



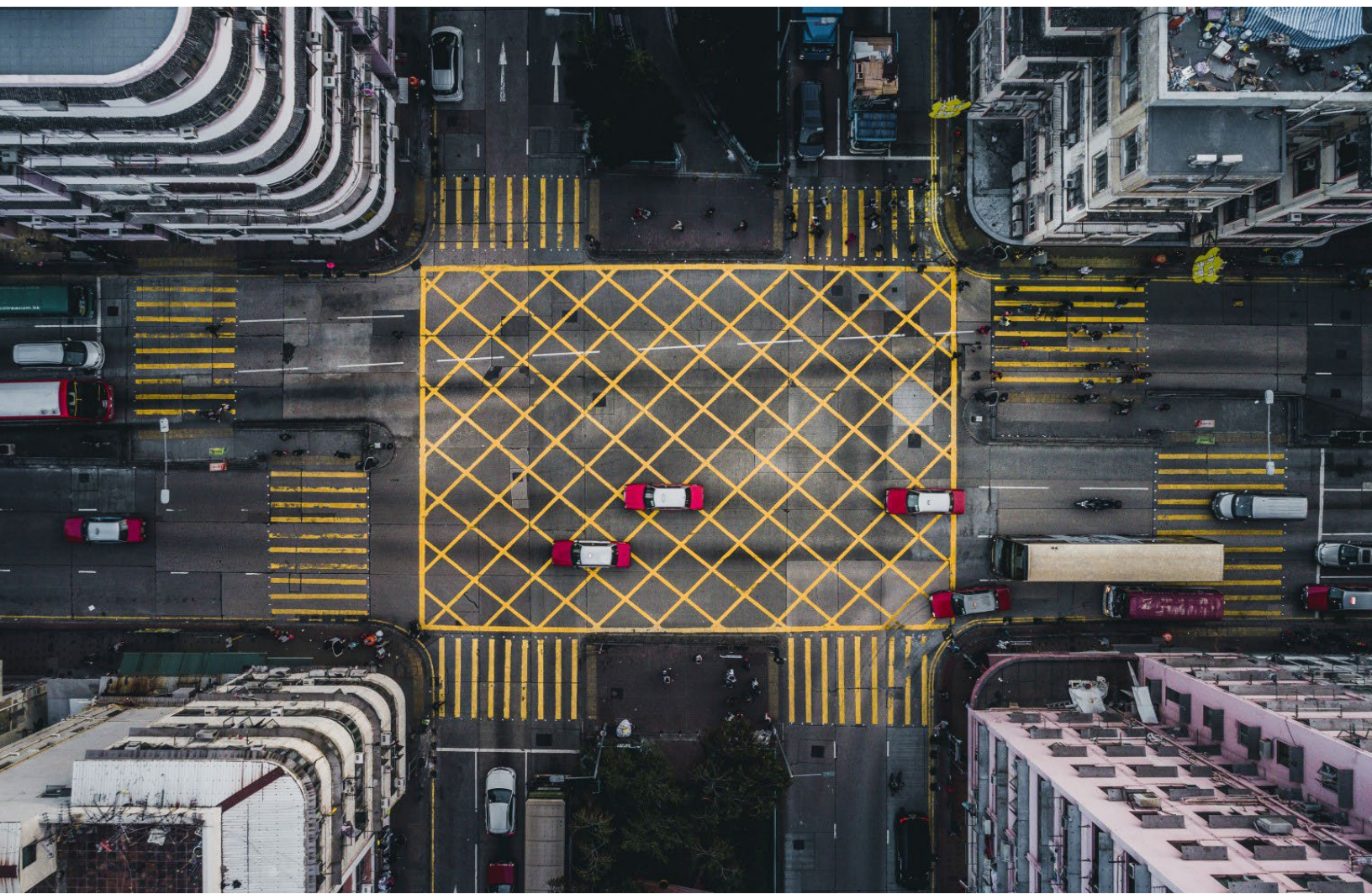
# Proposed Retirement and Assisted Care Development 46 Stevens Road, Municipality of Clarington

## Traffic Impact Study

Vad Retail Ltd.

July 12, 2022

→ **The Power of Commitment**



**GHD**



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Our ref: 12563422

July 12, 2022

**Rodrick Sutherland**  
**Land Development Manager**  
**Vad Retail Ltd.**  
315 – 220 Duncan Mill Road  
North York, ON M3B 3J5

Subject: **Traffic Impact Study**  
**Proposed Residential Retirement and Assisted Care Development**  
**46 Stevens Road, Municipality of Clarington**

Dear Mr. Sutherland,

GHD is pleased to submit the enclosed Traffic Impact Study for the proposed retirement and assisted care development located at 46 Stevens Road, generally north of Stevens Road and east of Bowmanville Avenue in the Municipality of Clarington. The property is approximately 8.6 hectares in size.

The purpose of this study is to determine the traffic-related impacts on the roadway system due to the proposed development traffic and is to determine appropriate Transportation Demand Management measures. It is also to determine appropriate site accesses / internal drive aisles to accommodate vehicle circulation requirements for the proposed development.

Based on the current site plan, the proposed development consists of the following developments:

- One storey bungalow townhouses (11 units);
- 7 storey assisted care facility (138 units);
- 8 storey memory care facility (146 units);
- 10 storey senior housing with opportunities for affordable housing (289 units); and
- 53,002 ft<sup>2</sup> amenity building.

The site plan proposes two full-moves accesses on Stevens Road as an emergency access.

GHD has consulted with Region and Municipality staff to confirm the assumptions of this study.

For study purposes, the proposed development is expected to be completed / occupied in 2023. Therefore, the study horizon is 2028, five years beyond build-out.

This study concludes that under the future traffic forecasts, the traffic generated by the proposed development along with non-site related traffic growth can be accommodated by the abutting street system with planned / recommended intersection improvements at Bowmanville Avenue / Stevens Road. Traffic generated by the proposed development does not add significant adverse impacts on the study intersections. No additional road improvements are triggered by the proposed development.

The Vehicle Circulation Review confirms that the proposed site plan is sufficient to accommodate the circulation requirements of fire services, garbage trucks, and heavy single unit trucks (HSU) as well as ambulance vehicles.

We trust the enclosed is sufficient for your needs, but please do not hesitate to contact the undersigned should you require any additional assistance.

Sincerely,

GHD



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**Roland Roovers, P.Eng.**  
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# Executive summary

- The purpose of this report is to determine the traffic-related impacts on the roadway system from the proposed retirement and assisted care development located at 46 Stevens Road, generally north of Stevens Road and east of Bowmanville Avenue in the Municipality of Clarington.
- Based on the current site plan, the proposed development consists of the following developments:
  - One storey bungalow townhouses (11 units);
  - 7 storey assisted care facility (138 units);
  - 8 storey assisted care facility (146 units);
  - 10 storey senior housing with opportunities for affordable housing (289 units); and
  - 53,002 ft<sup>2</sup> amenity building.
- The site plan proposes two full-moves accesses on Stevens Road (cul-de-sac) including the Site Access 2 (West Access) as an emergency access.
- As confirmed by the Region and Municipality, the study intersections for capacity analysis are:
  - Bowmanville Avenue / Stevens Road (existing signalized intersection);
  - Stevens Road / Munday Court (existing unsignalized intersection); and
  - Stevens Road / proposed Site Access 1 (East Access, future unsignalized intersection).
- The weekday turning movement counts were obtained from the Region's website for the intersection of Bowmanville Avenue / Stevens Road dated Wednesday, November 20, 2019. As confirmed by the Region and Municipality, the study used the 2019 TMC data for the baseline traffic.
- For study purposes, the proposed development is expected to be completed in 2023. Therefore, the study horizon will be 2028, five years beyond build-out as required by the Region's TIS guidelines.
- The AADT regression analysis within the current 10 years shows that there was negative growth along Bowmanville Avenue. To be conservative and to account for potential new traffic generators in the vicinity of the study, the study assumed an annual growth rate of 0.5% at the intersection of Bowmanville Avenue and Stevens Road except for the eastbound left and southbound right turning movements. This methodology was accepted by the Region.
- In consultation with the Region, there are intersection improvements planned for the intersection of Bowmanville Avenue with Stevens Road, and scheduled for 2021 and 2022. The Region provided plans of the improvements, which included exclusive left turn lanes on Stevens Road and an additional lane northbound and southbound on Bowmanville Avenue.
- Subject site trips for the townhouses, retirement and assisted care units were estimated based on the trip rates of Low-Rise Multifamily House (LUC #220), Senior Adult Housing (LUC #252)

and Assisted Living (LUC #254) provided by Trip Generation, 10th Edition, published by the Institute of Transportation Engineers (ITE).

Although there could be an allowance for transit and active transportation modes, trip reductions were not considered in this analysis. Accordingly, the total new site trips are expected to be 118 two way trips during the weekday AM peak hour and 157 two way trips during the weekday PM peak hour.

- The directional distribution and assignment of traffic approaching and departing the subject site were determined based on the Transportation Tomorrow Study (2016 TTS) survey data and the available road network.
- This study concludes that under the future traffic forecasts, the traffic generated by the proposed development along with non-site related traffic growth can be accommodated by the abutting street system with planned intersection improvements at Bowmanville Avenue / Stevens Road.
- Traffic generated by the proposed development does not add significant adverse impacts on the study intersections. No additional road improvements are triggered by the proposed development.
- The proposed site accesses can be expected to have good operational characteristics under the future 2028 total traffic conditions.
- The Vehicle Circulation Review confirms that the proposed site plan is sufficient to accommodate the circulation requirements of fire services, garbage trucks, and heavy single unit trucks (HSU) as well as ambulance vehicles.
- Durham Region Transit (DRT) currently provides bus service in the study area with Route 902A. Route 902A – King bus operates between the Oshawa GO Station, Oshawa Centre Terminal, Bowmanville Park & Ride and King Street East / Simpson Avenue area via King Street. There are bus stops at the intersection of King Street West / Bowmanville Avenue. Bus 902A provides weekday and weekend service.
- The Active Transportation Plan (ATP) describes options and identifies opportunities and makes recommendations for connectivity, convenience, accessibility, and improving active transportation facilities (i.e. sidewalks, multi-use trails, etc.) for the purpose of improving community health through physical activity, reducing greenhouse gas emissions, and alleviating traffic congestion.
- The site's residents can access to the surrounding pedestrian network, transit system and cycling network via internal roadways, Stevens Road and Bowmanville Avenue.
- The TDM plan proposes a mix of hard and soft measures including sidewalk connectivity, unbundled residential parking, bicycle parking and information package distribution to meet the objectives and targets to reduce vehicular demand and encourage passenger, transit, cycling, and walking.

# Contents

<b>1.</b>	<b>Introduction</b>	<b>1</b>
1.1	Retainer and objective	1
1.2	Study background	1
1.3	Study Team	2
<b>2.</b>	<b>Site characteristics</b>	<b>4</b>
2.1	Site environs	4
2.2	Study area	4
2.3	Site plan	4
<b>3.</b>	<b>Existing traffic conditions</b>	<b>5</b>
3.1	Existing road network	5
3.2	Existing traffic data	5
3.3	Transit data	6
3.4	Existing traffic conditions	7
<b>4.</b>	<b>Background traffic conditions</b>	<b>9</b>
4.1	Study horizon	9
4.2	Planned road network	9
4.3	Future traffic growth	10
4.4	Other background developments	11
4.5	Background traffic volumes	11
4.6	Background traffic conditions	12
<b>5.</b>	<b>Proposed site development</b>	<b>14</b>
5.1	Site traffic generation	14
5.2	Directional distribution and assignment	15
<b>6.</b>	<b>Total traffic conditions</b>	<b>16</b>
6.1	Total traffic volumes	16
6.2	Total traffic conditions	16
<b>7.</b>	<b>Site circulation review</b>	<b>19</b>
<b>8.</b>	<b>Active transportation plan</b>	<b>19</b>
<b>9.</b>	<b>Transportation demand management</b>	<b>20</b>
9.1	Objectives	20
9.2	Travel demand management	20
9.3	Existing TDM opportunities	21
9.4	Proposed TDM opportunities	21
9.5	Implementation and monitoring costs	22
<b>10.</b>	<b>Findings, conclusions and recommendations</b>	<b>22</b>

## Figure index

Figure 1	Site location	2
Figure 2	Site plan	3
Figure 3	Existing lane configurations	6
Figure 4	Existing traffic volumes	6
Figure 5	Future lane configurations	9
Figure 6	Net growth traffic volumes	10
Figure 7	2028 background traffic volumes	11
Figure 8	Site trips	15
Figure 9	Total traffic volumes	16

## Table index

Table 1	Existing traffic conditions	7
Table 2	2028 background traffic conditions	12
Table 3	Site trip generation	14
Table 4	Site trip distribution	15
Table 5	Total traffic conditions	17

## Appendices

Appendix A	Traffic and transit data
Appendix B	Synchro PHF & truck% and Synchro Report: Existing traffic conditions
Appendix C	Planned improvements, traffic growth review and other background developments
Appendix D	Synchro Report: Background traffic conditions
Appendix E	ITE trip generation sheets, 2016 TTS data and summary
Appendix F	Synchro Report: Total traffic conditions
Appendix G	Site circulation review
Appendix H	Excerpts of Clarington Transportation Master Plan and Durham Region TMP



# 1. Introduction

## 1.1 Retainer and objective

GHD was retained by Vad Retail Ltd. to prepare a Traffic Impact Study to determine the traffic related impacts on the roadway system from the proposed residential, retirement and assisted care development and to determine appropriate Transportation Demand Management measures and an Active Transportation Plan. It is also to determine appropriate site accesses / internal drive aisles to accommodate vehicle circulation requirements of the Site Plan.

The proposed development is located at 46 Stevens Road, generally north of Stevens Road and east of Bowmanville Avenue in the Municipality of Clarington. The site location is shown in Figure 1.

## 1.2 Study background

Based on the current site plan, the proposed development consists of the following developments:

- One storey bungalow townhouses (11 units);
- 7 storey assisted care facility (138 units);
- 8 storey assisted care facility (146 units);
- 10 storey senior housing with opportunities for affordable housing (289 units); and
- 53,002 ft<sup>2</sup> amenity building.

The site plan proposes two full-moves accesses on Stevens Road including an emergency access.

Figure 2 shows the proposed development and the access locations.

For study purposes, the proposed development is expected to be completed in 2023. Therefore, the study horizon will be 2028, five years beyond build-out as confirmed by the Region.

This study establishes the existing traffic volumes and operating conditions for the weekday AM and PM peak hour periods, derives and assesses the future background traffic growth, estimates and assigns new site traffic volumes, and documents the expected site-related impacts on the road network.

GHD has consulted with the Region and Municipality staff to confirm the assumptions of this study. We have also reviewed the following to aid in the preparation of this report:

- Traffic Addendum by IBI Group prepared for Brookhill Residential Development, dated March 12, 2021.

Our findings, conclusions and recommendations are contained herein.

## 1.3 Study Team

The project team members involved in the preparation of this study are:

- Mr. Roland Roovers, P.Eng., Senior Transportation Manager, Transportation Planning
- Mr. Hong Shen, M.Eng., P.Eng., Transportation Project Engineer.



**Figure 1** Site location

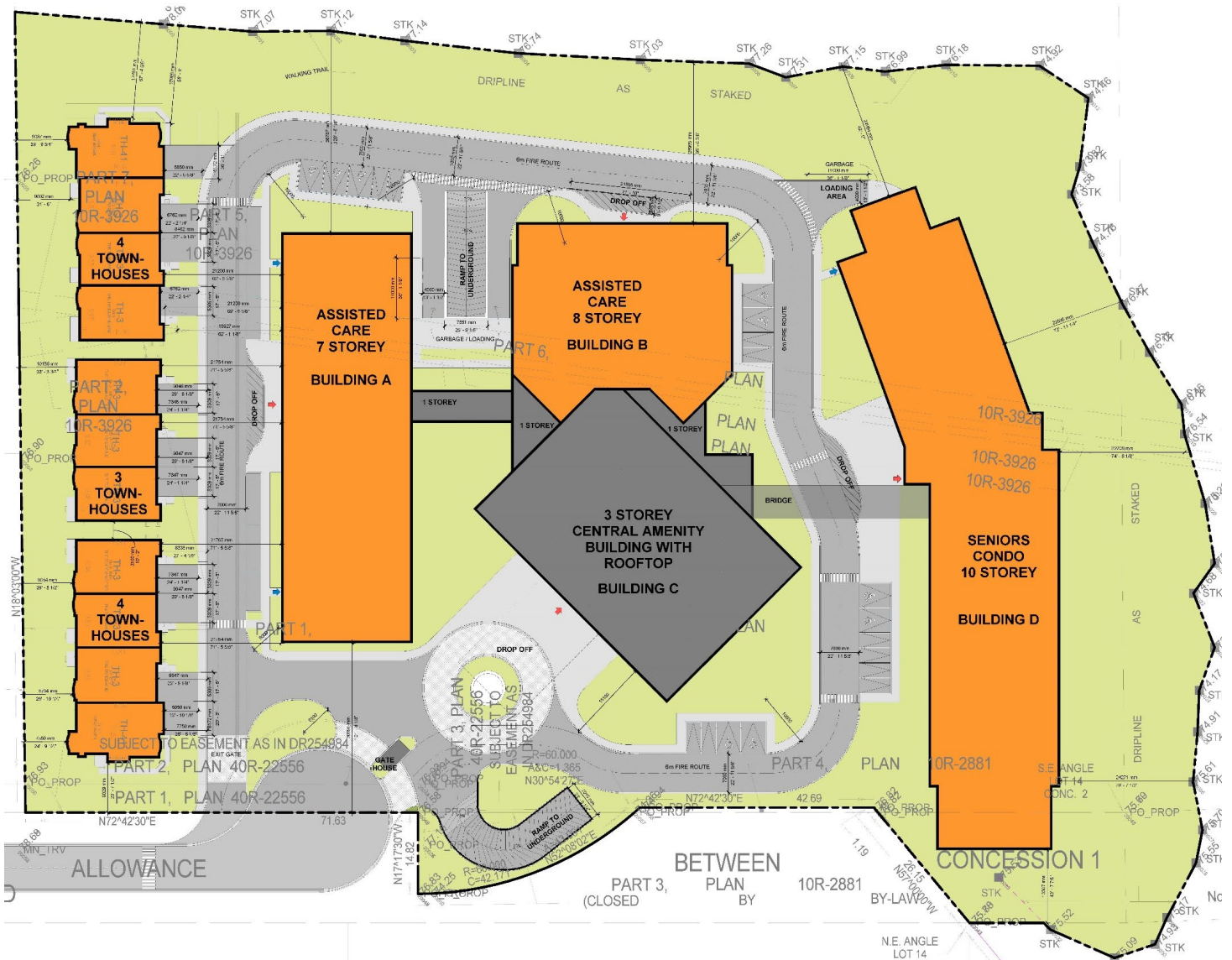


Figure 2 Site plan

## **2. Site characteristics**

### **2.1 Site environs**

The current site land use consists of a house and is roughly rectangular in shape with approximately 8.6 hectares in size. It is bordered to the south by Stevens Road, to the west by existing houses, to the north and east by vacant lands. The location of the subject site is shown in Figure 1.

