Future Volume (vph)	48	332	25	45	552	75	143	26	91	70	12	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.982			0.883			0.865	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1722	3423	0	1825	3360	0	1825	1696	0	1674	1647	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1722	3423	0	1825	3360	0	1825	1696	0	1674	1647	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
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
Heavy Vehicles (%)	6%	6%	0%	0%	5%	19%	0%	0%	0%	9%	0%	1%
Adj. Flow (vph)	52	361	27	49	600	82	155	28	99	76	13	115
Shared Lane Traffic (%)												
Lane Group Flow (vph)	52	388	0	49	682	0	155	127	0	76	128	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 45.6% ICU Level of Service A

Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	332	25	45	552	75	143	26	91	70	12	106
Future Volume (Veh/h)	48	332	25	45	552	75	143	26	91	70	12	106
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)	52	361	27	49	600	82	155	28	99	76	13	115
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	682			388			998	1258	194	1136	1231	341
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	682			388			998	1258	194	1136	1231	341
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.7	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	94			96			0	82	88	27	92	83
cM capacity (veh/h)	880			1182			144	155	821	104	161	658

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	52	241	147	49	400	282	155	127	76	128
Volume Left	52	0	0	49	0	0	155	0	76	0
Volume Right	0	0	27	0	0	82	0	99	0	115
cSH	880	1700	1700	1182	1700	1700	144	422	104	501
Volume to Capacity	0.06	0.14	0.09	0.04	0.24	0.17	1.08	0.30	0.73	0.26
Queue Length 95th (m)	1.4	0.0	0.0	1.0	0.0	0.0	63.4	9.5	29.3	7.7
Control Delay (s)	9.3	0.0	0.0	8.2	0.0	0.0	158.4	17.2	101.3	14.6
Lane LOS	A			A			F	C	F	B
Approach Delay (s)	1.1			0.5			94.8		46.9	
Approach LOS							F		E	

Intersection Summary			
Average Delay	22.4		
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	83	694	121	97	581	90	58	15	73	87	24	94
Future Volume (vph)	83	694	121	97	581	90	58	15	73	87	24	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.978			0.980			0.875			0.880	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1738	3540	0	1825	3528	0	1825	1681	0	1825	1691	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1738	3540	0	1825	3528	0	1825	1681	0	1825	1691	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
Confl. Peds. (#/hr)	1		1	1		1	1					1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	1%	0%	0%	1%	4%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	85	708	123	99	593	92	59	15	74	89	24	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	831	0	99	685	0	59	89	0	89	120	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 50.0% ICU Level of Service A

Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	83	694	121	97	581	90	58	15	73	87	24	94
Future Volume (Veh/h)	83	694	121	97	581	90	58	15	73	87	24	94
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	85	708	123	99	593	92	59	15	74	89	24	96
Pedestrians		1						1			1	
Lane Width (m)		3.7						3.7			3.7	
Walking Speed (m/s)		1.1						1.1			1.1	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	686			832			1544	1824	416	1444	1840	344
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	686			832			1544	1824	416	1444	1840	344
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	90			88			0	76	87	0	60	85
cM capacity (veh/h)	883			808			40	62	590	57	60	656

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	85	472	359	99	395	290	59	89	89	120
Volume Left	85	0	0	99	0	0	59	0	89	0
Volume Right	0	0	123	0	0	92	0	74	0	96
cSH	883	1700	1700	808	1700	1700	40	242	57	221
Volume to Capacity	0.10	0.28	0.21	0.12	0.23	0.17	1.48	0.37	1.57	0.54
Queue Length 95th (m)	2.4	0.0	0.0	3.2	0.0	0.0	46.0	12.3	61.8	22.1
Control Delay (s)	9.5	0.0	0.0	10.1	0.0	0.0	471.8	28.4	442.7	39.2
Lane LOS	A			B			F	D	F	E
Approach Delay (s)	0.9			1.3			205.1		211.0	
Approach LOS							F		F	

Intersection Summary			
Average Delay	37.1		
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	357	0	0	595	81	0	0	0	76	0	114
Future Volume (vph)	52	357	0	0	595	81	0	0	0	76	0	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.982						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1722	3444	0	1921	3360	0	1921	1921	0	1674	1617	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1722	3444	0	1921	3360	0	1921	1921	0	1674	1617	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
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
Heavy Vehicles (%)	6%	6%	0%	0%	5%	19%	0%	0%	0%	9%	0%	1%
Adj. Flow (vph)	57	388	0	0	647	88	0	0	0	83	0	124
Shared Lane Traffic (%)												
Lane Group Flow (vph)	57	388	0	0	735	0	0	0	0	83	124	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 39.4%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	357	0	0	595	81	0	0	0	76	0	114
Future Volume (Veh/h)	52	357	0	0	595	81	0	0	0	76	0	114
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)	57	388	0	0	647	88	0	0	0	83	0	124
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	735			388			950	1237	194	999	1193	368
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	735			388			950	1237	194	999	1193	368
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.7	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	93			100			100	100	100	53	100	80
cM capacity (veh/h)	840			1182			166	165	821	178	176	632

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	57	259	129	0	431	304	0	0	83	124
Volume Left	57	0	0	0	0	0	0	0	83	0
Volume Right	0	0	0	0	0	88	0	0	0	124
cSH	840	1700	1700	1700	1700	1700	1700	1700	178	632
Volume to Capacity	0.07	0.15	0.08	0.00	0.25	0.18	1.26	0.33	0.47	0.20
Queue Length 95th (m)	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.8	5.5
Control Delay (s)	9.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.7	12.1
Lane LOS	A						A	A	E	B
Approach Delay (s)	1.2			0.0			0.0		23.9	
Approach LOS							A		C	

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	39.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	748	0	0	626	97	0	0	0	93	0	101
Future Volume (vph)	90	748	0	0	626	97	0	0	0	93	0	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.980						0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1738	3614	0	1921	3528	0	1921	1921	0	1825	1633	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1738	3614	0	1921	3528	0	1921	1921	0	1825	1633	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
Confl. Peds. (#/hr)	1		1	1		1	1					1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	1%	0%	0%	1%	4%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	92	763	0	0	639	99	0	0	0	95	0	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	92	763	0	0	738	0	0	0	0	95	103	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 42.0% ICU Level of Service A

Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	748	0	0	626	97	0	0	0	93	0	101
Future Volume (Veh/h)	90	748	0	0	626	97	0	0	0	93	0	101
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	92	763	0	0	639	99	0	0	0	95	0	103
Pedestrians		1						1			1	
Lane Width (m)		3.7						3.7			3.7	
Walking Speed (m/s)		1.1						1.1			1.1	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	739			764			1372	1687	382	1255	1638	371
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	739			764			1372	1687	382	1255	1638	371
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	89			100			100	100	100	20	100	84
cM capacity (veh/h)	843			857			82	84	621	119	90	631

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	92	509	254	0	426	312	0	0	95	103
Volume Left	92	0	0	0	0	0	0	0	95	0
Volume Right	0	0	0	0	0	99	0	0	0	103
cSH	843	1700	1700	1700	1700	1700	1700	1700	119	631
Volume to Capacity	0.11	0.30	0.15	0.00	0.25	0.18	2.01	0.43	0.80	0.16
Queue Length 95th (m)	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.3	4.4
Control Delay (s)	9.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	103.3	11.8
Lane LOS	A						A	A	F	B
Approach Delay (s)	1.1			0.0			0.0		55.7	
Approach LOS							A		F	

Intersection Summary			
Average Delay	6.7		
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	357	25	45	595	81	143	26	91	76	12	114
Future Volume (vph)	52	357	25	45	595	81	143	26	91	76	12	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.982			0.883			0.864	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1722	3422	0	1825	3360	0	1825	1696	0	1674	1645	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1722	3422	0	1825	3360	0	1825	1696	0	1674	1645	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
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
Heavy Vehicles (%)	6%	6%	0%	0%	5%	19%	0%	0%	0%	9%	0%	1%
Adj. Flow (vph)	57	388	27	49	647	88	155	28	99	83	13	124
Shared Lane Traffic (%)												
Lane Group Flow (vph)	57	415	0	49	735	0	155	127	0	83	137	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 51.3%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	357	25	45	595	81	143	26	91	76	12	114
Future Volume (Veh/h)	52	357	25	45	595	81	143	26	91	76	12	114
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)	57	388	27	49	647	88	155	28	99	83	13	124
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	735			415			1068	1348	208	1210	1318	368
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	735			415			1068	1348	208	1210	1318	368
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.7	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	93			96			0	79	88	6	91	80
cM capacity (veh/h)	840			1155			123	136	805	89	142	632

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	57	259	156	49	431	304	155	127	83	137
Volume Left	57	0	0	49	0	0	155	0	83	0
Volume Right	0	0	27	0	0	88	0	99	0	124
cSH	840	1700	1700	1155	1700	1700	123	386	89	476
Volume to Capacity	0.07	0.15	0.09	0.04	0.25	0.18	1.26	0.33	0.94	0.29
Queue Length 95th (m)	1.7	0.0	0.0	1.0	0.0	0.0	75.2	10.7	39.8	9.0
Control Delay (s)	9.6	0.0	0.0	8.3	0.0	0.0	235.0	18.8	162.4	15.6
Lane LOS	A			A			F	C	F	C
Approach Delay (s)	1.2			0.5			137.7		71.0	
Approach LOS							F		F	

Intersection Summary			
Average Delay	31.5		
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	748	121	97	626	97	58	15	73	93	24	101
Future Volume (vph)	90	748	121	97	626	97	58	15	73	93	24	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	5.0		0.0	5.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.979			0.980			0.875			0.878	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1738	3543	0	1825	3528	0	1825	1681	0	1825	1687	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1738	3543	0	1825	3528	0	1825	1681	0	1825	1687	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		246.3			240.1			117.4			185.9	
Travel Time (s)		18.5			18.0			8.8			13.9	
Confl. Peds. (#/hr)	1		1	1		1	1					1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	1%	0%	0%	1%	4%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	92	763	123	99	639	99	59	15	74	95	24	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	92	886	0	99	738	0	59	89	0	95	127	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 54.4% ICU Level of Service A

Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	748	121	97	626	97	58	15	73	93	24	101
Future Volume (Veh/h)	90	748	121	97	626	97	58	15	73	93	24	101
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	92	763	123	99	639	99	59	15	74	95	24	103
Pedestrians		1						1			1	
Lane Width (m)		3.7						3.7			3.7	
Walking Speed (m/s)		1.1						1.1			1.1	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	739			887			1643	1946	444	1534	1958	371
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	739			887			1643	1946	444	1534	1958	371
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	89			87			0	70	87	0	52	84
cM capacity (veh/h)	843			771			29	51	566	45	50	631

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	92	509	377	99	426	312	59	89	95	127
Volume Left	92	0	0	99	0	0	59	0	95	0
Volume Right	0	0	123	0	0	99	0	74	0	103
cSH	843	1700	1700	771	1700	1700	29	209	45	197
Volume to Capacity	0.11	0.30	0.22	0.13	0.25	0.18	2.01	0.43	2.10	0.64
Queue Length 95th (m)	2.8	0.0	0.0	3.3	0.0	0.0	52.5	15.0	74.8	28.8
Control Delay (s)	9.8	0.0	0.0	10.4	0.0	0.0	757.3	34.5	700.3	51.5
Lane LOS	A			B			F	D	F	F
Approach Delay (s)	0.9			1.2			322.6		329.1	
Approach LOS							F		F	

Intersection Summary			
Average Delay	56.2		
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix E