The site has opportunities to access the surrounding arterial street and transit systems. The distance between the site and Bowmanville Avenue along Stevens Road is approximately 230 meters, and the distance between the Stevens Road and King Street West along Bowmanville Avenue is approximately 270 meters.

### **2.2 Study area**

As confirmed by the Region and Municipality, the study intersections for capacity analysis are:

- Bowmanville Avenue / Stevens Road (existing signalized intersection);
- Stevens Road / Munday Court (existing unsignalized intersection); and
- Stevens Road / proposed Site Access 1 (East Access, future unsignalized intersection).

### **2.3 Site plan**

Based on the current site plan, the proposed development consists of the following developments:

- One storey bungalow townhouses (11 units);
- 7 storey assisted care facility (138 units);
- 8 storey assisted care facility (146 units);
- 10 storey senior housing with opportunities for affordable housing (289 units); and
- 53,002 ft<sup>2</sup> amenity building.

The site plan proposes two full-moves accesses on Stevens Road including an emergency access.

Figure 2 shows the proposed development and the access locations.

## **3. Existing traffic conditions**

### **3.1 Existing road network**

The following describes the existing road infrastructure in the study area. Figure 3 shows the existing lane configurations and traffic controls of the study intersections.

#### **Bowmanville Avenue**

Bowmanville Avenue (Regional Road 57) is a north-south Type A arterial road under the jurisdiction of the Region of Durham. It has a posted speed limit of 60 km/hr in the vicinity of the subject site. It currently has a two-lane rural cross-section, and there are no sidewalks within the study area.

The intersection of Bowmanville Avenue with Stevens Road is signalized with exclusive northbound and southbound left turn lanes, a through-right lane on the northbound approach, as well as a through lane and a right lane on the southbound approach. At the eastbound and westbound approaches, Stevens Road has a shared left-through-right lane. In consultation with the Region, there are intersection improvements planned for the Bowmanville Avenue intersection with Stevens Road, and scheduled for 2021 and 2022. The improvements include exclusive left turn lanes on Stevens Road and an additional lane northbound and southbound.

#### **Stevens Road**

Stevens Road is an east-west collector road west of Bowmanville Avenue and a local road east of Bowmanville Avenue. It is under the jurisdiction of the Municipality of Clarington. It has a two-lane urban cross-section with a sidewalk on the south side of road and a posted speed limit of 50 km/hr west of Bowmanville Avenue. It is a two-lane rural cross-section without sidewalks east of Bowmanville Avenue.

The intersection of Stevens Road with Munday Court is a STOP controlled intersection with shared lanes on all approaches.

#### **Munday Court**

Munday Court is a north-south local road under the jurisdiction of the Municipality of Clarington. It has a two-lane rural cross-section, and no sidewalks.

### **3.2 Existing traffic data**

The weekday turning movement counts dated Wednesday, November 20, 2019 were obtained from the Region's website for the intersection of Bowmanville Avenue / Stevens Road. As confirmed by the Region and Municipality, the study used the 2019 TMC data for the baseline traffic. The Annual Average Daily Traffic (AADT) and Automatic Traffic Recorder (ATR) data were also obtained from the Region and is provided in Appendix A.

Figure 4 shows the existing 2019 traffic volumes for weekday AM and PM peak hours at the study area intersections. The most recent and available historical traffic data are provided in Appendix A. The existing signal timing for the Bowmanville Avenue / Stevens Road intersection was obtained from the Region and is also provided in Appendix A.

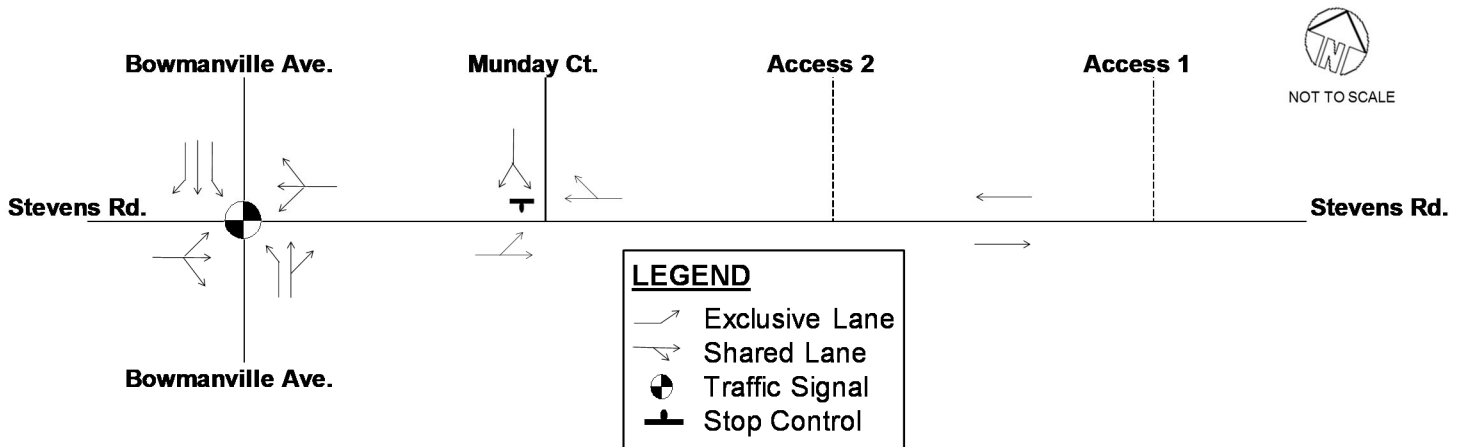


Figure 3 Existing lane configurations

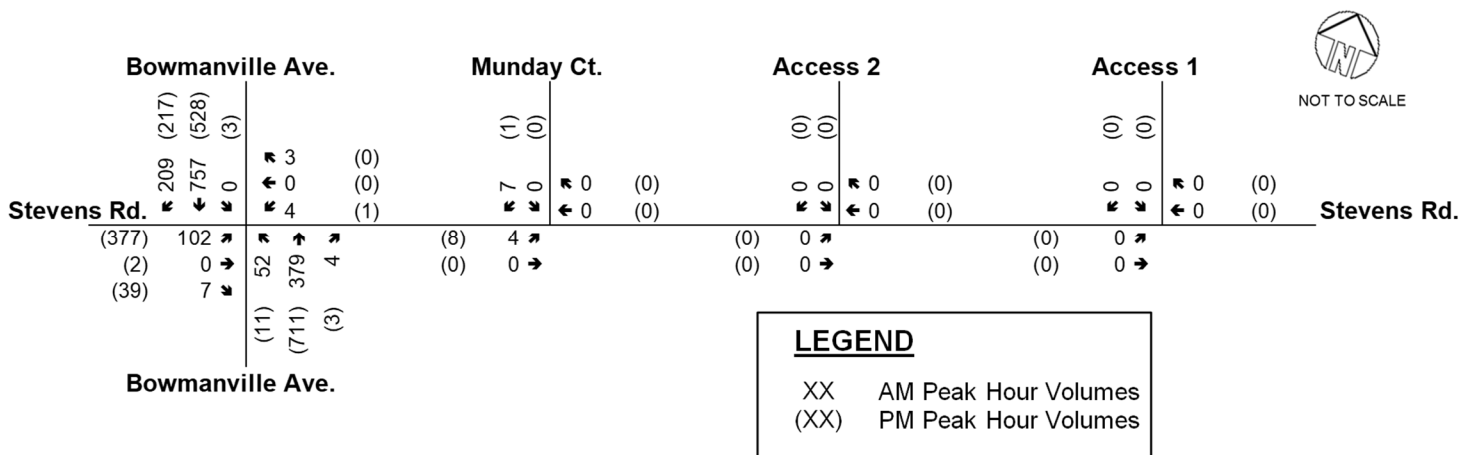


Figure 4 Existing traffic volumes

### 3.3 Transit data

Durham Region Transit (DRT) currently provides bus service in the study area with Route 902A. Route 902A – King bus operates between the Oshawa GO Station, Oshawa Centre Terminal, Bowmanville Park & Ride and King Street East / Simpson Avenue area via King Street. There are bus stops at the intersection of King Street West / Bowmanville Avenue. Bus 902A provides weekday weekend service.

The DRT route map and service schedule are provided in Appendix A.

### 3.4 Existing traffic conditions

The capacity analysis identifies how well the intersections and driveways are operating. The analyses are based on the methodology contained in the Highway Capacity Manual, which assigns an intersection Level of Service (LOS) based on the average control delay experienced by each vehicle passing through that intersection. Synchro software was utilized to conduct the analysis.

Peak hour factors for the study intersection were from the existing traffic data and used in the Synchro analysis.

For analysis purposes, ‘critical’ intersection movements are defined as traffic movements where:

- Volume to capacity (v/c) ratio of through movement or shared through/turning movement exceeds 0.85; or
- Volume to capacity (v/c) ratio of an exclusive turning movement exceeds 1.0.

Table 1 summarizes the results of the existing intersection capacity analyses. Appendix B contains the detailed existing intersection capacity analysis reports.

**Table 1 Existing traffic conditions**

Intersection	Control Type	AM Peak Hour			PM Peak Hour		
		Overall v/c (LOS) Delay in Seconds	Critical/ Key Movements v/c(LOS) Delay in Seconds	95th %ile Queues (m)	Overall v/c (LOS) Delay in Seconds	Critical/ Key Movements v/c(LOS) Delay in Seconds	95th %ile Queues (m)
Bowmanville Ave (R.R. 57) & Stevens Rd	Signalized	0.78 (B) 18	EBTLR = 0.45 (D) 39 WBTLR = 0.01 (C) 34 NBL = 0.23 (A) 9 NBTR = 0.4 (A) 6 SBL = ( ) 0 SBT = 0.88 (C) 24 SBR = 0.22 (A) 7	EBTLR = 25 m WBTLR = 0 m NBL = 10 m NBTR = 50 m SBL = 0 m SBT = 215 m SBR = 15 m	0.93 (D) 36	EBTLR = 0.97 (E) 63 WBTLR = 0 (B) 18 NBL = 0.05 (B) 12 NBTR = 0.91 (D) 36 SBL = 0.03 (B) 12 SBT = 0.7 (C) 23 SBR = 0.16 (B) 13	EBTLR = 135 m WBTLR = 5 m NBL = 5 m NBTR = 190 m SBL = 5 m SBT = 110 m SBR = 15 m
Stevens Rd & Munday Ct	Unsignalized	SBLR 0.01 (A) 9	EBTL = 0 (A) 7 WBTR = 0 ( ) 0 SBLR = 0.01 (A) 9	EBTL = 5 m WBTR = 0 m SBLR = 5 m	SBLR 0 (A) 8	EBTL = 0.01 (A) 7 WBTR = 0 ( ) 0 SBLR = 0 (A) 8	EBTL = 5 m WBTR = 0 m SBLR = 0 m

#### Bowmanville Avenue and Stevens Road

Under existing conditions, this signalized intersection is operating at acceptable levels of service (LOS) ‘B’ and ‘D’ during the weekday AM and PM peak hours with overall delays of 18 and 36 seconds, respectively. The overall v/c ratios during the weekday AM and PM peak hours are 0.78 and 0.93, respectively.

During the weekday AM peak hour, the southbound through movement is identified as a critical movement with a v/c ratio of 0.88 however, with good level of service (LOS) 'C'. All other individual movements are operating at acceptable levels of service (LOS 'D,' or better) and v/c ratios of 0.45 or less.

During the weekday PM peak hour, the eastbound shared left-through-right and northbound through-right movements are identified as critical movements with v/c ratios of 0.97 and 0.91. and LOS 'E' and 'D', respectively.

### **Stevens Road and Munday Court**

Under existing conditions, this unsignalized intersection has excellent operational characteristics. All movements have 'good' LOS 'A' with v/c ratios of 0.01 or less during the AM and PM peak hours. No critical movements and queue issues are identified.



# 4. Background traffic conditions

## 4.1 Study horizon

For study purposes, the proposed development is expected to be completed in 2023. Therefore, the study horizon will be 2028, five years beyond build-out as confirmed by the Region and Municipality.

## 4.2 Planned road network

In consultation with the Region, there are intersection improvements planned for the Bowmanville Avenue intersection with Stevens Road, and scheduled for 2021 and 2022. The improvements include exclusive left turn lanes on Stevens Road and an additional lane northbound and southbound.

According to the "Durham Transportation Master Plan" dated December 2017, Bowmanville Avenue (RR 57) is recommended to be widened from 2 to 4 lanes between King Street to Stevens Road in the period 2017 to 2021, and between Stevens Road to Nash Road in the period 2022 to 2026 (provided in Appendix C).

Figure 5 shows the planned future lane configurations and traffic controls of the study intersections.

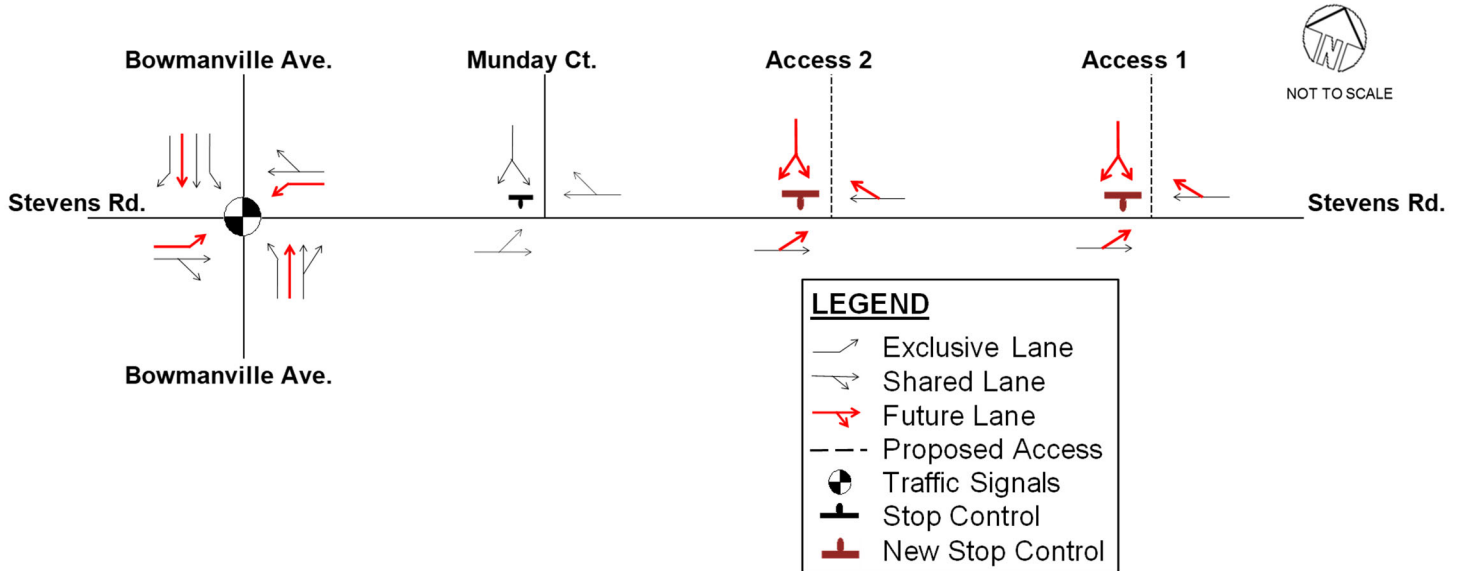


Figure 5 Future lane configurations

### 4.3 Future traffic growth

To assess the growth rate, the AADT data from 2004 to 2015 was based on the Region’s AADT summary Table, and the AADT and ATR data from 20017 to 2020 was obtained from the Region’s Website.