Signal Warrant Analysis

Analysis Sheet

621 Dundas Street East - Belleville

Intersection: Dundas Street East and Haig Road/Site Access

Analysis Period: Future Total 2039

Signal Warrant Analysis Date: November 3, 2023

Analyst: GHD

Both Intersection Roads Exists

Justification 7-1: Minimum Vehicle Volumes

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 Lanes		2 or More Lanes		Hour Ending									
Flow Condition	FREE FLOW ✗	RESTR. FLOW ✗	FREE FLOW ✗	RESTR. FLOW ✓	AM	PM	AHV	AHV	AHV	AHV	AHV	AHV		
1A	480	720	600	900	1,615	2,143	942	942	942	942	942	942		
	COMPLIANCE %				120.0%	120.0%	104.7%	104.7%	104.7%	104.7%	104.7%	104.7%	868.0%	108.5%
1B	120	170	120	170	460	364	207	207	207	207	207	207		
	COMPLIANCE %				120.0%	120.0%	120.0%	120.0%	120.0%	120.0%	120.0%	120.0%	960.0%	120.0%
Restricted Flow Signal Justification 1:					Both 1A and 1B 120% Fullfilled each of 8 hours					Yes	✗		No	✓

Justification 7-2: Delay to Cross Traffic

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 lanes		2 or More lanes		Hour Ending									
Flow Condition	FREE FLOW ✗	RESTR. FLOW ✗	FREE FLOW ✗	RESTR. FLOW ✓	AM	PM	AHV	AHV	AHV	AHV	AHV	AHV		
2A	480	720	600	900	1,155	1,779	735	735	735	735	735	735		
	COMPLIANCE %				120.0%	120.0%	81.7%	81.7%	81.7%	81.7%	81.7%	81.7%	730.0%	91.3%
2B	50	75	50	75	244	177	103	103	103	103	103	103		
	COMPLIANCE %				120.0%	120.0%	120.0%	120.0%	120.0%	120.0%	120.0%	120.0%	960.0%	120.0%
Restricted Flow Signal Justification 2:					Both 2A and 2B 120% Fullfilled each of 8 hours					Yes	✗		No	✓

Results Sheet

621 Dundas Street East - Belleville

Intersection: Dundas Street East and Haig Road/Site Access

Analysis Period: Future Total 2039

Signal Warrant Analysis Date: November 3, 2023

Analyst: GHD

Both Intersecting Roads Exists

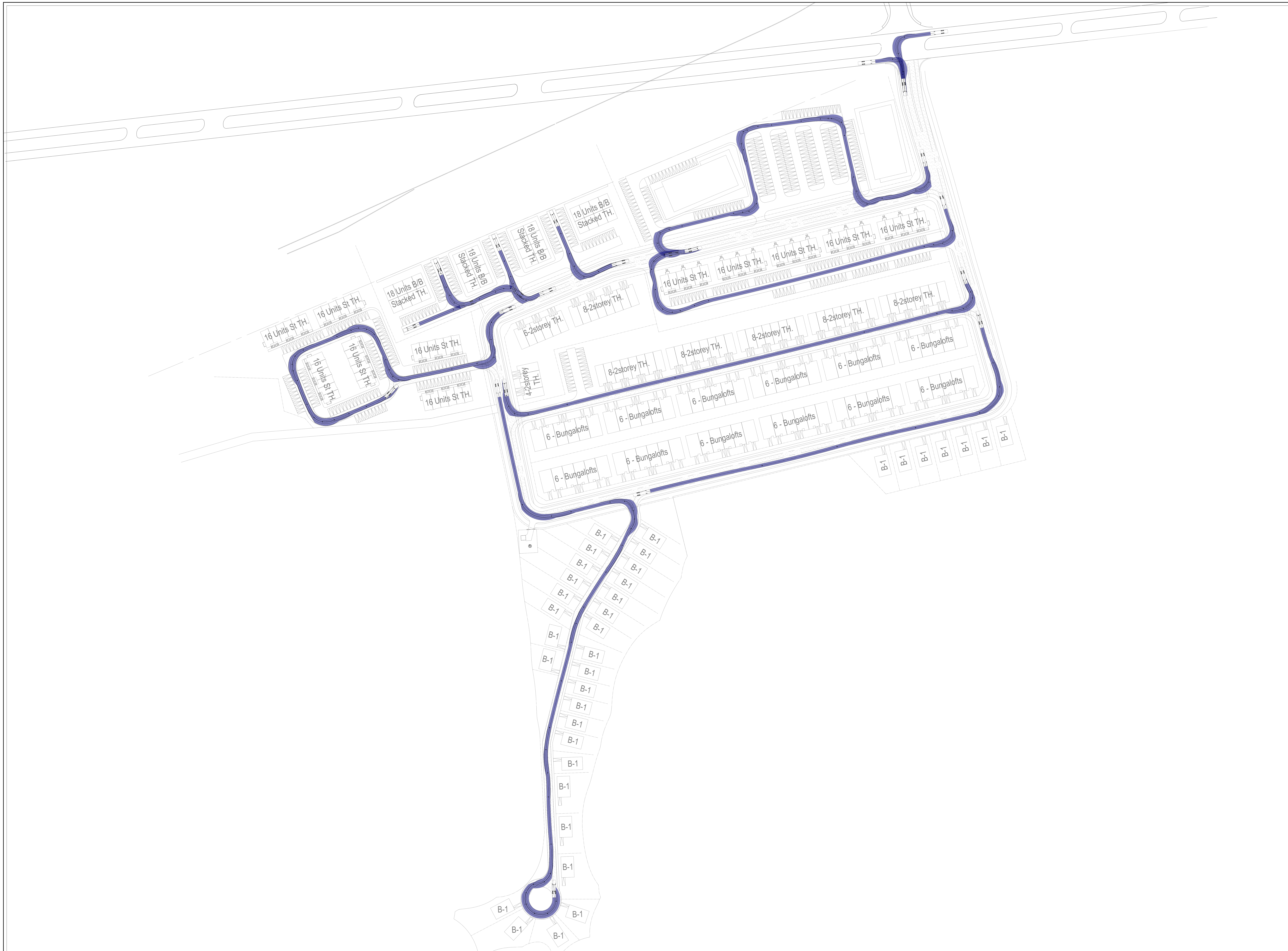
Summary Results

Justification		Compliance	Signal Justified? YES	Signal Justified? NO
7-1. Minimum Vehicular Volume	A Total Volume	108.5%	✗	✓
	B Crossing Volume	120.0%		
7-2. Delay to Cross Traffic	A Main Road	91.3%	✗	✓
	B Crossing Road	120.0%		

SIGNAL WARRANTS BASED ON MTO OTM BOOK 12 (2012) METHODOLOGIES

Appendix F

AutoTURN Swept Path Analysis



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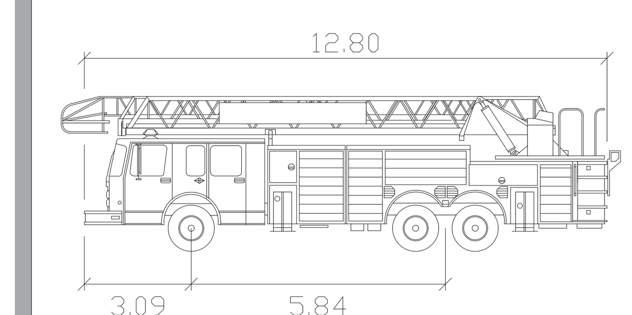
0 25mm



Aerial Fire

	meters
Width	: 2.54
Track	: 2.54
Lock to Lock Time	: 6.0
Steering Angle	: 37.0

No.	Issue	Checked	Approved	Date
1	First Submission	W.M	W.M	1/9/24

Author	J.E	Designer	J.E
Drafting Check	W.M	Design Check	W.M
Project Manager	W.M	Project Director	W.M

Client
2255718 ONTARIO LTD.

Project
621 Dundas Street

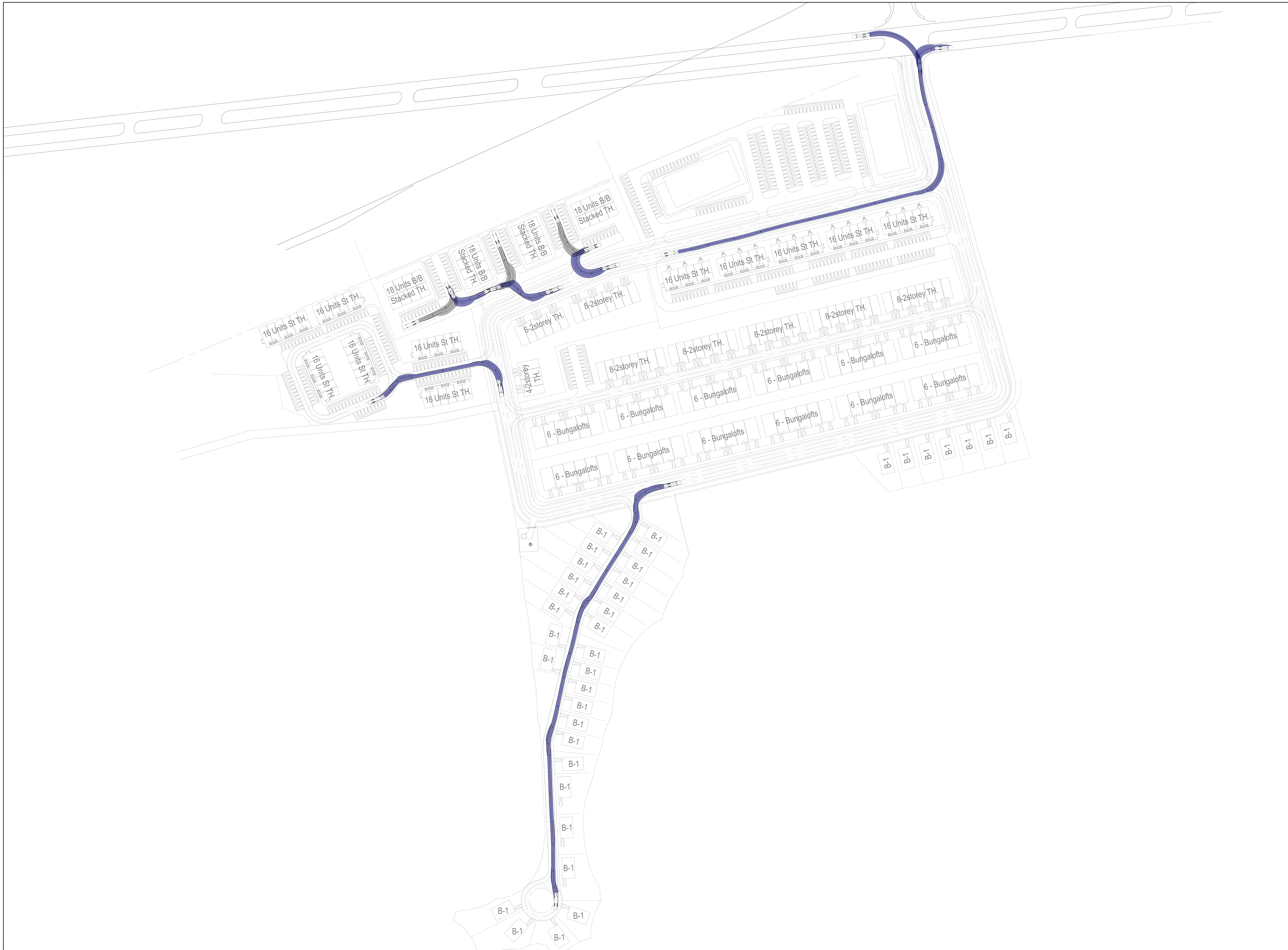
Date January 9, 2024
Scale NTS

Project No. 12624196

Title
VEHICLE MANEUVERING DIAGRAM - FIRE TRUCK (INBOUND)

Size ANSI D

Sheet No. AT-101



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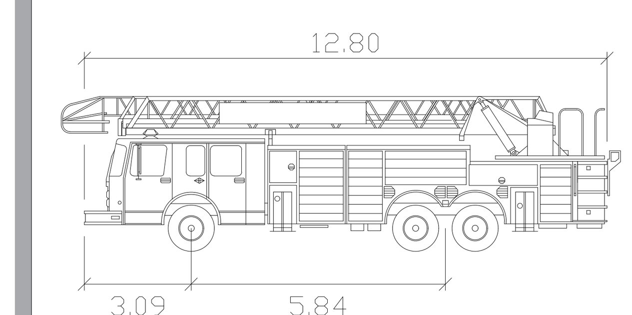