Due to the current COVID-19 pandemic, the 2020 AADT data may not likely be representative of pre-COVID-19 volumes. For analysis purposes, traffic growth rates were also calculated without the 2020 AADT/ATR data.

Based on the regression analysis of the AADT data using between 2010 and 2017 to 2019 (within 10 years), negative growth rates of -0.13% to -3.36% along Bowmanville Avenue were derived.

Appendix C contains regression analyses for the growth rate calculations.

GHD also reviewed the most recent turning movement count data (November 20, 2019 TMC) available on the Region’s website for the intersection of Bowmanville Avenue / Stevens Road. The Region’s 2019 TMC data indicated that the eastbound left turn traffic at the intersection of Bowmanville Avenue / Stevens Road was 377 vehicle per hour during the weekday PM peak hour, which reaching the design capacity of the left turn lane. Similarly, the southbound right during the AM peak hour is also comparatively high to other turn movements.

In summary, the AADT regression analysis within the current 10 years shows that there was negative growth along Bowmanville Avenue. To be conservative and to account for potential new traffic generators in the vicinity of the study, the study assumed an annual growth rate of 0.5% at the intersection of Bowmanville Avenue and Stevens Road except for the eastbound left and southbound right turning movements due to the already high volumes. This methodology was accepted by the Region.

The net growth traffic volumes are shown in Figure 6.

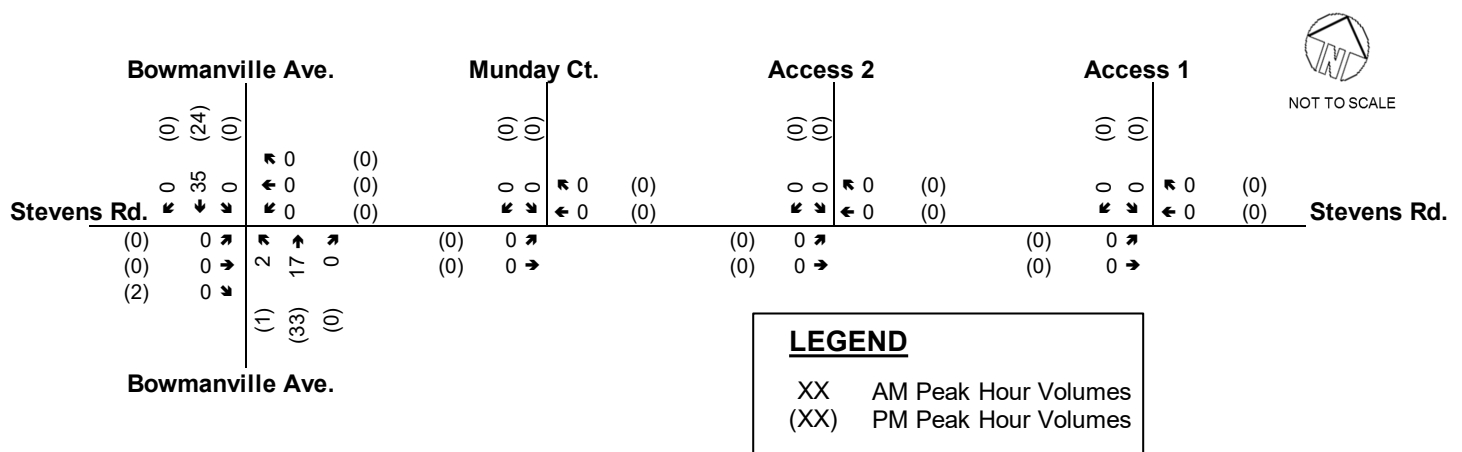


Figure 6 Net growth traffic volumes

## 4.4 Other background developments

Based on a review of the background information provided by the Municipality (locations shown in Appendix C), there are 2 other developments in the area with potential impacts to the study intersections.

1. Brookhill Residential Development: total of 450 residential condominium apartment units, located directly north of the Walmart on the northwest corner of Bosewell Drive and Brookhill Boulevard
2. Brookhill Phase 5 development: including 95 condominium units, 57 townhouses and 53 Single detached dwellings. It is located north of Ross Wright Avenue.

Based on review of the Traffic Addendum (provided in Appendix C) prepared by IBI Group for Brookhill Residential Development (dated March 12, 2021), there is no traffic assigned to/from the east-west on Stevens Road.

Assuming a similar distribution for the second residential development (north of 1<sup>st</sup> development) also results in no site traffic at study intersection of Bowmanville Ave / Stevens Road.

Therefore, these two developments will not impact the study intersections.

## 4.5 Background traffic volumes

Based on the above discussions, the existing traffic (Figure 4) and the estimated net traffic growth (Figure 6) were combined to derive the future background weekday AM and PM peak hour traffic volumes. The background (2028) traffic volumes are presented in Figure 7.

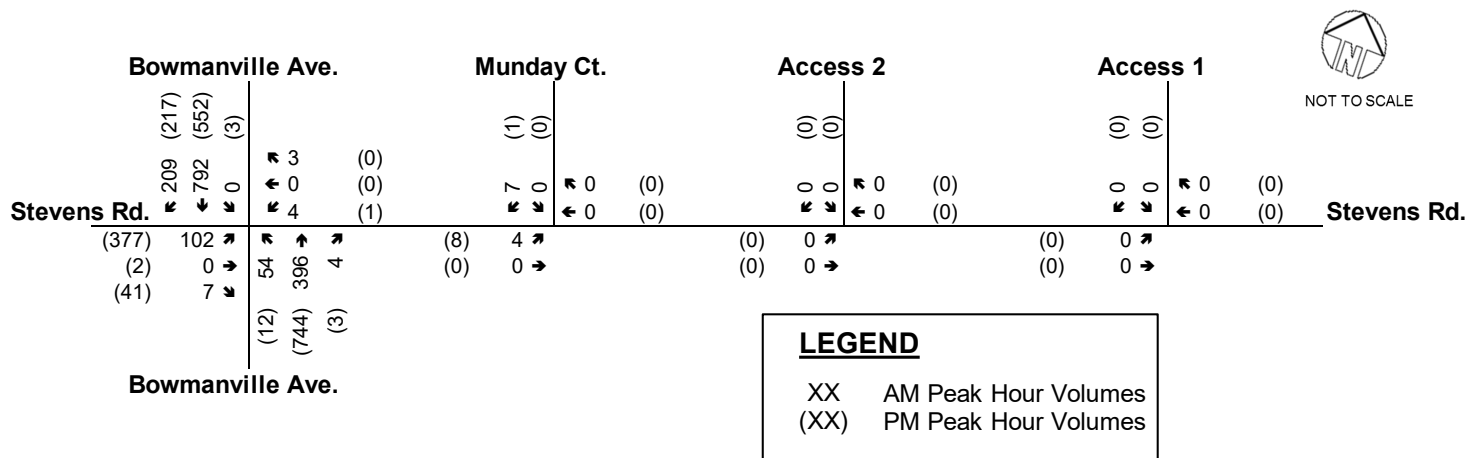


Figure 7 2028 background traffic volumes

## 4.6 Background traffic conditions

The future background 2028 traffic volumes were subjected to intersection capacity analyses based on the same methodologies and existing lane configurations utilized for the existing conditions. Peak hour factors for the study intersections were from the existing traffic data and used in the Synchro analysis.

As discussed, the planned future lane configurations and traffic controls are shown in Figure 5.

Table 2 summarizes the results of the intersection capacity analysis. Appendix D contains the detailed background 2028 intersection capacity analysis reports.

**Table 2 2028 background traffic conditions**

Intersection	Control Type	AM Peak Hour			PM Peak Hour		
		Overall v/c (LOS) Delay in Seconds	Critical/ Key Movements v/c(LOS) Delay in Seconds	95th % ile Queues (m)	Overall v/c (LOS) Delay in Seconds	Critical/ Key Movements v/c(LOS) Delay in Seconds	95th % ile Queues (m)
Bowmanville Ave (R.R. 57) & Stevens Rd	Signalized (Existing Signal Timings)	0.52 (B) 12	EBL = 0.65 (D) 42 EBTR = 0.01 (C) 31 WBL = 0.03 (C) 31 WBTR = 0 (C) 31 NBL = 0.19 (A) 5 NBTR = 0.23 (A) 5 SBL = ( ) 0 SBT = 0.52 (B) 12 SBR = 0.18 (A) 9	EBL = 35 m EBTR = 0 m WBL = 5 m WBTR = 0 m NBL = 10 m NBTR = 25 m SBL = 0 m SBT = 75 m SBR = 10 m	0.66 (C) 22	EBL = 0.92 (D) 52 EBTR = 0.03 (B) 20 WBL = 0 (B) 19 WBTR = ( ) 0 NBL = 0.04 (B) 11 NBTR = 0.48 (B) 15 SBL = 0.01 (B) 11 SBT = 0.37 (B) 14 SBR = 0.16 (B) 12	EBL = 115 m EBTR = 10 m WBL = 5 m WBTR = 0 m NBL = 5 m NBTR = 65 m SBL = 5 m SBT = 45 m SBR = 15 m
	Signalized (Optimized Signal Timings)	0.52 (B) 11	EBL = 0.65 (D) 43 EBTR = 0.01 (C) 31 WBL = 0.03 (C) 32 WBTR = 0 (C) 31 NBL = 0.19 (A) 5 NBTR = 0.23 (A) 5 SBL = ( ) 0 SBT = 0.51 (B) 11 SBR = 0.18 (A) 8	EBL = 35 m EBTR = 0 m WBL = 5 m WBTR = 0 m NBL = 10 m NBTR = 25 m SBL = 0 m SBT = 70 m SBR = 10 m	0.66 (C) 20	EBL = 0.82 (D) 36 EBTR = 0.03 (B) 17 WBL = 0 (B) 17 WBTR = ( ) 0 NBL = 0.05 (B) 13 NBTR = 0.52 (B) 18 SBL = 0.02 (B) 13 SBT = 0.4 (B) 16 SBR = 0.16 (B) 14	EBL = 80 m EBTR = 5 m WBL = 5 m WBTR = 0 m NBL = 5 m NBTR = 80 m SBL = 5 m SBT = 60 m SBR = 15 m
Stevens Rd & Munday Ct	Unsignalized	SBLR 0.01 (A) 9	EBTL = 0 (A) 7 WBTR = 0 ( ) 0 SBLR = 0.01 (A) 9	EBTL = 5 m WBTR = 0 m SBLR = 5 m	SBLR 0 (A) 8	EBTL = 0.01 (A) 7 WBTR = 0 ( ) 0 SBLR = 0 (A) 8	EBTL = 5 m WBTR = 0 m SBLR = 0 m

The background traffic conditions are as follows:

### Bowmanville Avenue and Stevens Road

Under 2028 background traffic conditions with planned intersection improvements and existing signal times, this signalized intersection is expected to operate at acceptable LOS 'B' and 'C' during the weekday AM and PM peak hours with overall delays of 12 and 22 seconds, respectively. The overall v/c ratios during the weekday AM and PM peak hours are 0.52 and 0.66, respectively.

During the weekday AM peak hour, all individual movements are expected to operate at acceptable levels of service (LOS 'D,' or better) and v/c ratios of 0.65 or less.

During the weekday PM peak hour, the eastbound left turn movement is expected to operate at LOS 'D' with a v/c ratio of 0.92. All other individual movements are operating at 'good' levels of service (LOS 'B,' or better) and v/c ratios of 0.48 or less.

During the weekday PM peak hours, the eastbound left turn vehicle queues are expected to occasionally reach 115 metres, exceeded the planned left turn lane parallel and storage length of 108 m. The eastbound left turn operation can be improved by optimizing the timings of the phases.

With the implementation of the existing signal cycle length (90 seconds) and optimized phases, the eastbound left turn movement is expected to operate at LOS 'D' with an improved v/c ratio of 0.82 during the weekday PM peak hours. The eastbound left turn vehicle queues are expected to occasionally reach 80 metres, within the planned left turn lane parallel and storage length of 108 m. Appendix D contains the detailed capacity analysis reports.

### **Stevens Road and Munday Court**

Under 2028 background traffic conditions, this unsignalized intersection has excellent operational characteristics. All movements have 'good' LOS 'A' with v/c ratios of 0.01 or less during the AM and PM peak hours. No critical movements and queue issues are identified.

# 5. Proposed site development

## 5.1 Site traffic generation

Based on the current site plan, the proposed development consists of the following:

- One storey bungalow townhouses (11 units);
- 7 storey assisted care facility (138 units);
- 8 storey assisted care facility (146 units);
- 10 storey senior housing with opportunities for affordable housing (289 units); and
- 53,002 ft<sup>2</sup> amenity building.

Subject site trips for the townhouse, retirement and assisted care units were estimated based on the trip rates of Low-Rise Multifamily House (LUC #220), Senior Adult Housing (LUC #252) and Assisted Living (LUC #254) provided by Trip Generation, 10th Edition, published by the Institute of Transportation Engineers (ITE).

To be conservative, the subsequent analysis applied the higher trip rates based on the ITE average trip rates as well as trip rates derived from the fitted curve equations.

The entering and exiting proportions, and estimated total site trips are summarized in Table 3. the detail ITE trip generation sheets are provided in Appendix E.

**Table 3 Site trip generation**

Site Development	Units	Parameter	Peak Hour Trip Generation					
			Weekday AM Peak			Weekday PM Peak		
			In	Out	Total	In	Out	Total
Townhouse (One Storey) LUC 220	11	Gross Rate	0.125	0.420	0.545	0.455	0.272	0.727
		New Trips	1	5	6	5	3	8
Assisted Care (7 Storey) LUC 254	138	Gross Rate	0.12	0.07	0.19	0.10	0.16	0.26
		New Trips	16	10	26	14	22	36
Assisted Care (8 Storey) LUC 254	146	Gross Rate	0.12	0.07	0.19	0.10	0.16	0.26
		New Trips	17	11	28	14	24	38
Senior Housing (10 Storey) LUC 252	289	Gross Rate	0.07	0.13	0.20	0.14	0.12	0.26
		New Trips	20	38	58	41	34	75
<b>Total</b>	<b>584</b>	<b>Total New Trips</b>	<b>54</b>	<b>64</b>	<b>118</b>	<b>74</b>	<b>83</b>	<b>157</b>

Although there could be an allowance for transit and active transportation modes, to be conservative, trip reductions were not considered, for this exercise. Accordingly, the total new site trips are expected to be 118 two-way trips during the weekday AM peak hour total and 157 two-way trips during the weekday PM peak hour.

## 5.2 Directional distribution and assignment

The distributions of the residential trips are based on the Transportation Tomorrow Study (2016 TTS) survey data (see Appendix E).

The residential trip distribution was based on AM home productions and PM home attractions for the Clarington Ward 2 (2016 TTS ward 73) within the study area. The TTS was queried for auto-based home trip productions for the 6-9am period and home trip attractions for the 4-7pm period.

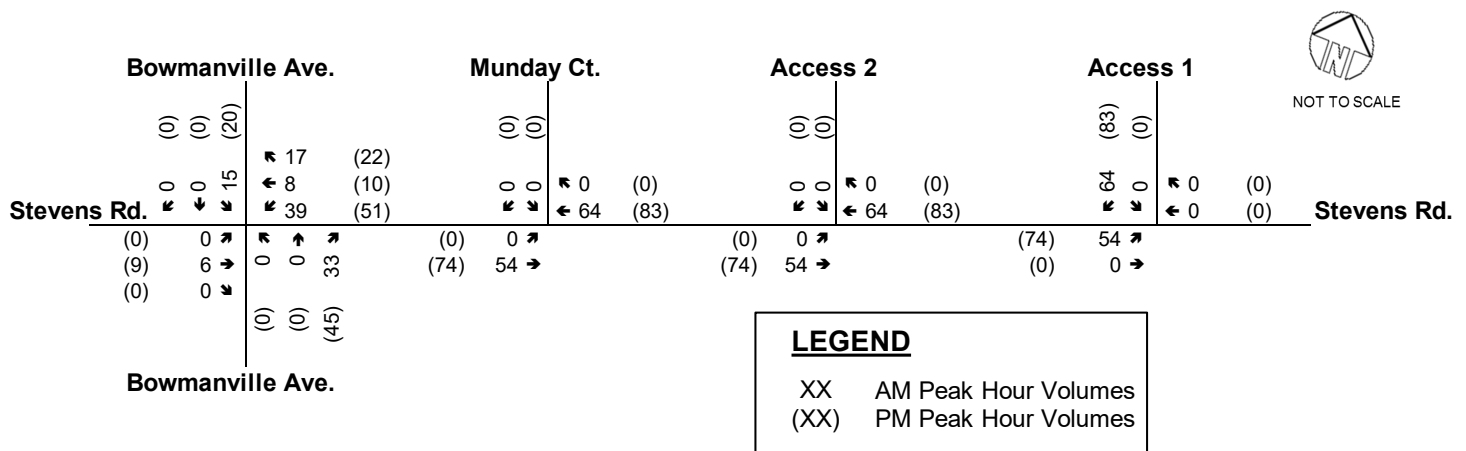
Table 4 summarizes the trip distribution adopted in the study to assign the site trips to the road network for the weekday AM and weekday PM peak hours.

**Table 4 Site trip distribution**

Trip Orientation	Street	Trip Distribution
North	Bowmanville Ave.	27%
South	Bowmanville Ave.	61%
East	Stevens Rd.	0%
West	Stevens Rd.	12%
<b>Total</b>		<b>100%</b>

All site trips will enter and exit the site via site Access 1 (East Access). As discussed, the Site Access 2 (West Access) is an emergency access.