Aerial Fire

meters

Width : 2.54
Track : 2.54
Lock to Lock Time : 6.0
Steering Angle : 37.0

No.	Issue	Checked	Approved	Date
1	First Submission	W.M	W.M	1/9/24

Author	J.E	Designer	J.E
Drafting Check	W.M	Design Check	W.M
Project Manager	W.M	Project Director	W.M

Client

2255718 ONTARIO LTD.

Project

621 Dundas Street

Date January 9, 2024

Scale NTS

Project No. 12624196

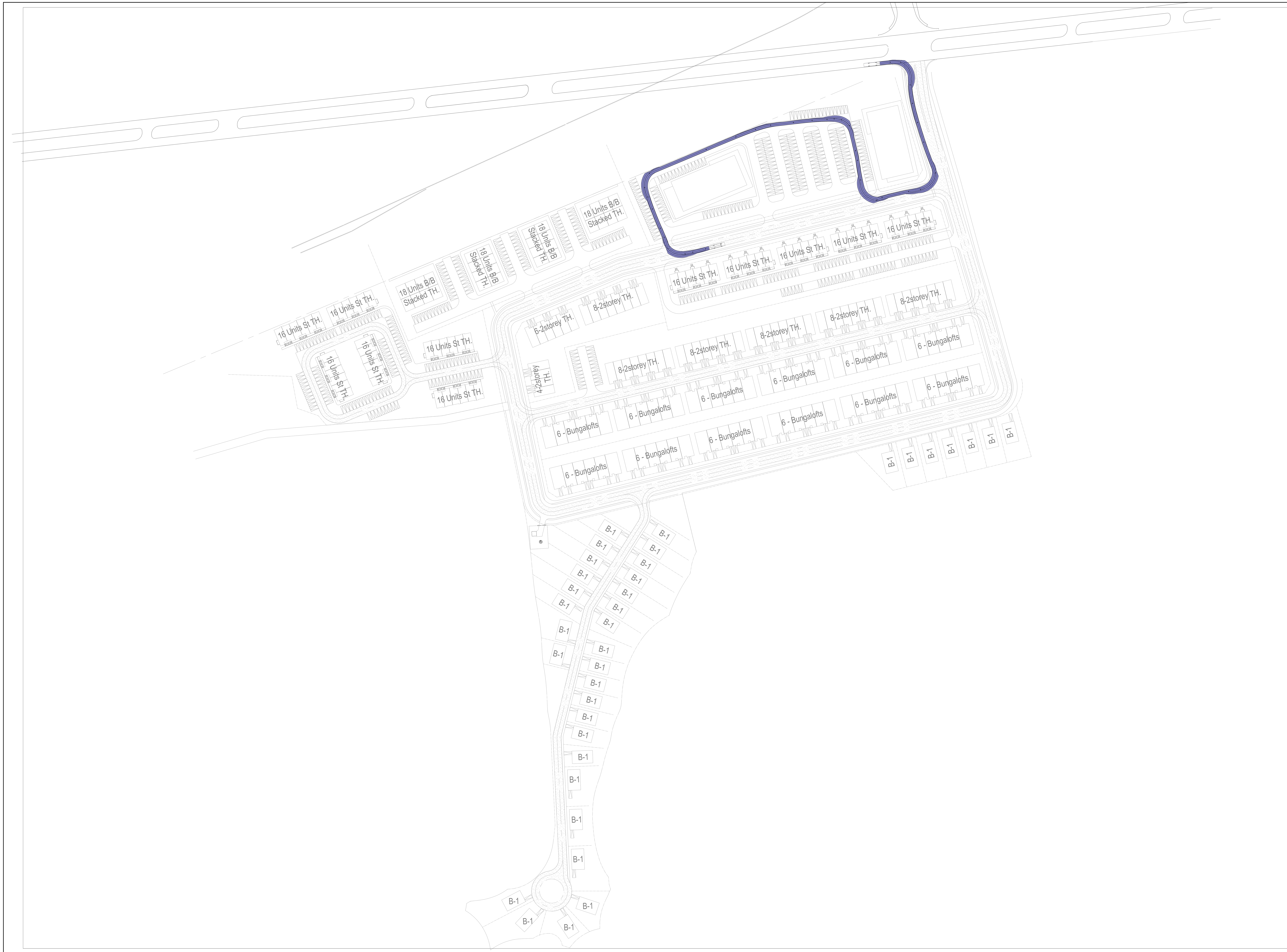
Title

VEHICLE MANEUVERING DIAGRAM - FIRE TRUCK (OUTBOUND)

Size ANSI D

Sheet No. AT-102

Plot Date: 9 January 2024 - 1:30 PM   Plotted By: Raf Andrenacci   Path and Filename: N:\CA\Mississauga\Projects\Legacy\SernasTransTech\Projects\2023\621 Dundas Street East (12624196)\Drawings\AutoTURNs\621 Dundas Street East AT_Jan2023.dwg



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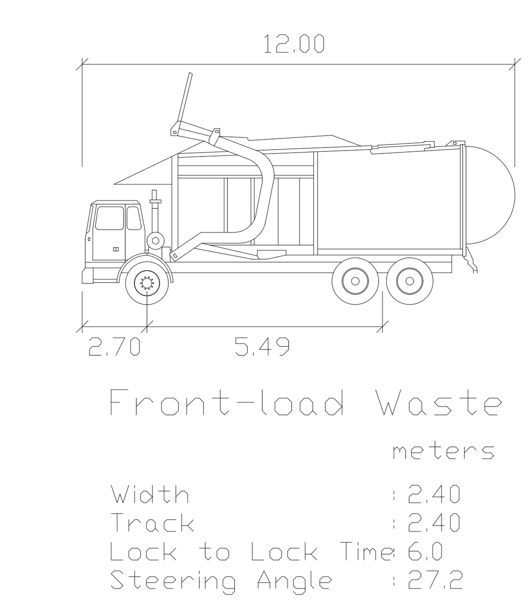
Bar is 25mm on original size sheet
0 25mm



No.	Issue	Checked	Approved	Date
1	First Submission	W.M	W.M	1/9/24

Author	J.E	Designer	J.E
Drafting Check	W.M	Design Check	W.M
Project Manager	W.M	Project Director	W.M

Client
2255718 ONTARIO LTD.

Project
621 Dundas Street

Date January 9, 2024 | Scale NTS

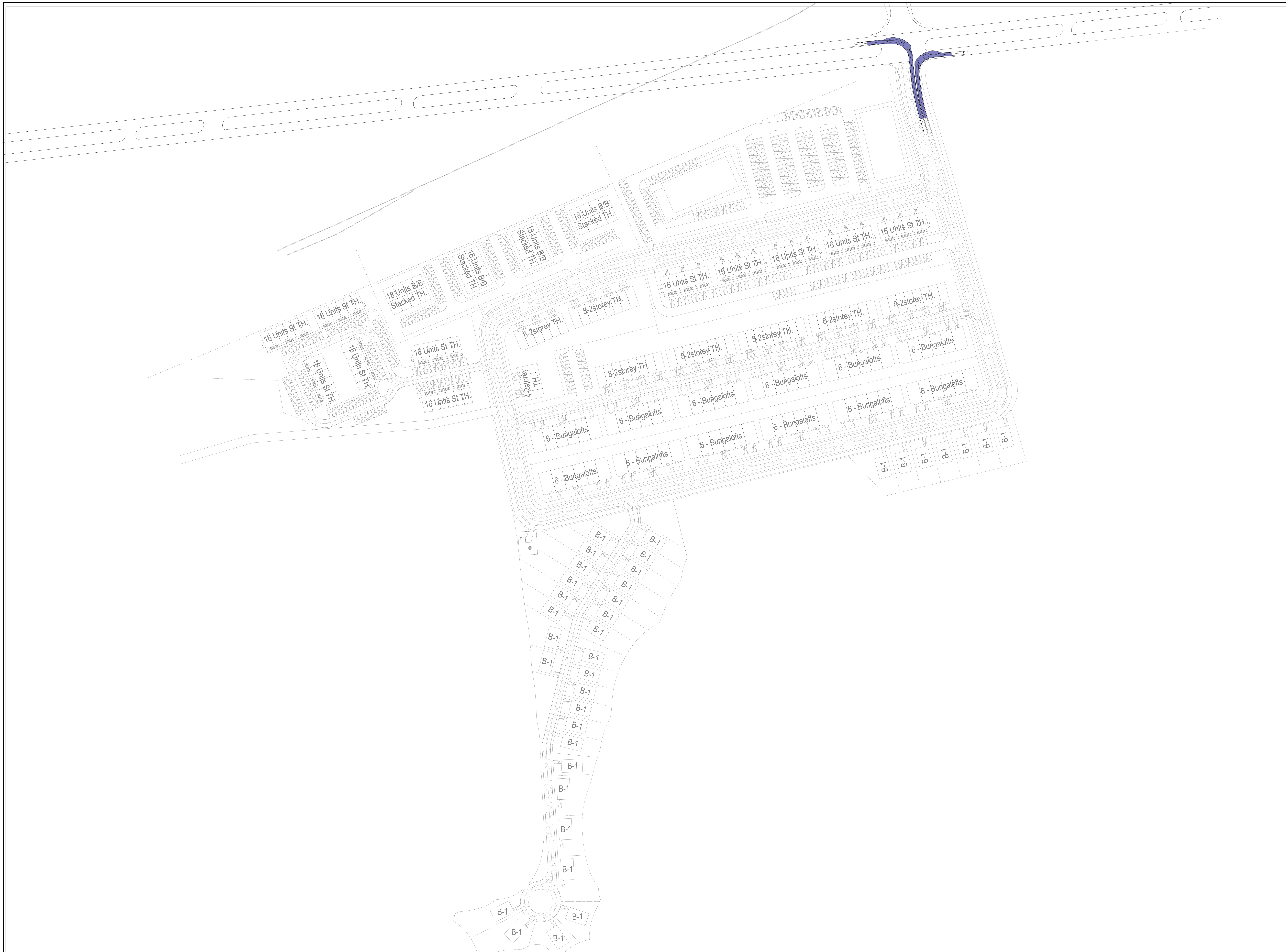
Project No. 12624196

Title
VEHICLE MANEUVERING DIAGRAM - GARBAGE TRUCK (FRONT LOAD INBOUND)

Size ANSI D

Sheet No. AT-103

Plot Date: 9 January 2024 - 1:30 PM   Plotted By: Raf Andrenacci   Path and Filename: N:\CA\Mississauga\Projects\Legacy\SernasTransTech\Projects\2023\621 Dundas Street East (12624196)\Drawings\AutoTURNs\621 Dundas Street East AT_Jan2023.dwg



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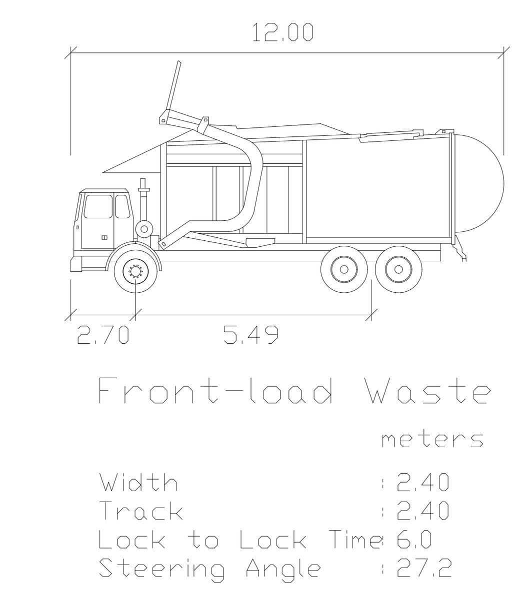
Bar is 25mm on original size sheet
0 25mm



No.	Issue	Checked	Approved	Date
1	First Submission	W.M	W.M	1/9/24

Author	J.E	Designer	J.E
Drafting Check	W.M	Design Check	W.M
Project Manager	W.M	Project Director	W.M

Client
2255718 ONTARIO LTD.