The site traffic volumes are illustrated in Figure 8.



**Figure 8 Site trips**

## 6. Total traffic conditions

### 6.1 Total traffic volumes

In order to estimate the traffic impacts due to the introduction of site related trips, the background traffic flows (Figure 7) were combined with the estimated site trips (Figure 8) to get the estimate of the total (2028) traffic during the weekday AM and PM peak hours as illustrated in Figure 9.

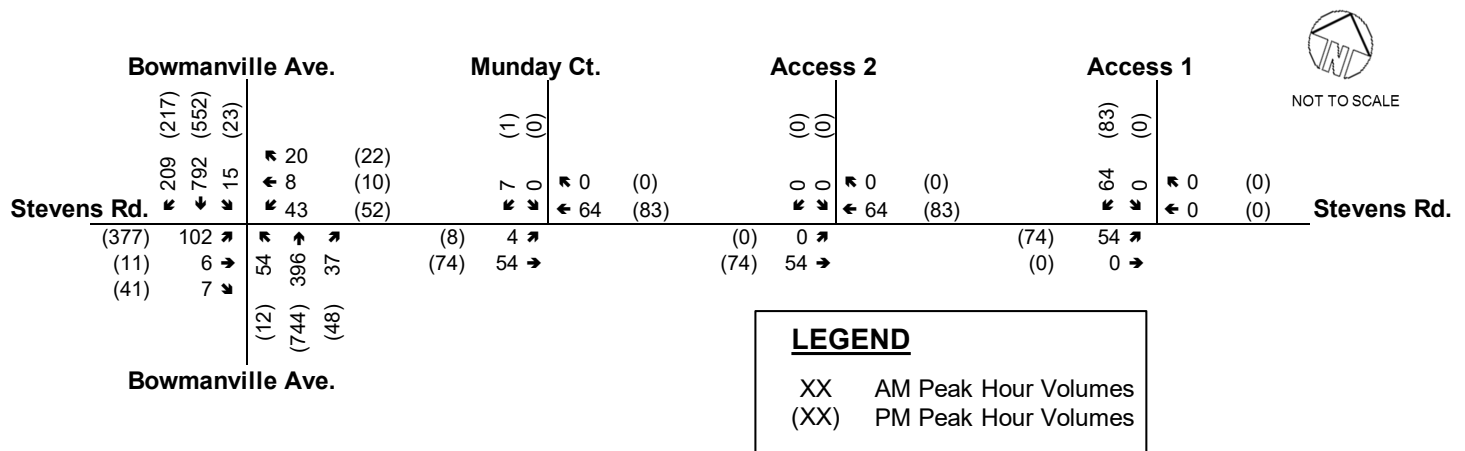


Figure 9 Total traffic volumes

### 6.2 Total traffic conditions

The future total (2028) traffic volumes were subjected to intersection capacity analyses based on the same methodologies utilized for the background conditions. Peak hour factors for the study intersections were from the existing traffic data and used in the Synchro analysis. As discussed, Figure 5 shows the planned future lane configurations and traffic controls of the study area intersections including the proposed site accesses.

Table 5 summarizes the results of the intersection capacity analysis, while Appendix F contains the detailed 2028 total intersection capacity analysis reports.

#### Bowmanville Avenue and Stevens Road

Under 2028 total traffic conditions with planned intersection improvements and existing signal times, this signalized intersection is expected to continue to operate at acceptable LOS 'B' and 'C' during the weekday AM and PM peak hours with overall delays of 12 and 22 seconds (no change when compared to the future background condition), respectively. The overall v/c ratios during the weekday AM and PM peak hours are 0.53 and 0.68, respectively. Compared to the future background condition, the overall v/c ratios increased by 0.01 and 0.02 during the AM and PM peak hours, respectively.

During the weekday AM peak hour, all individual movements are expected to operate at acceptable levels of service (LOS 'D,' or better) and v/c ratios of 0.65 or less.



During the weekday PM peak hour, the eastbound left turn movement is expected to operate at LOS 'D' with a v/c ratio of 0.93. All other individual movements are operating at 'good' levels of service (LOS 'B,' or better) and v/c ratios of 0.51 or less.

During the weekday PM peak hours, the eastbound left turn vehicle queues are expected to occasionally reach 115 metres (no change when compared to the future background condition), exceeded the planned left turn lane parallel and storage length of 108 m. The eastbound left turn operation can be improved by optimizing the timings of the phases.

**Table 5 Total traffic conditions**

Intersection	Control Type	AM Peak Hour			PM Peak Hour		
		Overall v/c (LOS) Delay in Seconds	Critical/ Key Movements v/c(LOS) Delay in Seconds	95th %ile Queues (m)	Overall v/c (LOS) Delay in Seconds	Critical/ Key Movements v/c(LOS) Delay in Seconds	95th %ile Queues (m)
Bowmanville Ave (R.R. 57) & Stevens Rd	Signalized (Existing Signal Timings)	0.53 (B) 12	EBL = 0.65 (D) 43 EBTR = 0.03 (C) 31 WBL = 0.26 (C) 33 WBTR = 0.07 (C) 32 NBL = 0.19 (A) 6 NBTR = 0.25 (A) 6 SBL = 0.03 (A) 8 SBT = 0.52 (B) 12 SBR = 0.18 (A) 9	EBL = 35 m EBTR = 5 m WBL = 15 m WBTR = 10 m NBL = 10 m NBTR = 25 m SBL = 5 m SBT = 75 m SBR = 10 m	0.68 (C) 22	EBL = 0.93 (D) 55 EBTR = 0.05 (B) 19 WBL = 0.11 (B) 20 WBTR = 0.03 (B) 19 NBL = 0.04 (B) 11 NBTR = 0.51 (B) 16 SBL = 0.12 (B) 13 SBT = 0.38 (B) 14 SBR = 0.16 (B) 12	EBL = 115 m EBTR = 10 m WBL = 15 m WBTR = 10 m NBL = 5 m NBTR = 70 m SBL = 10 m SBT = 45 m SBR = 15 m
	Signalized (Optimized Signal Timings)	0.53 (B) 12	EBL = 0.66 (D) 44 EBTR = 0.03 (C) 32 WBL = 0.27 (C) 34 WBTR = 0.07 (C) 32 NBL = 0.19 (A) 5 NBTR = 0.25 (A) 5 SBL = 0.03 (A) 7 SBT = 0.51 (B) 11 SBR = 0.18 (A) 8	EBL = 35 m EBTR = 5 m WBL = 15 m WBTR = 10 m NBL = 10 m NBTR = 25 m SBL = 5 m SBT = 70 m SBR = 10 m	0.68 (C) 21	EBL = 0.84 (D) 37 EBTR = 0.04 (B) 17 WBL = 0.1 (B) 18 WBTR = 0.03 (B) 17 NBL = 0.05 (B) 13 NBTR = 0.56 (B) 19 SBL = 0.13 (B) 15 SBT = 0.41 (B) 16 SBR = 0.16 (B) 14	EBL = 85 m EBTR = 10 m WBL = 15 m WBTR = 5 m NBL = 5 m NBTR = 85 m SBL = 10 m SBT = 55 m SBR = 15 m
Stevens Rd & Munday Ct	Unsignalized	SBLR 0.01 (A) 9	EBTL = 0 (A) 0 WBTR = 0.04 ( ) 0 SBLR = 0.01 (A) 9	EBTL = 5 m WBTR = 0 m SBLR = 5 m	SBLR 0 (A) 9	EBTL = 0.01 (A) 1 WBTR = 0.05 ( ) 0 SBLR = 0 (A) 9	EBTL = 5 m WBTR = 0 m SBLR = 0 m
Stevens Rd & Access 1	Unsignalized	SBLR 0.06 (A) 8	EBTL = 0.04 (A) 7 WBTR = 0 ( ) 0 SBLR = 0.06 (A) 8	EBTL = 5 m WBTR = 0 m SBLR = 5 m	SBLR 0.08 (A) 9	EBTL = 0.05 (A) 7 WBTR = 0 ( ) 0 SBLR = 0.08 (A) 9	EBTL = 5 m WBTR = 0 m SBLR = 5 m

With the implementation of the existing signal cycle length (90 seconds) and optimized phases, the eastbound left turn movement is expected to operate at LOS 'D' with an improved v/c ratio of 0.84 during the weekday PM peak hours. Compared to the future background condition, the eastbound left tur v/c ratio increased by 0.02 during the PM peak hours. The eastbound left turn vehicle queues are expected to occasionally reach 85 metres, which is within the planned left turn lane parallel and storage length of 108 m.

### **Stevens Road and Munday Court**

Under 2028 total traffic conditions, this unsignalized intersection has excellent operational characteristics. All movements have 'good' LOS 'A' with v/c ratios of 0.05 or less during the AM and PM peak hours. No critical movements and queue issues are identified.

### **Stevens Road and Site Access 1**

Under 2028 total traffic conditions, this unsignalized intersection has excellent operational characteristics. All movements have 'good' LOS 'A' with v/c ratios of 0.08 or less during the AM and PM peak hours. No critical movements and queue issues are identified.

In summary, based on the above analysis, the traffic generated by the proposed development along with non-site related traffic growth can be accommodated by the abutting street system with planned intersection improvements at Bowmanville Avenue / Stevens Road.

Traffic generated by the proposed development does not add significant adverse impacts on the study intersections. No additional road improvements are triggered by the proposed development.

The proposed site accesses can be expected to have good operational characteristics under the future 2028 total traffic conditions.

## 7. Site circulation review

The site plan was reviewed with respect to design vehicle circulation using AutoTURN software. Based on the analysis, the Circulation Review confirms that the proposed site plan is sufficient to accommodate the circulation requirements of fire services, garbage trucks, and heavy single unit trucks (HSU) as well as ambulance vehicles illustrated in (Appendix G).

The proposed site plan has been reviewed and found to be acceptable in terms of vehicular flow and parking space accessibility. Therefore, we conclude that the current site plan can accommodate the intended design vehicles.

## 8. Active transportation plan

Active transportation is any human powered transport including walking, cycling, in-line skating, skateboarding, skiing, and more. Walking and cycling are among the most popular and can be combined with other modes, such as public transit.

The following Active Transportation Plan (ATP) describes options and identifies opportunities and makes recommendations for connectivity, convenience, accessibility, and improving active transportation facilities (i.e. sidewalks, multi-use trails, trails, etc.) for the purpose of improving community health through physical activity, reducing greenhouse gas emissions, and alleviating traffic congestion.

### **Pedestrian**

As indicated in Section 3.1, currently there is a sidewalk provided on the south side of Stevens Road west of Bowmanville Avenue, however there are no sidewalks on Stevens Road east of Bowmanville Avenue.

The site plan proposes internal sidewalks connecting to Stevens Road. In the future, a sidewalk along the site frontage will be constructed and will form part of a sidewalk network along Stevens Road.

According to the Clarington Transportation Master Plan (CTMP, Figures ES-1 and ES-2, provided in Appendix H), a Potential Regional Trail Connection (north-south) is recommended east of the subject site.

The residents of the site can easily connect to the planned Potential Regional Trail in the future.

### **Cycling**

Currently, there are no bicycle facilities provided on Stevens Road and in the vicinity of the subject site.

Bicycles associated with the site can easily access to the Potential Regional Trail Connections planned by the Municipality.

Also, the site's residents can access the surrounding Clarington's bike lanes and trails via the proposed internal roadways, Stevens Road and Bowmanville Avenue.

## **Transit**

As indicated in Section 3.3, Durham Region Transit (DRT) currently provides bus service in the study area with Route 902A. Route 902A – King bus operates between the Oshawa GO Station, Oshawa Centre Terminal, Bowmanville Park & Ride and King Street East / Simpson Avenue area via King Street. There are bus stops at the intersection of King Street West / Bowmanville Avenue. Bus 902A provides weekday weekend service.

The fundamental idea of transit routes is to provide “equal” public transportation accessibility to all transit riders. Considering the land development pattern within the study area, there is the potential for future transit routes along Stevens Road and Bowmanville Avenue connecting to existing bus routes and the site.

# **9. Transportation demand management**

Transportation Demand Management (TDM) is the term used to describe initiatives, policies and recommendations to reduce the public's dependence on the car and use alternate modes of transportation (transit, carpooling, and active transportation such as walking and cycling) which will contribute to the reduction of overall site congestion and parking requirements. The composition and location of the subject development is ideally suited for the application of TDM initiatives.

## **9.1 Objectives**

Development of site specific TDM measures for the proposed site has been done in the context that the primary objective is to reduce single occupancy vehicle use, the plan will review opportunities to set realistic targets for increased use of transit, cycling, and walking trips.

## **9.2 Travel demand management**

Travel Demand Management refers to a variety of strategies to reduce congestion, minimize the number of single-occupant vehicles, encourage non-auto modes of travel, and reduce vehicle dependency to create a sustainable transportation system. TDM strategies have multiple benefits including the following:

- Reduced auto-related emissions to improve air quality;
- Decreased traffic congestion to reduce travel time;
- Increased travel options for businesses and commuters;
- Reduced personal transportation costs and energy consumptions; and
- Support Provincial smart growth objectives.

The combined benefits listed above will assist in creating a more active and livable community through improvements to overall active transportation standards for the local businesses and surrounding community.

## **9.3 Existing TDM opportunities**

### **Walking**

Sidewalks are currently provided on the south side of Stevens Road at the west of Bowmanville Avenue.

Based on the planned intersection improvements for the Bowmanville Avenue intersection with Stevens Road, there are crosswalks provided on all approaches of the intersection of Bowmanville Avenue and Stevens Road.

The variety of nearby transit stops are conveniently accessible by pedestrians residing at the subject development through a complete network of pedestrian sidewalks.

### **Transit**

Currently, Durham Region Transit (DRT) currently provides bus service in the study area with Route 902A. Route 902A – King bus operates between the Oshawa GO Station, Oshawa Centre Terminal, Bowmanville Park & Ride and King Street East / Simpson Avenue area via King Street. There are bus stops at the intersection of King Street West / Bowmanville Avenue. Bus 902A provides weekday weekend service.

It is expected that after the COVID-19 pandemic, DRT will provide the more bus route services in the study area to accommodate the normal transit ridership. Therefore, the subject site has opportunities to access the surrounding transit systems.

According to the Durham Transportation Master Plan (TMP), December 2017 provided in Appendix H, it recommends that King Street will be a high frequency bus service in the study area.

## **9.4 Proposed TDM opportunities**

The TDM plan proposes a mix of hard and soft measures to meet the objectives and targets to reduce vehicular demand and encourage passenger, transit, cycling, and walking. The proposed TDM measures are listed as follows:

### **Sidewalk Connectivity**

- As shown in the site plan in Figure 2, the proposed site plan includes convenient access to the residential buildings via the proposed internal sidewalks.

### **Unbundled Resident Parking**

- Separate (or unbundle) resident parking to separate the cost of parking from the cost of each residential unit. This will make the hidden cost of driving visible and encourage

residents to make more informed active transportation decisions and may create opportunities for the use of more sustainable modes of transportation.

- In some municipalities, unbundled parking is used to support a parking reduction of 10 percent of the required resident parking.

### **Bicycle Parking**

- Providing opportunities and safeguards for residents and visitors to travel to/from the development through cycling can encourage cycling and transit as a viable alternative to using an automobile.

### **Information Distribution (Building Owners)**

- An information package for all new residents will be distributed on available pedestrian trails, cycling, and transit facilities and carpool options including community map, Durham Transit route map, GO Transit route map and schedules.

## **9.5 Implementation and monitoring costs**

Costs to implement and monitor the proposed “soft” and “hard” TDM measures are the responsibility of the applicant. The applicant will be responsible for implementing, marketing and monitoring the TDM measures and working with the property manager of the building and other TDM stakeholders to ensure success and make adjustments as necessary. Stakeholders include Durham Region and Municipality of Clarington.

# **10. Findings, conclusions and recommendations**

- The purpose of this report is to determine the traffic-related impacts on the roadway system from the proposed retirement and assisted care development located at 46 Stevens Road, generally north of Stevens Road and east of Bowmanville Avenue in the Municipality of Clarington.
- Based on the current site plan, the proposed development consists of the following developments:
  - One storey bungalow townhouses (11 units);
  - 7 storey assisted care facility (138 units);
  - 8 storey assisted care facility (146 units);
  - 10 storey senior housing with opportunities for affordable housing (289 units); and
  - 53,002 ft<sup>2</sup> amenity building.
- The site plan proposes two full-moves accesses on Stevens Road (cul-de-sac) including the Site Access 2 (West Access) as an emergency access.