Project
621 Dundas Street

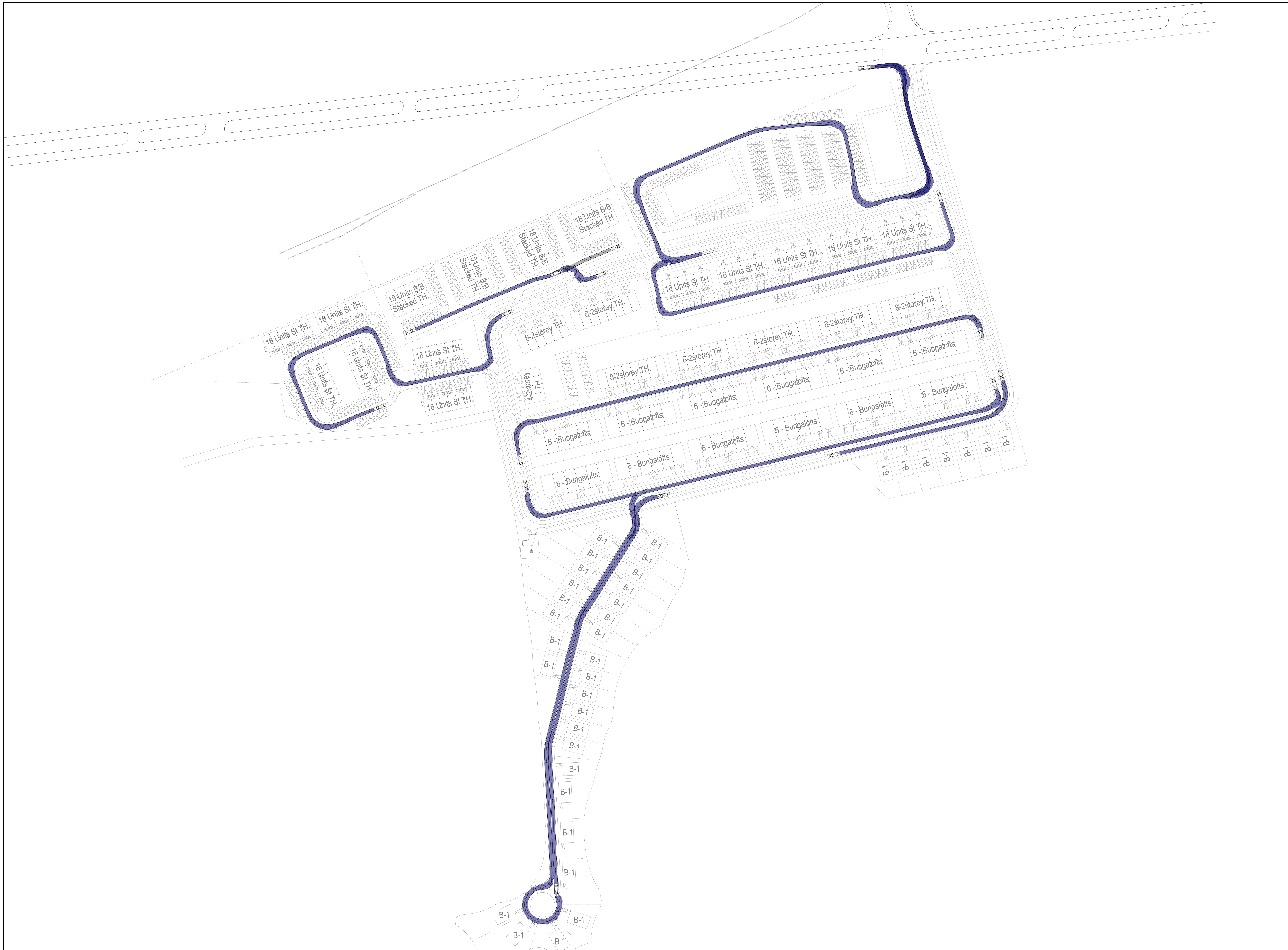
Date January 9, 2024
Scale NTS

Project No.
12624196

Title
VEHICLE MANEUVERING DIAGRAM - GARBAGE TRUCK (FRONT LOAD OUTBOUND)

Size
ANSI D

Sheet No.
AT-104



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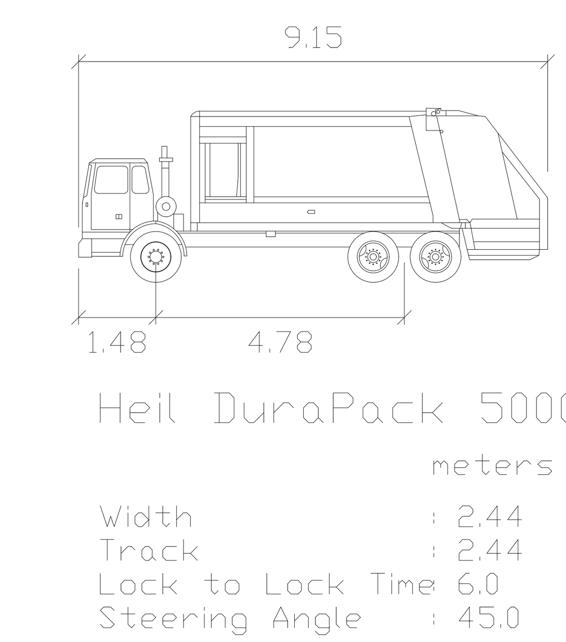


No.	Issue	Checked	Approved	Date
1	First Submission	W.M	W.M	1/9/24

Author	J.E	Designer	J.E
Drafting Check	W.M	Design Check	W.M
Project Manager	W.M	Project Director	W.M

Client
2255718 ONTARIO LTD.