- As confirmed by the Region and Municipality, the study intersections for capacity analysis are:
  - Bowmanville Avenue / Stevens Road (existing signalized intersection);
  - Stevens Road / Munday Court (existing unsignalized intersection); and
  - Stevens Road / proposed Site Access 1 (East Access, future unsignalized intersection).
- The weekday turning movement counts were obtained from the Region's website for the intersection of Bowmanville Avenue / Stevens Road dated Wednesday, November 20, 2019. As confirmed by the Region and Municipality, the study used the 2019 TMC data for the baseline traffic.
- For study purposes, the proposed development is expected to be completed in 2023. Therefore, the study horizon will be 2028, five years beyond build-out as required by the Region's TIS guidelines.
- The AADT regression analysis within the current 10 years shows that there was negative growth along Bowmanville Avenue. To be conservative and to account for potential new traffic generators in the vicinity of the study, the study assumed an annual growth rate of 0.5% at the intersection of Bowmanville Avenue and Stevens Road except for the eastbound left and southbound right turning movements. This methodology was accepted by the Region.
- In consultation with the Region, there are intersection improvements planned for the intersection of Bowmanville Avenue with Stevens Road, and scheduled for 2021 and 2022. The Region provided plans of the improvements, which included exclusive left turn lanes on Stevens Road and an additional lane northbound and southbound on Bowmanville Avenue.
- Subject site trips for the townhouses, retirement and assisted care units were estimated based on the trip rates of Low-Rise Multifamily House (LUC #220), Senior Adult Housing (LUC #252) and Assisted Living (LUC #254) provided by Trip Generation, 10th Edition, published by the Institute of Transportation Engineers (ITE).

Although there could be an allowance for transit and active transportation modes, trip reductions were not considered in this analysis. Accordingly, the total new site trips are expected to be 118 two way trips during the weekday AM peak hour and 157 two way trips during the weekday PM peak hour.

- The directional distribution and assignment of traffic approaching and departing the subject site were determined based on the Transportation Tomorrow Study (2016 TTS) survey data and the available road network.
- This study concludes that under the future traffic forecasts, the traffic generated by the proposed development along with non-site related traffic growth can be accommodated by the abutting street system with planned intersection improvements at Bowmanville Avenue / Stevens Road.
- Traffic generated by the proposed development does not add significant adverse impacts on the study intersections. No additional road improvements are triggered by the proposed development.
- The proposed site accesses can be expected to have good operational characteristics under the future 2028 total traffic conditions.

- The Vehicle Circulation Review confirms that the proposed site plan is sufficient to accommodate the circulation requirements of fire services, garbage trucks, and heavy single unit trucks (HSU) as well as ambulance vehicles.
- Durham Region Transit (DRT) currently provides bus service in the study area with Route 902A. Route 902A – King bus operates between the Oshawa GO Station, Oshawa Centre Terminal, Bowmanville Park & Ride and King Street East / Simpson Avenue area via King Street. There are bus stops at the intersection of King Street West / Bowmanville Avenue. Bus 902A provides weekday and weekend service.
- The Active Transportation Plan (ATP) describes options and identifies opportunities and makes recommendations for connectivity, convenience, accessibility, and improving active transportation facilities (i.e. sidewalks, multi-use trails, etc.) for the purpose of improving community health through physical activity, reducing greenhouse gas emissions, and alleviating traffic congestion.
- The site's residents can access to the surrounding pedestrian network, transit system and cycling network via internal roadways, Stevens Road and Bowmanville Avenue.
- The TDM plan proposes a mix of hard and soft measures including sidewalk connectivity, unbundled residential parking, bicycle parking and information package distribution to meet the objectives and targets to reduce vehicular demand and encourage passenger, transit, cycling, and walking.



# **Appendix A**

**Traffic and transit data**

TMC Tabular Report

Bowmanville Av (R.R.57) @ Stevens Rd (815)

TMC No: 0571200000 Intersection ID: 4475 Count ID: 35702018205 Count Date: 11/20/2019, Wed

AM Peak 07:45				Ped. ↕			
0.57	0.88	0.00	0.00	0.57	0.88	0.00	0.00
20%	20%	0%	0%	↑	↑	↑	↑
42	148	0	115	42	148	0	115
167	609	0	369	167	609	0	369
				Cars	Trucks	Trucks %	PHF
←	53	208	↔	↔	↔	↔	↔
0.61	29%	30	72	1	2	67%	0.38
0.00	0%	0	0	0	0	0%	0.00
0.58	29%	2	5	3	1	25%	0.50
				↔	↔	↔	↔
PHF	Trucks %	Trucks	Cars				
				617	41	296	3
				151	11	83	1
				→	→	→	→
				25%	22%	21%	0.50
				0.62	0.85	0.85	0.50
				Ped.			
				0			

MD Peak 12:15				Ped. ↕			
0.88	0.92	0.25	0.25	0.88	0.92	0.25	0.25
21%	22%	50%	50%	↑	↑	↑	↑
40	86	1	132	40	86	1	132
149	306	1	482	149	306	1	482
				Cars	Trucks	Trucks %	PHF
←	45	172	↔	↔	↔	↔	↔
0.82	17%	38	189	2	0	0%	0.25
0.00	0%	0	0	0	0	0%	0.00
0.84	16%	6	31	2	1	33%	0.25
				↔	↔	↔	↔
PHF	Trucks %	Trucks	Cars				
				339	23	291	3
				93	5	94	0
				→	→	→	→
				0%	24%	18%	0.38
				0.64	0.93	0.93	0.38
				Ped.			
				0			

PM Peak 17:00				Ped. ↕			
0.86	0.38	0.90	0.38	0.86	0.38	0.90	0.38
16%	33%	20%	20%	↑	↑	↑	↑
35	105	423	172	35	105	423	172
182	423	916	916	182	423	916	916
				Cars	Trucks	Trucks %	PHF
←	39	189	↔	↔	↔	↔	↔
0.88	16%	62	315	0	0	0%	0.00
0.50	0%	0	2	0	0	0%	0.00
0.81	3%	1	38	1	0	0%	0.25
				↔	↔	↔	↔
PHF	Trucks %	Trucks	Cars				
				462	7	601	3
				106	4	110	0
				→	→	→	→
				0%	15%	36%	0.38
				0.69	0.95	0.95	0.38
				Ped.			
				0			

Total Count 7 hours*				Ped. ↕			
0.88	0.92	0.25	0.25	0.88	0.92	0.25	0.25
18%	20%	20%	20%	↑	↑	↑	↑
235	841	3278	1002	235	841	3278	1002
1093	3278	4169	4169	1093	3278	4169	4169
				Cars	Trucks	Trucks %	PHF
←	266	1237	↔	↔	↔	↔	↔
17%	279	1359	5	4	44%		
14%	1	6	4	0	0%		
15%	32	180	17	2	11%		
			↔	↔	↔	↔	↔
PHF	Trucks %	Trucks	Cars				
				3475	140	2805	15
				875	31	719	3
				→	→	→	→
				17%	20%	18%	0.25
				0.64	0.93	0.93	0.25
				Ped.			
				2			





# INTERSECTION SIGNAL TIMING REPORT

<b>Location</b>	Bowmanville Ave (R.R.57) and Stevens Rd.				
<b>Date</b>	10/8/2021	<b>C&amp;E No.</b>	34642416	<b>Prepared by</b>	A. Platt
<b>Prepared for</b>	GHD				

## AM Peak 06:00 - 09:00



Phase Number	2	4	5	6	8
Movement	NBTL	EBTL	NBL	SBTL	WBTL
Lead/Lag			Lead	Lag	
Lead-Lag Optimize			Yes	Yes	
Recall Mode	C-Max	None	None	C-Max	None
Maximum Split (s)	54	36	9.9	44.1	36
Maximum Split (%)	60.0%	40.0%	11.0%	49.0%	40.0%
Minimum Split (s)	27	24	9	27	24
Yellow Time (s)	4.4	4.1	3	4.4	4.1
All-Red Time (s)	1.9	2.2	0	1.9	2.2
Minimum Initial (s)	20	8	5	20	8
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)	14	12		14	12
Flash Dont Walk (s)	5	5		5	5

Intersection Summary	
Cycle Length	90
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 35.1 (39%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 815: REG RD 57 & STEVENS RD



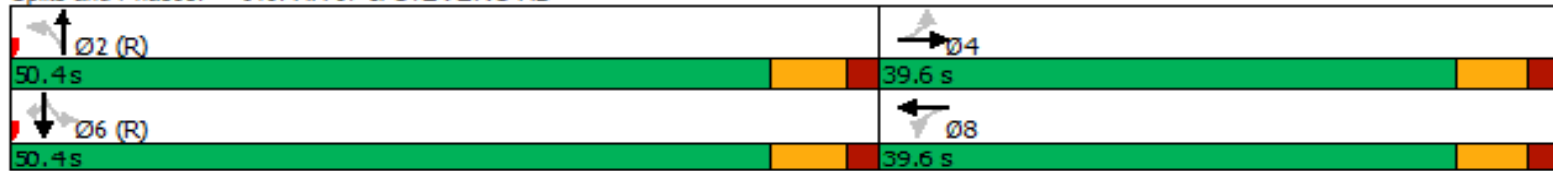
## PM Peak 15:15 - 22:00



Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	C-Max	None	C-Max	None
Maximum Split (s)	50.4	39.6	50.4	39.6
Maximum Split (%)	56.0%	44.0%	56.0%	44.0%
Minimum Split (s)	27	24	27	24
Yellow Time (s)	4.4	4.1	4.4	4.1
All-Red Time (s)	1.9	2.2	1.9	2.2
Minimum Initial (s)	20	8	20	8
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	14	12	14	12
Flash Dont Walk (s)	5	5	5	5

Intersection Summary	
Cycle Length	90
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 83.7 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 815: RR 57 & STEVENS RD



## Weekend Peak 09:00 - 22:00



Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	C-Max	None	C-Max	None
Maximum Split (s)	50.4	39.6	50.4	39.6
Maximum Split (%)	56.0%	44.0%	56.0%	44.0%
Minimum Split (s)	27	24	27	24
Yellow Time (s)	4.4	4.1	4.4	4.1
All-Red Time (s)	1.9	2.2	1.9	2.2
Minimum Initial (s)	20	8	20	8
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	14	12	14	12
Flash Dont Walk (s)	5	5	5	5

Intersection Summary	
Cycle Length	90
Control Type	Actuated-Coordinated
Natural Cycle	55
Offset: 72.9 (81%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 815: RR 57 & STEVENS RD



*\*Please note a concerted effort has been made to ensure the accuracy and completeness of the data provided, however, inadvertent errors or omissions can still occur. Please bring any errors or omissions to the Region's attention.*

## TRANSPORTATION STUDIES AND DATA A.A.D.T. PROGRAM

ATR STATION	PCS #	LOCATION	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
5401		Immediately N. of Marion Ave. (Oshawa)	6400	6860	6552	6480	6200	6010	5930	5940	6236	5070	5680	6600	
5402		100 m. N. of Hwy 401 WB Ramp	D		23831	24240	17250	13200	12750	Const.					
5403		200 m. S. of Bloor St. (R.R. 22)	D	23980	23682	20950	17400	15500	16600	17710	18609	15810			
	407	N. of Cordova Rd.										14400	16650	17420	
5404		200 m. N. of Phillip Murray Ave. (R.R. 52)	D	10100							5253				
5405		35 m. N. of Bond St.		13920	15980	15232	15640	15100	13370	13860	14090	15086	13110	13920	15210
5406		50 m. S. of King St.		18970	19330	19131	19890	17400	15560	16360	16170	16665	14040	16490	18120
	51	N. of Bloor St. (R.R. 22)										12377	11840	12660	
	57	S. of Wentworth St. (R.R. 60)										5045	4950	5070	
<b>Oshawa/Clarington Townline Road (R.R. 55)</b>															
5501		300 m. S. of Taunton Rd. (R.R. 4)		8460	8350		8670	8100	8690	8530	10410	11046	9630	11070	12130
5502		100 m. N. of Hwy. 2		15690	15190	13337	16110	15900	16430	16310	16930	17047	15870	15860	16010
5503		300 m. N. of Olive Ave. (R.R. 59)		10190											9370
5504		150 m. S. of Adelaide Ave. (R.R. 58)	D												
5506		100 m. S. of Pebblestone Rd.													11950
	436	S. of Adelaide Ave. (R.R. 58)										17160	16290	16950	
<b>Farewell Street (R.R. 56)</b>															
5601		250 m. S. of Bloor St. (R.R. 22)		15080	15290	16813	14870	14100	13870	13690	13560	11196	10630	12490	13430
<b>Scugog Rd./Waverly Rd./Martin Road (R.R. 57)</b>															
5701		200 m. S. of View Lake Rd.		1310	1360	1107	1440		1420	1390	1390	1489	1340	1470	1260
5702		1 km. N. of Hwy. 7A		3100	3260	3116	3230		3100	3040	2980	3054	2670	2700	2980
5703		425 m. N. of Regional Rd. 19		4250	4290	3647	4180		4280	4370	4340	4611	4610	4320	4310
5704		500 m. N. of Mosport Rd. (R.R. 20)		4590	4560	3799	4750		Const.	Const.	Const.	4948	5320	4910	5260
5705		500 m. S. of Concession Rd. 7		5740	5600	6336	5700	5400	5430	5560	6050	6466	5480	6350	5280
5706		200 m. S. of Taunton Rd. (R.R. 4)		5980	6050	5430	6600	6700	6860	6670	7180	7248	6860	7890	8450
5707		125 m. N. of Hwy. 2		8040	10570	10963	12090	12640	13500	14090	16300	16840	13900	16390	17100
5709		150 m. S. of Waverly Rd.	D												
5710		S. of Longworth Ave.													16390
	377	S. of Longworth Ave.										15600	16580	17420	
5711		200 m. S. of Hwy. 2	D			15345	18390	18420	19120	19390	20390	20559			
	332	S. of Hwy. 2											19870	22090	22090
5712		150 m. N. of Waverly Rd.	D												
	366	N. of Waverly Rd.											14700	15410	14120
5720		60 m. S. of Baseline Rd.	D	16910	16910	13357	19690	16700	17670	18340	19250	18262	17460		
	335	S. of Baseline Rd.											16760	17450	18060
<b>Adelaide Avenue/Manning Road (R.R. 58)</b>															
5801		100 m. E. of Arena St.	D												
5802		Immediately W. of Townline Rd. (R.R. 55)		10570	10330	10646	11360	9710	10100	10300	9800	9590	7830	8960	9770
5803		300 m. E. of Thornton Rd. (R.R. 52)		8700	9660	8951	10320	10100	10030	9650	9350	9024	7760	9220	9230

## TRANSPORTATION STUDIES AND DATA A.A.D.T. PROGRAM

ATR STATION	PCS #	LOCATION	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
			7404		900 m. E. of Goodwood Rd. (R.R. 21)	9360	9610	8560	8920	8900	8610	8840	8860	8441	7360
7405		150 m. N. of Elgin Park Dr.	D												
	900	N. of Elgin Park Dr.										15420	15050	16140	
7406		200 m. W. of Concession 6				10740	11470	11200	10780	11910	11600	10900	10970	9730	
7408		200 m. W. of Hwy. 12			3512	3550	3600	3300	3470	3390	3538	3420	3410	2860	
7420		200 m. E. of Lake Ridge Rd. (R.R. 23)											3360	3410	
	352	N. of Welwood Dr.										17420	17430	17800	
	904	E. of Concession 6										12630	12720	13160	
<b>Regional Highway #48</b>															
7601		300m. E. of Hwy. 12		3560	6020	2587	3410		3510	3820	3390	3336	2810	3750	3880

**LEGEND:**

(\*) Two Counters Required

(D) Deactivated

NOTE: 2003, 2004, 2005, 2007 volumes are weekday averages (WDADT). They are based three 24-hr weekday counts (Spring, Summer &amp; Fall)

NOTE: 2006 volumes are weekday averages (WDADT). They are suspect since they are based on 3 weekdays in mid-late March and early April only  
Due to fluctuating volumes and the fallibility of hardware, the Region of Durham does not guarantee the absolute accuracy of these numbers.