Project
621 Dundas Street

Date: January 9, 2024 | Scale: NTS

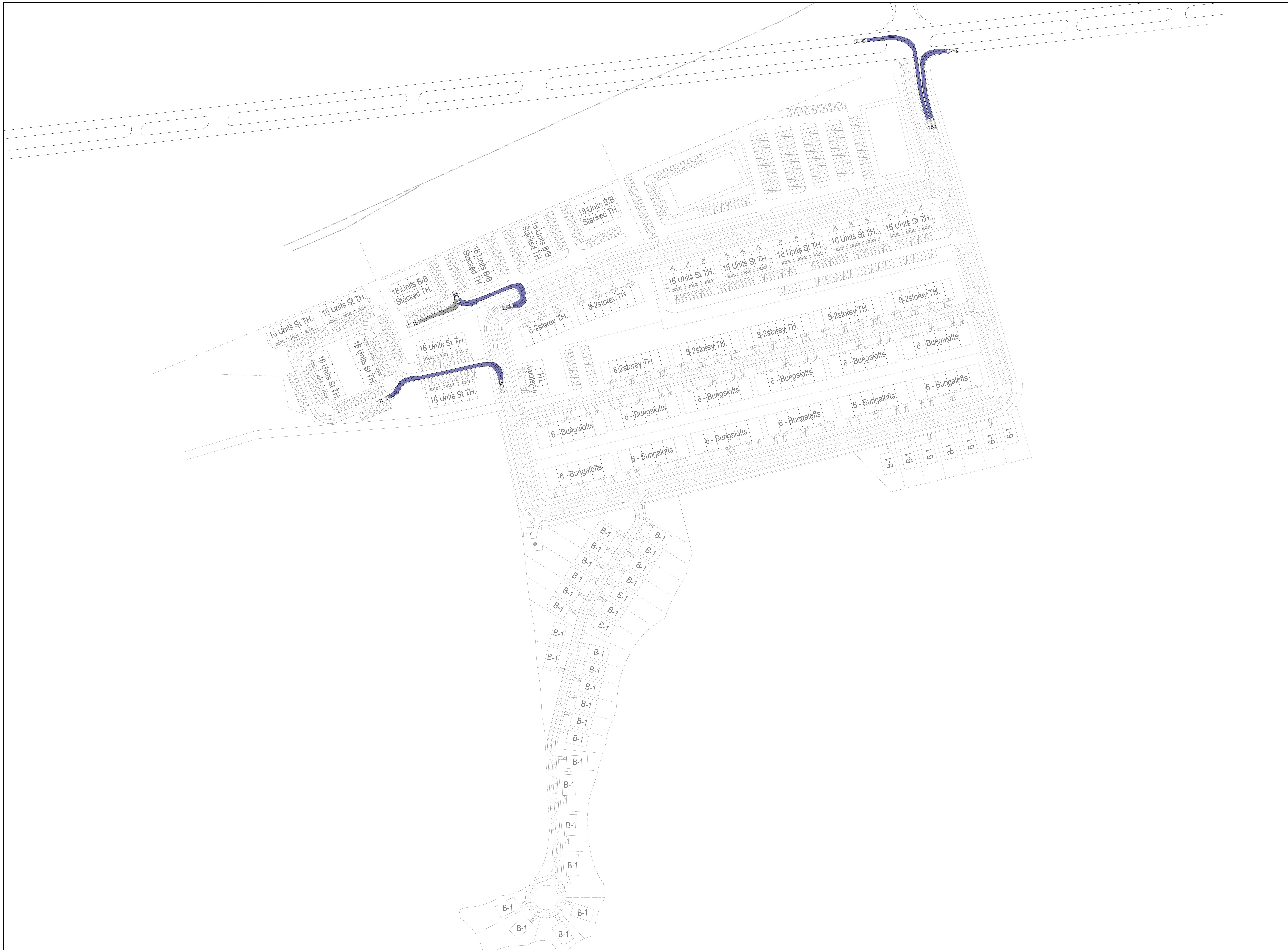
Project No. 12624196

Title
VEHICLE MANEUVERING DIAGRAM - GARBAGE TRUCK (REAR LOAD INBOUND)

Size: ANSI D

Sheet No. AT-105

Plot Date: 9 January 2024 - 1:30 PM   Plotted By: Raf Andrenacci   Path and Filename: N:\CA\Mississauga\Projects\Legacy\SernasTransTech\Projects\2023\621 Dundas Street East (12624196)\Drawings\AutoTURNs\621 Dundas Street East AT_Jan2023.dwg



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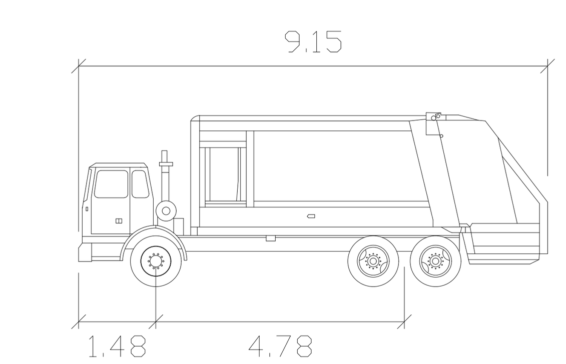

Heil DuraPack 5000
meters
Width : 2.44
Track : 2.44
Lock to Lock Time 6.0
Steering Angle : 45.0

No.	Issue	Checked	Approved	Date
1	First Submission	W.M	W.M	1/9/24

Author	J.E	Designer	J.E
Drafting Check	W.M	Design Check	W.M
Project Manager	W.M	Project Director	W.M

Client
2255718 ONTARIO LTD.

Project
621 Dundas Street

Date January 9, 2024
Scale NTS

Project No. 12624196

Title
VEHICLE MANEUVERING DIAGRAM - GARBAGE TRUCK (REAR LOAD OUTBOUND)

Size ANSI D

Sheet No. AT-106