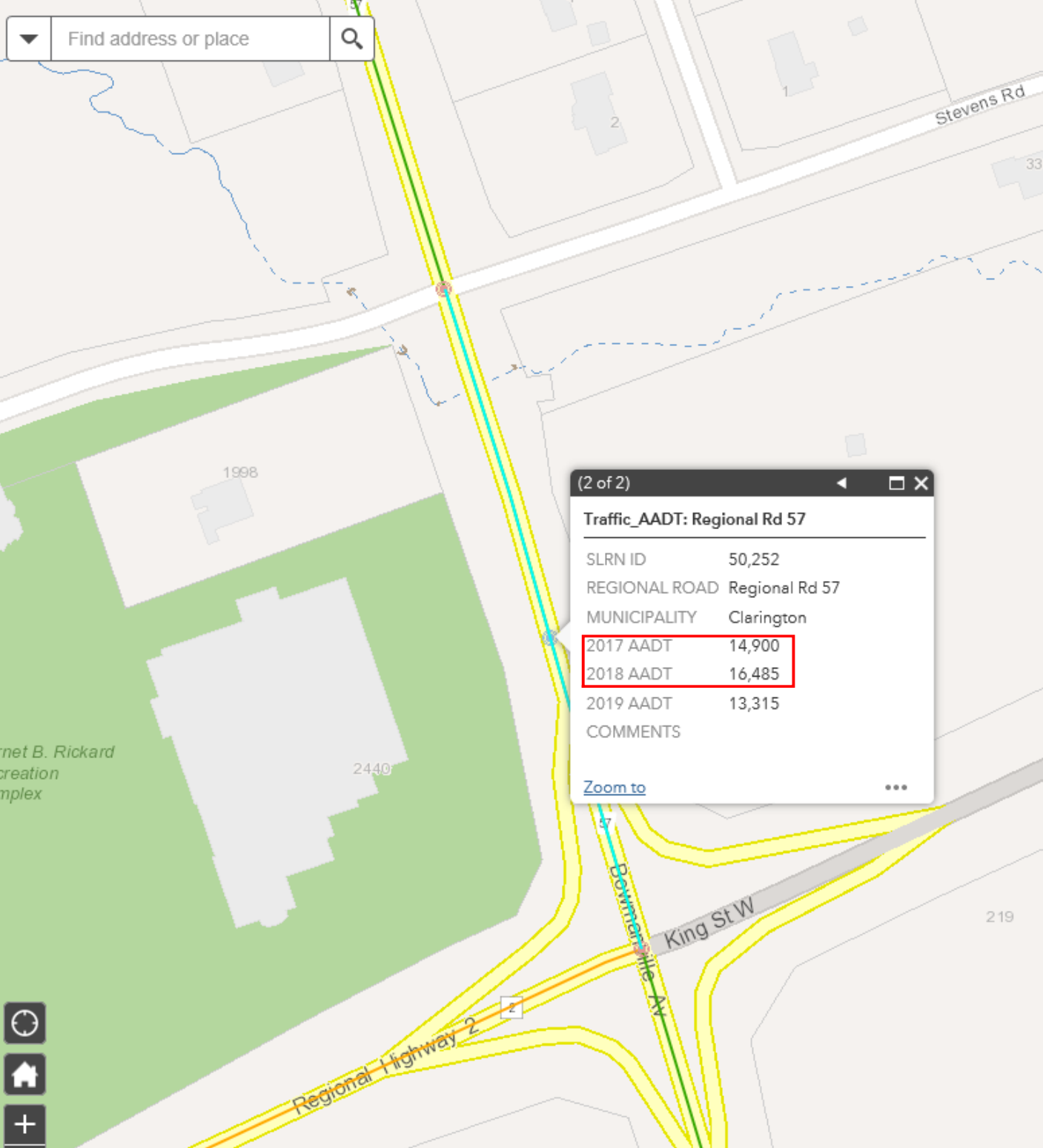
Const. Tube count impacted by Construction in the area

NOTE: Starting in 2013 - The methodology used for calculating AADT has resulted in a slight decrease in volumes Region wide

NOTE: PCS # - AADT volumes from Permanent Count Stations (PCS) have been included in 2013

NOTE: PCS Stations to replace ATR Stations starting in 2013

NOTE: 7 Day tube counts



# ATR Count Report

Bowmanville Av. (R.R.57) 125 m. N. of Regional Highway 2/King St.

**ATR No:** 5707      **Affiliated PCS No:** 806      **Start Date:** 05/25/2019      **End Date:** 05/31/2019

Start Time	2019-May-25		Sun		Mon		Tue		Wed		Thu		Fri		Average Day	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00	39	234	53	222	44	179	43	174	23	188	36	179	29	217	38	199
12:15	33	199	52	199	21	199	27	170	25	197	32	188	30	214	31	195
12:30	42	212	55	204	24	197	16	180	23	215	35	194	27	221	32	203
12:45	42	199	47	193	22	179	22	187	19	191	24	201	22	199	28	193
01:00	38	181	29	196	10	180	18	174	20	209	20	197	21	216	22	193
01:15	24	215	30	204	14	175	19	180	20	194	14	186	17	194	20	193
01:30	20	202	26	208	17	193	15	170	10	192	18	193	12	198	17	194
01:45	19	193	24	207	15	167	9	188	20	184	13	193	12	202	16	191
02:00	7	205	13	209	9	188	9	200	18	186	13	181	13	217	12	198
02:15	17	192	21	187	10	202	16	182	12	184	7	173	11	218	13	191
02:30	16	211	22	216	11	204	11	194	13	178	8	181	6	234	12	203
02:45	13	215	24	223	11	192	14	218	23	204	10	185	15	198	16	205
03:00	12	208	16	199	16	204	13	179	14	209	19	187	23	211	16	200
03:15	15	197	19	230	18	180	17	201	13	205	17	186	17	212	17	202
03:30	16	207	15	231	16	181	18	201	14	202	25	199	18	186	17	201
03:45	23	193	11	214	24	202	14	184	15	217	21	209	18	199	18	203
04:00	13	222	10	230	24	213	25	193	23	198	33	211	30	196	23	209
04:15	21	193	17	217	37	179	35	214	29	231	42	223	35	233	31	213
04:30	17	190	16	237	67	192	56	205	56	201	54	212	48	206	45	206
04:45	29	179	26	222	68	221	74	176	74	232	63	222	69	201	58	208
05:00	32	159	17	243	116	231	96	231	108	225	90	224	90	184	78	214
05:15	56	164	31	227	92	199	123	222	98	201	123	201	119	215	92	204
05:30	62	183	32	240	113	213	118	226	111	212	136	215	130	214	100	215
05:45	66	179	34	238	165	219	163	214	144	210	149	211	140	205	123	211
06:00	78	182	50	202	170	229	164	198	197	234	193	206	169	193	146	206
06:15	103	178	55	182	195	213	198	199	214	230	205	205	187	196	165	200
06:30	89	186	86	195	196	179	204	212	176	183	195	202	207	207	165	195
06:45	91	168	83	189	176	190	178	215	201	217	186	201	204	212	160	199
07:00	126	175	96	181	205	195	194	201	195	190	215	185	217	204	178	190
07:15	123	147	98	181	222	171	216	184	214	208	213	219	222	170	187	183
07:30	132	140	102	165	202	181	217	184	232	178	204	183	201	172	184	172
07:45	151	146	104	171	193	151	212	208	210	176	224	185	218	157	187	171
08:00	172	160	132	177	188	178	208	168	229	169	205	161	231	153	195	167
08:15	164	170	119	173	226	160	233	157	199	153	215	142	223	133	197	155
08:30	141	160	147	150	216	152	213	162	230	171	199	163	222	134	195	156
08:45	204	146	159	142	212	134	212	142	201	157	202	159	210	135	200	145
09:00	203	154	165	131	179	131	199	135	185	142	177	146	199	130	187	138
09:15	193	131	196	108	167	125	178	134	193	150	174	140	214	133	188	132
09:30	201	123	190	107	172	108	184	126	179	123	183	129	202	106	187	117
09:45	195	108	184	93	191	84	159	108	184	112	170	120	202	101	184	104
10:00	197	105	222	70	195	99	170	103	165	105	190	113	214	75	193	96
10:15	209	93	211	85	180	83	163	80	223	88	207	99	199	69	199	85
10:30	189	86	188	60	184	79	188	71	189	66	194	86	201	68	190	74
10:45	206	99	215	67	165	60	167	67	177	80	187	76	203	69	189	74
11:00	218	64	201	46	185	53	179	53	173	66	178	62	198	74	190	60
11:15	217	60	214	48	169	55	167	44	186	66	186	56	217	45	194	53
11:30	198	53	203	34	180	48	191	39	191	54	190	47	193	66	192	49
11:45	231	66	188	40	180	26	159	36	162	39	178	35	204	39	186	40
<b>Total</b>	<b>4703</b>	<b>7832</b>	<b>4248</b>	<b>8193</b>	<b>5512</b>	<b>7773</b>	<b>5524</b>	<b>7889</b>	<b>5630</b>	<b>8222</b>	<b>5672</b>	<b>8071</b>	<b>5909</b>	<b>8031</b>	<b>5313</b>	<b>8005</b>
Day	12535		12441		13285		13413		13852		13743		13940		13318	
Total%	37.52%	62.48%	34.15%	65.85%	41.49%	58.51%	41.18%	58.82%	40.64%	59.36%	41.27%	58.73%	42.39%	57.61%	39.89%	60.11%
Splits Peak	11:15	00:00	10:00	05:00	08:00	05:30	07:30	05:00	07:15	04:15	07:00	04:15	07:45	01:45	10:30	03:00
Vol.	880	844	836	948	842	874	870	893	885	889	856	881	894	871	4198	4436
P.H.F.	0.94	0.9	0.94	0.98	0.93	0.95	0.93	0.97	0.95	0.96	0.96	0.98	0.97	0.93	0.77	0.78



ATR Count Report

ATR No:

5707

Affiliated PCS No:

806

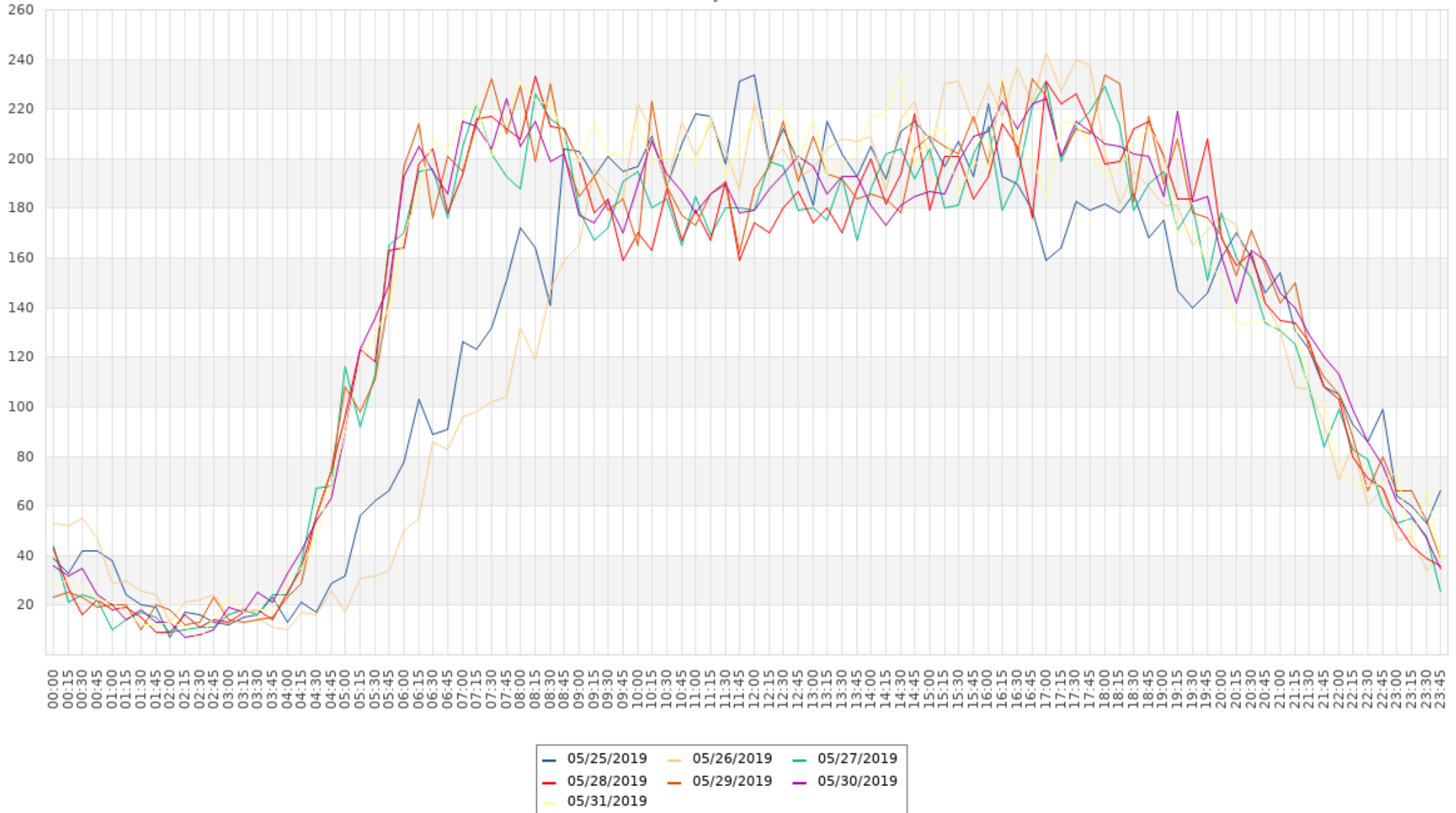
Start Date:

05/25/2019

End Date:

05/31/2019

Total by 15 min



# ATR Count Report

Bowmanville Av. (R.R.57) 125 m. N. of Regional Highway 2/King St.

**ATR No:** 5707      **Affiliated PCS No:** 806      **Start Date:** 07/26/2019      **End Date:** 08/01/2019

Start Time	2019-Jul-26		Sat		Sun		Mon		Tue		Wed		Thu		Average Day	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00	26	205	36	222	54	218	25	179	36	186	32	205	28	175	34	199
12:15	23	221	40	213	64	208	19	192	26	181	23	186	20	191	31	199
12:30	19	218	42	213	53	202	25	199	24	185	25	203	24	186	30	201
12:45	22	200	41	195	43	210	21	193	17	174	22	198	21	184	27	193
01:00	15	199	34	210	34	196	15	180	18	171	22	196	21	183	23	191
01:15	15	204	32	210	32	203	14	188	17	186	17	215	14	190	20	199
01:30	15	208	26	205	30	202	13	187	16	197	12	212	13	177	18	198
01:45	10	207	28	190	23	202	15	190	12	191	15	200	15	181	17	194
02:00	11	208	14	194	15	212	9	204	8	204	15	213	11	176	12	202
02:15	11	215	18	192	20	191	11	197	13	216	12	214	9	182	13	201
02:30	8	215	10	206	21	214	9	204	11	202	15	209	12	180	12	204
02:45	8	200	10	202	26	219	14	187	11	203	15	210	19	183	15	201
03:00	22	227	13	200	15	209	20	211	10	199	15	232	12	196	15	211
03:15	13	205	15	207	19	228	14	202	16	209	13	219	18	195	15	209
03:30	24	206	12	194	14	227	29	195	19	200	15	205	25	203	20	204
03:45	22	207	24	195	14	215	24	194	16	198	16	185	19	208	19	200
04:00	23	209	18	216	21	229	31	198	29	218	29	203	28	210	26	212
04:15	29	223	20	194	13	225	37	204	41	221	45	208	43	224	33	214
04:30	40	204	24	188	15	227	46	199	56	209	52	197	52	212	41	205
04:45	55	197	30	182	22	217	62	193	77	206	72	199	56	225	53	203
05:00	75	199	35	174	21	258	92	195	97	195	87	224	81	236	70	212
05:15	103	202	49	171	27	214	111	186	115	199	109	210	112	216	89	200
05:30	124	229	64	185	25	214	138	208	138	218	126	220	133	216	107	213
05:45	149	210	78	168	42	248	161	207	161	204	150	234	162	227	129	214
06:00	176	214	93	178	45	218	190	198	183	201	171	216	191	209	150	205
06:15	187	192	101	164	65	181	205	210	185	203	192	213	223	210	165	196
06:30	206	209	90	172	78	197	218	193	184	196	202	207	209	208	170	197
06:45	206	209	109	193	83	180	210	181	198	187	204	199	201	195	173	192
07:00	224	203	123	173	95	173	217	179	205	174	201	189	223	183	184	182
07:15	234	184	125	165	99	175	220	160	216	158	222	172	226	191	192	172
07:30	216	174	148	148	113	169	224	147	206	152	224	167	211	182	192	163
07:45	220	148	154	145	125	171	221	145	222	155	223	157	226	174	199	156
08:00	234	135	164	156	126	172	219	144	220	142	219	148	228	151	201	150
08:15	231	138	150	159	133	175	213	136	227	130	205	155	233	143	199	148
08:30	219	124	143	154	140	152	216	118	209	139	205	147	211	142	192	139
08:45	217	128	183	139	168	143	204	126	211	123	202	121	207	161	199	134
09:00	203	116	192	139	176	127	189	115	194	119	203	128	193	146	193	127
09:15	203	115	194	125	196	107	195	107	200	107	217	124	190	131	199	117
09:30	207	104	197	125	200	103	196	102	198	106	204	116	183	118	198	111
09:45	209	82	179	106	202	94	198	82	204	100	192	113	184	107	195	98
10:00	213	91	204	106	215	77	193	88	202	85	186	105	190	100	200	93
10:15	208	65	196	91	196	76	176	68	188	80	183	86	197	86	192	79
10:30	186	84	185	86	197	81	189	81	168	67	173	77	182	75	183	79
10:45	194	66	204	95	191	67	167	63	178	67	183	77	197	64	188	71
11:00	195	68	222	75	199	56	188	53	185	68	184	66	185	55	194	63
11:15	207	49	209	74	205	47	181	45	177	50	197	61	192	57	195	55
11:30	184	61	207	66	193	32	177	46	184	46	196	50	189	41	190	49
11:45	208	47	228	63	199	31	186	40	193	42	202	45	194	40	201	44
<b>Total</b>	5849	8024	4713	7823	4302	8192	5747	7519	5721	7669	5744	8136	5813	7925	5413	7899
Day	13873		12536		12494		13266		13390		13880		13738		13312	
Total%	42.16%	57.84%	37.6%	62.4%	34.43%	65.57%	43.32%	56.68%	42.73%	57.27%	41.38%	58.62%	42.31%	57.69%	40.66%	59.34%
Splits Peak	07:15	02:15	11:45	00:00	11:45	05:00	07:15	05:30	07:45	04:00	07:15	05:00	07:30	04:15	10:30	03:00
Vol.	904	857	876	843	827	934	884	823	878	854	888	888	898	897	4223	4508
P.H.F.	0.97	0.94	0.96	0.95	0.95	0.91	0.99	0.98	0.97	0.97	0.99	0.95	0.96	0.95	0.77	0.77

ATR Count Report

ATR No:

5707

Affiliated PCS No:

806

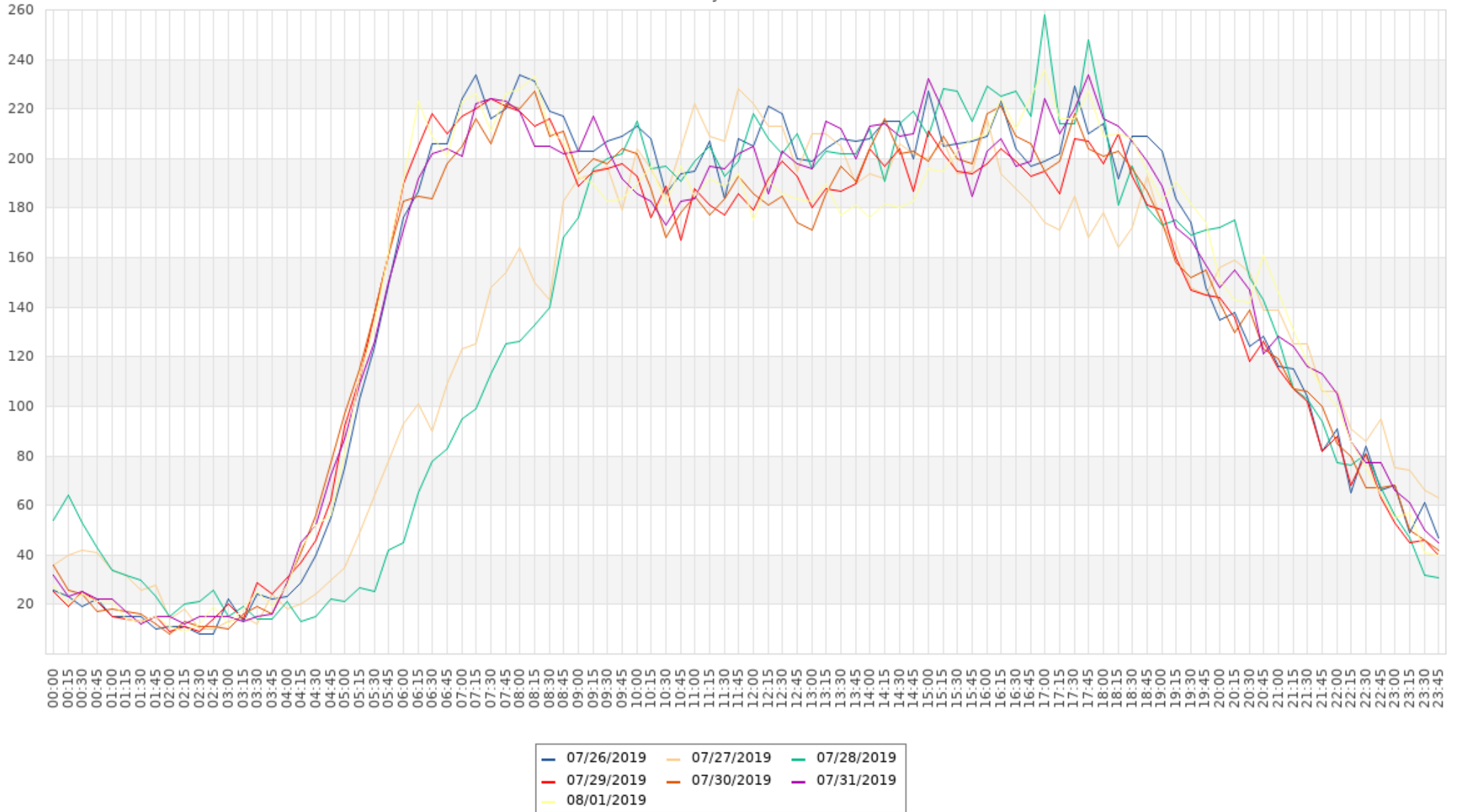
Start Date:

07/26/2019

End Date:

08/01/2019

Total by 15 min



ATR Count Report

Bowmanville Av. (R.R.57) 125 m. N. of Regional Highway 2/King St.

**ATR No:** 5707      **Affiliated PCS No:** 806      **Start Date:** 11/13/2019      **End Date:** 11/19/2019

Start Time	2019-Nov-13		Thu		Fri		Sat		Sun		Mon		Tue		Average Day	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00	12	203	18	186	31	244	54	234	50	228	18	190	14	196	28	212
12:15	20	220	19	195	24	238	52	249	47	234	15	207	17	196	28	220
12:30	7	207	19	198	23	225	43	265	42	237	18	222	23	180	25	219
12:45	11	189	14	195	16	222	40	257	39	233	14	200	11	212	21	215
01:00	15	200	14	188	21	230	34	253	43	233	11	209	11	209	21	217
01:15	12	218	9	195	12	254	31	245	38	215	10	179	23	212	19	217
01:30	14	211	9	186	14	239	32	240	29	223	10	216	10	217	17	219
01:45	12	212	11	188	20	229	23	244	38	229	7	210	10	208	17	217
02:00	5	228	10	209	12	251	20	233	26	226	12	204	8	205	13	222
02:15	12	209	12	242	10	243	26	234	19	239	4	207	7	219	13	228
02:30	20	208	9	212	9	261	25	246	25	234	10	209	6	245	15	231
02:45	10	236	8	239	8	239	19	239	21	254	13	229	5	234	12	239
03:00	12	257	14	253	14	258	22	235	18	253	10	268	15	234	15	251
03:15	11	250	12	249	22	282	17	242	13	246	10	250	20	266	15	255
03:30	19	272	25	239	16	259	24	246	15	230	23	271	11	253	19	253
03:45	33	271	20	226	17	266	21	260	20	241	18	242	25	250	22	251
04:00	31	262	38	241	38	233	24	234	16	232	18	251	27	252	27	244
04:15	38	267	44	245	37	249	16	241	18	246	35	269	34	279	32	257
04:30	40	292	61	278	49	236	18	219	17	245	55	241	34	269	39	254
04:45	53	284	72	255	56	249	18	231	16	229	55	272	62	276	47	257
05:00	92	289	87	259	84	225	27	214	20	237	74	272	75	255	66	250
05:15	99	273	112	280	119	251	40	215	20	251	114	262	99	287	86	260
05:30	152	293	150	273	128	283	45	211	32	216	142	284	130	278	111	263
05:45	191	258	144	290	165	286	66	222	32	228	165	292	196	262	137	263
06:00	210	300	188	260	201	247	74	205	54	214	209	312	228	266	166	258
06:15	235	317	201	265	264	240	80	190	51	215	233	292	238	273	186	256
06:30	275	294	240	270	229	231	106	190	74	224	263	260	267	265	208	248
06:45	315	256	261	265	246	216	102	191	74	201	297	259	279	247	225	234
07:00	295	221	290	231	268	195	120	177	87	201	304	221	271	210	234	208
07:15	316	192	257	218	299	203	133	182	74	228	314	231	297	217	241	210
07:30	264	211	289	197	272	226	150	182	98	193	325	207	305	206	243	203
07:45	297	179	303	217	299	228	150	181	99	175	288	176	302	194	248	193
08:00	291	156	271	189	322	184	178	153	109	171	274	185	283	184	247	175
08:15	345	164	322	168	269	183	190	155	128	170	271	175	290	171	259	169
08:30	320	175	291	174	276	169	189	159	152	155	273	150	278	165	254	164
08:45	282	143	278	157	282	158	233	130	154	129	292	150	274	145	256	145
09:00	259	138	242	149	263	152	232	116	156	115	255	139	274	120	240	133
09:15	269	135	248	130	265	132	239	138	212	113	235	124	243	144	244	131
09:30	239	113	209	121	216	119	247	134	210	101	216	113	228	128	224	118
09:45	196	131	186	96	196	122	246	132	220	82	190	90	209	105	206	108
10:00	173	94	209	102	210	118	266	107	215	69	213	97	212	118	214	101
10:15	189	93	198	83	224	99	240	107	219	59	163	94	197	92	204	90
10:30	180	87	185	68	203	96	261	100	243	54	188	86	179	85	206	82
10:45	196	62	178	67	209	100	253	105	240	41	204	81	177	70	208	75
11:00	204	59	191	64	233	91	238	74	252	58	188	69	196	60	215	68
11:15	231	68	201	57	239	95	244	70	236	45	182	59	210	62	220	65
11:30	209	48	199	51	247	75	259	74	245	26	192	57	181	60	219	56
11:45	199	52	186	53	228	65	235	72	229	35	167	45	199	45	206	52
<b>Total</b>	<b>6910</b>	<b>9497</b>	<b>6554</b>	<b>9173</b>	<b>6905</b>	<b>9696</b>	<b>5402</b>	<b>9033</b>	<b>4485</b>	<b>8713</b>	<b>6597</b>	<b>9328</b>	<b>6690</b>	<b>9326</b>	<b>6218</b>	<b>9256</b>
Day	16407		15727		16601		14435		13198		15925		16016		15474	
Total%	42.12%	57.88%	41.67%	58.33%	41.59%	58.41%	37.42%	62.58%	33.98%	66.02%	41.43%	58.57%	41.77%	58.23%	40.18%	59.82%
Splits Peak	07:45	05:45	07:45	05:15	07:15	05:15	10:00	00:15	10:45	02:30	06:45	05:30	07:15	04:45	06:45	03:00
Vol.	1253	1169	1187	1103	1192	1067	1020	1024	973	987	1240	1180	1187	1096	5253	5562
P.H.F.	0.91	0.92	0.92	0.95	0.93	0.93	0.96	0.97	0.97	0.97	0.95	0.95	0.97	0.95	0.77	0.78

ATR Count Report

ATR No:

5707

Affiliated PCS No:

806

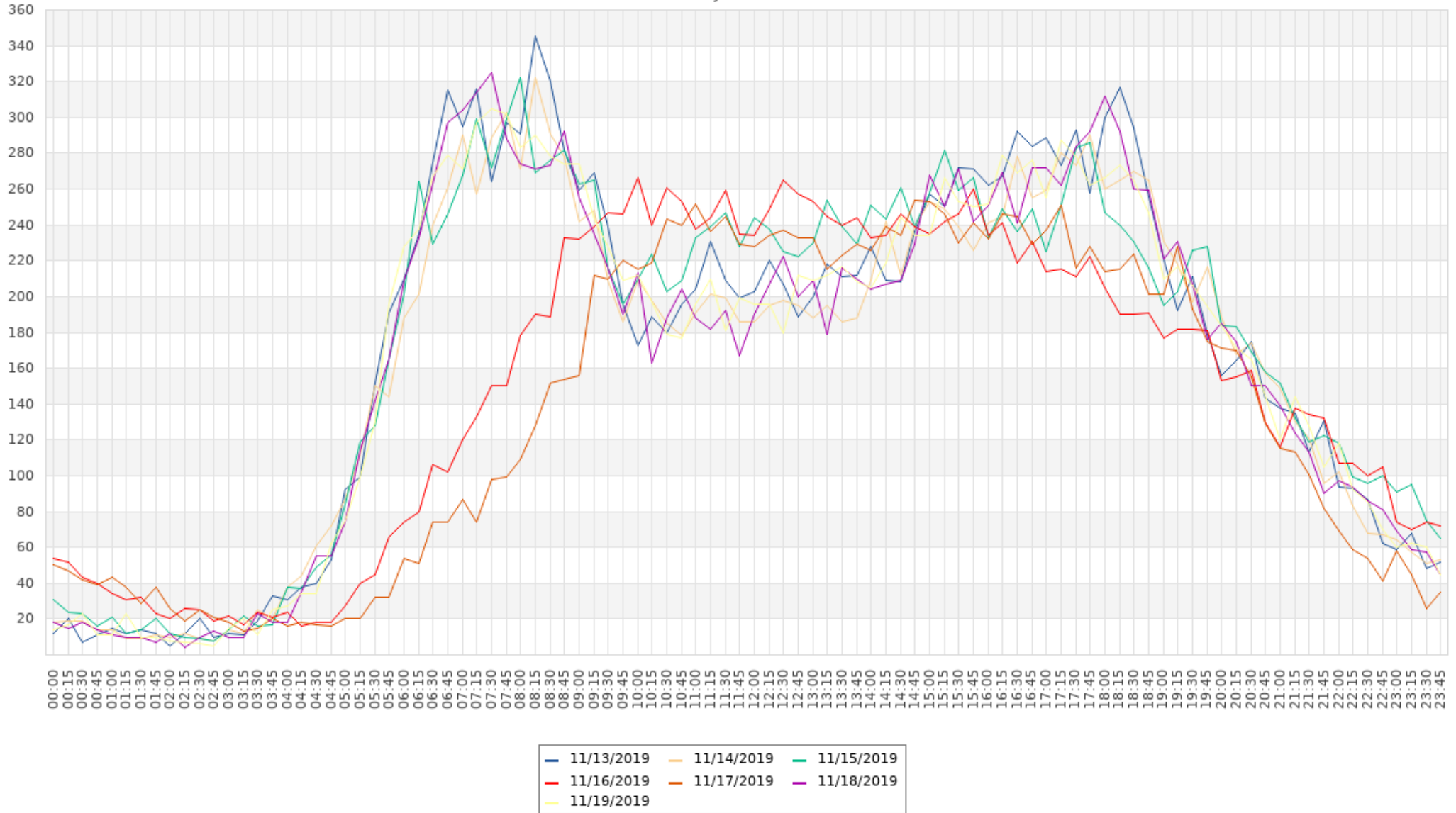
Start Date:

11/13/2019

End Date:

11/19/2019

Total by 15 min



# ATR Count Report

Bowmanville Av. (R.R.57) 125 m. N. of Regional Highway 2/King St.

**ATR No:** 5707      **Affiliated PCS No:** 806      **Start Date:** 10/22/2020      **End Date:** 10/28/2020

Start Time	2020-Oct-22		Fri		Sat		Sun		Mon		Tue		Wed		Average Day	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00	10	179	25	206	34	235	45	192	19	189	17	188	16	189	24	197
12:15	13	196	20	213	34	228	38	192	14	198	15	186	21	195	22	201
12:30	15	195	20	219	36	225	41	202	16	196	17	182	8	191	22	201
12:45	10	183	16	219	37	218	42	218	9	196	11	196	18	191	20	203
01:00	12	190	17	211	40	218	35	194	16	199	8	194	12	200	20	201
01:15	12	186	13	227	36	217	30	198	11	198	16	190	8	193	18	201
01:30	9	167	15	226	22	222	25	197	13	194	14	193	9	198	15	200
01:45	8	192	13	217	22	220	29	220	7	187	11	202	11	198	14	205
02:00	9	182	11	215	23	222	20	215	6	212	7	181	9	217	12	206
02:15	11	190	10	210	28	220	24	211	8	219	8	203	9	212	14	209
02:30	8	190	13	230	15	208	17	221	9	217	8	207	10	219	11	213
02:45	10	196	8	220	15	219	17	226	13	195	5	201	6	207	11	209
03:00	15	212	15	232	18	222	15	220	11	222	13	220	10	214	14	220
03:15	14	230	16	229	14	214	14	228	15	231	16	225	9	226	14	226
03:30	13	215	19	226	19	219	16	218	20	225	10	217	22	223	17	220
03:45	21	212	17	241	21	206	14	207	15	239	23	224	28	222	20	222
04:00	20	215	36	216	17	214	13	207	25	232	28	222	31	227	24	219
04:15	50	238	44	228	20	217	14	227	22	229	35	229	43	229	33	228
04:30	36	244	35	214	19	209	15	216	31	235	32	225	42	230	30	225
04:45	60	212	48	228	20	200	13	202	51	223	68	221	54	219	45	215
05:00	68	212	70	228	34	204	16	227	69	229	69	230	77	235	58	224
05:15	92	224	114	226	20	192	17	210	103	217	90	228	104	229	77	218
05:30	121	230	106	240	37	202	49	219	131	230	113	232	124	240	97	228
05:45	142	236	151	250	48	194	22	206	146	238	143	239	152	240	115	229
06:00	172	231	190	226	64	182	32	194	179	235	183	234	188	231	144	219
06:15	180	243	222	214	69	178	32	212	198	236	200	231	203	233	158	221
06:30	190	217	214	217	75	178	45	187	209	236	203	228	203	220	163	212
06:45	220	247	227	205	85	170	72	190	220	223	221	208	225	223	181	209
07:00	236	210	238	187	110	156	62	187	236	180	237	205	234	208	193	190
07:15	233	182	236	184	144	160	76	198	237	188	236	180	243	188	201	183
07:30	245	187	239	191	139	147	69	175	249	191	242	187	242	190	204	181
07:45	230	188	273	178	131	157	94	169	244	182	247	177	245	184	209	176
08:00	249	152	222	149	164	141	99	157	237	158	236	177	249	175	208	158
08:15	230	173	244	159	170	138	125	144	241	160	246	157	243	177	214	158
08:30	264	171	230	151	201	135	153	134	232	149	243	158	258	163	226	152
08:45	234	135	217	150	206	123	141	119	236	140	237	153	236	135	215	136
09:00	222	120	211	128	213	118	141	126	218	125	219	128	241	123	209	124
09:15	218	124	208	116	217	115	159	106	214	123	216	117	214	117	207	117
09:30	205	117	189	112	222	100	181	89	198	110	203	111	205	113	200	107
09:45	181	85	187	111	229	112	196	91	197	88	198	93	192	106	197	98
10:00	205	100	185	111	222	110	197	55	180	102	193	93	190	101	196	96
10:15	184	73	197	110	219	110	182	53	194	81	190	93	202	99	195	88
10:30	182	75	197	97	239	90	194	40	184	86	183	85	194	76	196	78
10:45	162	88	213	68	213	86	207	37	194	74	195	73	198	79	197	72
11:00	182	63	213	63	229	83	219	47	188	67	196	68	190	70	202	66
11:15	184	59	234	78	222	67	217	45	204	68	192	59	214	70	210	64
11:30	181	56	232	76	235	68	214	42	188	76	183	64	199	65	205	64
11:45	163	43	216	67	226	64	208	33	201	65	190	49	196	49	200	53
<b>Total</b>	<b>5731</b>	<b>8265</b>	<b>6086</b>	<b>8719</b>	<b>4873</b>	<b>8133</b>	<b>3896</b>	<b>7903</b>	<b>5858</b>	<b>8493</b>	<b>5866</b>	<b>8363</b>	<b>6037</b>	<b>8539</b>	<b>5477</b>	<b>8342</b>
Day	13996		14805		13006		11799		14351		14229		14576		13819	
Total%	40.95%	59.05%	41.11%	58.89%	37.47%	62.53%	33.02%	66.98%	40.82%	59.18%	41.23%	58.77%	41.42%	58.58%	39.63%	60.37%
Splits Peak	08:00	05:30	07:00	05:00	11:30	00:00	11:00	02:30	07:30	05:45	07:45	05:30	07:45	05:00	10:30	03:00
Vol.	977	940	986	944	924	906	858	895	971	945	972	936	995	944	4462	4897
P.H.F.	0.93	0.97	0.9	0.94	0.98	0.96	0.98	0.98	0.97	0.99	0.98	0.98	0.96	0.98	0.76	0.77

ATR Count Report

ATR No:

5707

Affiliated PCS No:

806

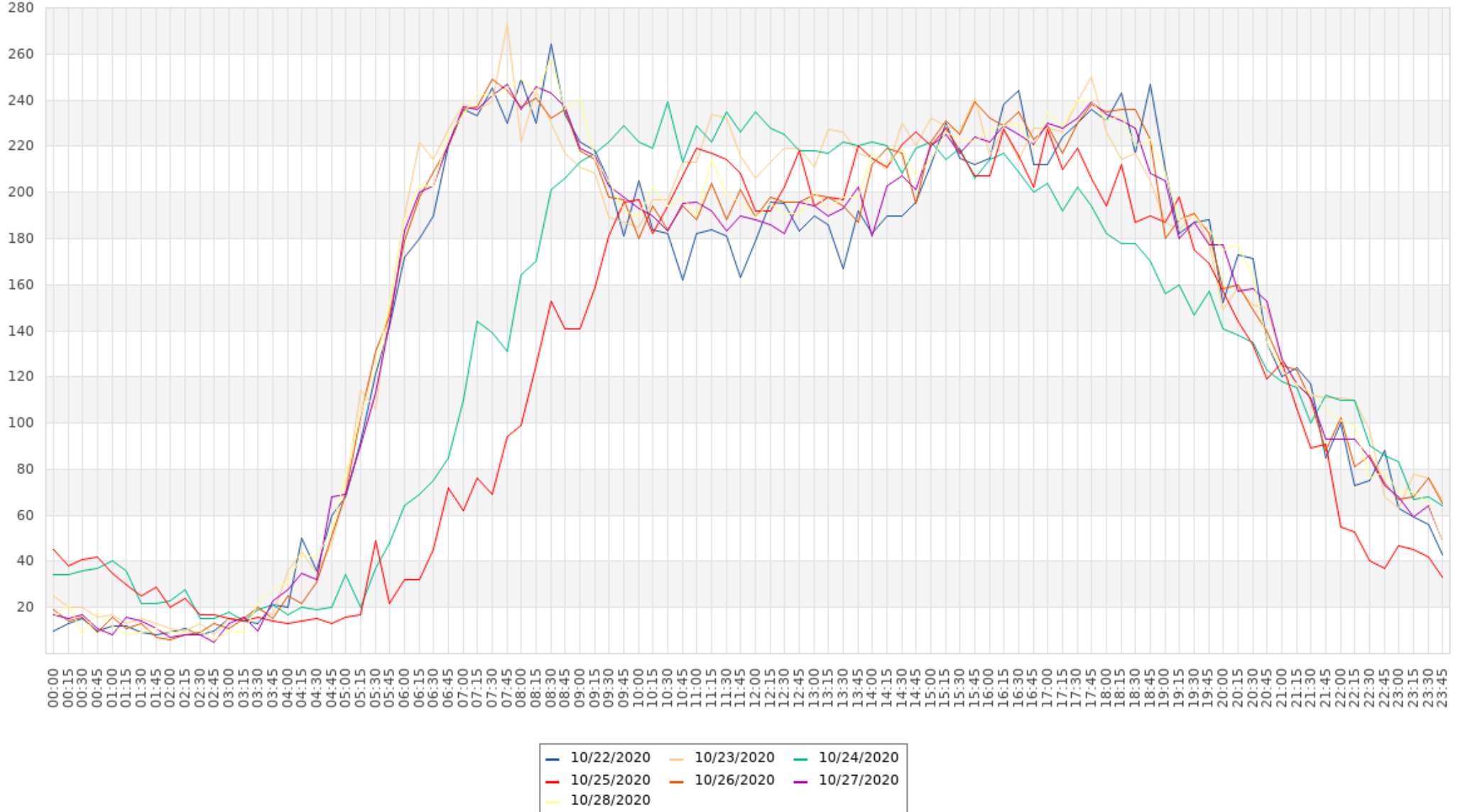
Start Date:

10/22/2020

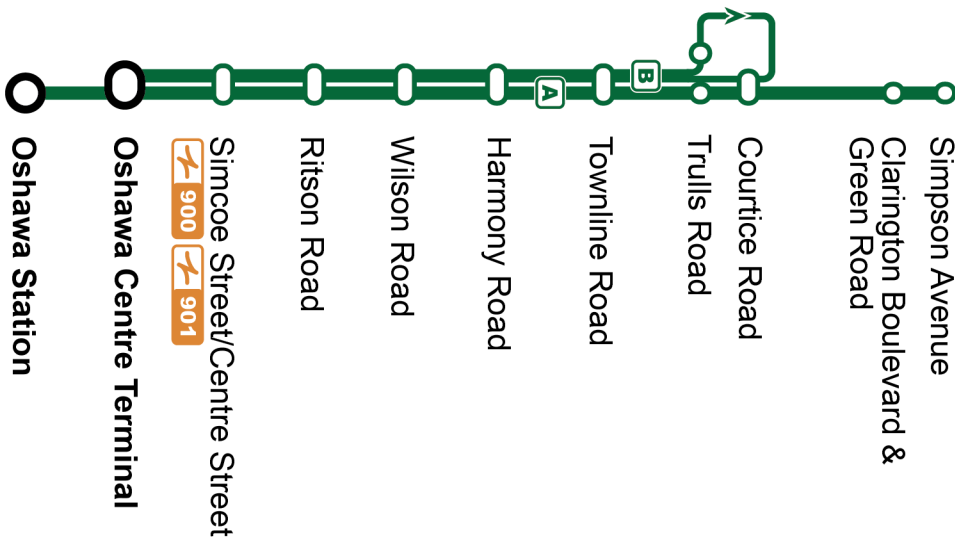
End Date:

10/28/2020

Total by 15 min



Dashes indicate the stop is not served by a trip. Trip notes are indicated by a letter or symbol and explained at the bottom of each timetable. Schedule times are shown in 24-hour clock. If you require this information in an accessible format, please contact Customer Service at 1-866-247-0055. See [durhamregiontransit.com](http://durhamregiontransit.com) for more information.





Weekday							West
King Eastbound @ Liberty Stop #1456	King Westbound @ Roenigk Stop #1433	Trulls Northbound @ Highway 2 Stop #93338	Highway 2 Westbound @ Trulls Stop #1219	Bond Westbound @ Simcoe Stop #1165	Oshawa Centre Terminal Stop #2595	Oshawa Station Stop #2585	
A 5:25	5:31	—	5:45	5:58	6:12	6:20	
A 5:55	6:01	—	6:15	6:28	6:42	6:50	
A 6:25	6:31	—	6:45	6:58	7:12	7:20	
—	—	B 6:49	7:00	7:13	7:19	—	
A 6:55	7:01	—	7:15	7:28	7:42	7:50	
—	—	B 7:19	7:30	7:44	7:52	—	
A 7:24	7:31	—	7:45	7:59	8:12	8:20	
—	—	B 7:45	8:00	8:14	8:22	—	
A 7:54	8:01	—	8:15	8:29	8:42	8:50	
—	—	B 8:15	8:30	8:44	8:52	—	
A 8:24	8:31	—	8:45	8:59	9:12	9:20	
—	—	B 8:45	9:00	9:14	9:22	—	
A 8:54	9:01	—	9:15	9:29	9:42	9:50	
—	—	B 9:15	9:30	9:44	9:52	—	
A 9:24	9:31	—	9:45	9:59	10:12	10:20	
—	—	B 9:45	10:00	10:14	10:22	—	
A 9:54	10:01	—	10:15	10:29	10:42	10:50	
—	—	B 10:17	10:30	10:44	10:52	—	
A 10:24	10:31	—	10:45	10:59	11:12	11:20	
—	—	B 10:47	11:00	11:15	11:22	—	
A 10:54	11:01	—	11:15	11:30	11:41	11:50	
—	—	B 11:17	11:30	11:45	11:52	—	
A 11:24	11:31	—	11:45	12:00	12:11	12:20	
—	—	B 11:47	12:00	12:15	12:22	—	
A 11:54	12:01	—	12:15	12:30	12:41	12:50	
—	—	B 12:17	12:30	12:45	12:52	—	
A 12:24	12:31	—	12:45	13:00	13:11	13:20	
—	—	B 12:47	13:00	13:15	13:22	—	
A 12:54	13:01	—	13:15	13:30	13:41	13:50	
—	—	B 13:17	13:30	13:45	13:52	—	
A 13:24	13:31	—	13:45	14:00	14:11	14:20	
—	—	B 13:49	14:00	14:15	14:22	—	
A 13:54	14:01	—	14:15	14:30	14:41	14:50	
—	—	B 14:19	14:30	14:45	14:52	—	

**A** To Oshawa Station via Oshawa Centre Terminal  
**B** To Oshawa Centre Terminal via George Reynolds Drive

Weekday							West
King Eastbound @ Liberty Stop #1456	King Westbound @ Roenigk Stop #1433	Trulls Northbound @ Highway 2 Stop #93338	Highway 2 Westbound @ Trulls Stop #1219	Bond Westbound @ Simcoe Stop #1165	Oshawa Centre Terminal Stop #2595	Oshawa Station Stop #2585	
A 14:24	14:31	—	14:45	15:00	15:11	15:20	
—	—	B 14:49	15:00	15:15	15:22	—	
A 14:54	15:01	—	15:15	15:30	15:41	15:50	
—	—	B 15:19	15:30	15:45	15:52	—	
A 15:24	15:31	—	15:45	16:00	16:11	16:20	
—	—	B 15:49	16:00	16:15	16:22	—	
A 15:54	16:01	—	16:15	16:30	16:41	16:50	
—	—	B 16:19	16:30	16:45	16:52	—	
A 16:24	16:31	—	16:45	17:00	17:11	17:20	
—	—	B 16:49	17:00	17:15	17:22	—	
A 16:54	17:01	—	17:15	17:30	17:41	17:50	
—	—	B 17:19	17:30	17:45	17:52	—	
A 17:24	17:31	—	17:45	18:00	18:11	18:20	
—	—	B 17:46	18:00	18:15	18:22	—	
A 17:54	18:01	—	18:15	18:30	18:41	18:50	
—	—	B 18:16	18:30	18:45	18:52	—	
A 18:24	18:31	—	18:45	19:00	19:11	19:20	
—	—	B 18:46	19:00	19:14	19:20	—	
A 18:55	19:01	—	19:15	19:29	19:41	19:50	
—	—	B 19:16	19:30	19:44	19:50	—	
A 19:25	19:31	—	19:45	19:59	20:11	20:20	
A 19:55	20:01	—	20:15	20:29	20:41	20:50	
A 20:25	20:31	—	20:45	20:59	21:11	21:20	
A 20:55	21:01	—	21:15	21:29	21:41	21:50	
A 21:25	21:31	—	21:45	21:59	22:11	22:20	
A 21:55	22:01	—	22:15	22:29	22:41	22:50	
A 22:25	22:31	—	22:45	22:59	23:11	23:20	
A 22:55	23:01	—	23:15	23:29	23:41	23:50	

**A** To Oshawa Station via Oshawa Centre Terminal  
**B** To Oshawa Centre Terminal via George Reynolds Drive

Weekday		East				
Oshawa Station Stop #2585	Oshawa Centre Terminal Stop #2595	King Eastbound @ Simcoe Stop #1242	Highway 2 Eastbound @ Trulls Stop #1245	Trulls Northbound @ Highway 2 Stop #93338	Clarington Northbound @ Prince William Stop #93720	King Eastbound @ Liberty Stop #1456
—	<b>A</b> 6:10	6:17	6:30	—	6:40	6:55
<b>A</b> 6:25	6:40	6:47	7:00	—	7:10	7:24
<b>A</b> 6:55	7:10	7:17	7:30	—	7:40	7:54
—	<b>B</b> 7:25	7:32	—	7:45	—	—
<b>A</b> 7:25	7:40	7:47	8:00	—	8:10	8:24
—	<b>B</b> 7:55	8:02	—	8:15	—	—
<b>A</b> 7:55	8:10	8:17	8:30	—	8:40	8:54
—	<b>B</b> 8:25	8:32	—	8:45	—	—
<b>A</b> 8:25	8:40	8:47	9:00	—	9:10	9:24
—	<b>B</b> 8:55	9:02	—	9:15	—	—
<b>A</b> 8:55	9:10	9:17	9:30	—	9:40	9:54
—	<b>B</b> 9:25	9:32	—	9:45	—	—
<b>A</b> 9:25	9:40	9:47	10:00	—	10:10	10:24
—	<b>B</b> 9:55	10:04	—	10:17	—	—
<b>A</b> 9:55	10:10	10:19	10:32	—	10:42	10:54
—	<b>B</b> 10:25	10:34	—	10:47	—	—
<b>A</b> 10:25	10:40	10:49	11:02	—	11:12	11:24
—	<b>B</b> 10:55	11:04	—	11:17	—	—
<b>A</b> 10:55	11:10	11:19	11:32	—	11:42	11:54
—	<b>B</b> 11:25	11:34	—	11:47	—	—
<b>A</b> 11:25	11:40	11:49	12:02	—	12:12	12:24
—	<b>B</b> 11:55	12:04	—	12:17	—	—
<b>A</b> 11:55	12:10	12:19	12:32	—	12:42	12:54
—	<b>B</b> 12:25	12:34	—	12:47	—	—
<b>A</b> 12:25	12:40	12:49	13:02	—	13:12	13:24
—	<b>B</b> 12:55	13:04	—	13:17	—	—
<b>A</b> 12:55	13:10	13:19	13:32	—	13:42	13:54
—	<b>B</b> 13:25	13:35	—	13:49	—	—
<b>A</b> 13:25	13:40	13:50	14:04	—	14:14	14:24
—	<b>B</b> 13:55	14:05	—	14:19	—	—
<b>A</b> 13:55	14:10	14:20	14:34	—	14:44	14:54
—	<b>B</b> 14:25	14:35	—	14:49	—	—
<b>A</b> 14:25	14:40	14:50	15:04	—	15:14	15:24
—	<b>B</b> 14:55	15:05	—	15:19	—	—
<b>A</b> 14:55	15:10	15:20	15:34	—	15:44	15:54

**A** To King Street and Simpson Avenue  
**B** To Trulls Road and Highway 2

Weekday		East				
Oshawa Station Stop #2585	Oshawa Centre Terminal Stop #2595	King Eastbound @ Simcoe Stop #1242	Highway 2 Eastbound @ Trulls Stop #1245	Trulls Northbound @ Highway 2 Stop #93338	Clarington Northbound @ Prince William Stop #93720	King Eastbound @ Liberty Stop #1456
—	<b>B</b> 15:25	15:35	—	15:49	—	—
<b>A</b> 15:25	15:40	15:50	16:04	—	16:14	16:24
—	<b>B</b> 15:55	16:05	—	16:19	—	—
<b>A</b> 15:55	16:10	16:20	16:34	—	16:44	16:54
—	<b>B</b> 16:25	16:35	—	16:49	—	—
<b>A</b> 16:25	16:40	16:50	17:04	—	17:14	17:24
—	<b>B</b> 16:55	17:05	—	17:19	—	—
<b>A</b> 16:55	17:10	17:20	17:34	—	17:44	17:54
—	<b>B</b> 17:25	17:33	—	17:46	—	—
<b>A</b> 17:25	17:40	17:48	18:01	—	18:11	18:24
—	<b>B</b> 17:55	18:03	—	18:16	—	—
<b>A</b> 17:55	18:10	18:18	18:31	—	18:41	18:55
—	<b>B</b> 18:25	18:33	—	18:46	—	—
<b>A</b> 18:25	18:40	18:48	19:01	—	19:11	19:25
—	<b>B</b> 18:55	19:03	—	19:16	—	—
<b>A</b> 18:55	19:10	19:18	19:31	—	19:41	19:55
<b>A</b> 19:25	19:40	19:48	20:01	—	20:11	20:25
<b>A</b> 19:55	20:10	20:18	20:31	—	20:41	20:55
<b>A</b> 20:25	20:40	20:48	21:01	—	21:11	21:25
<b>A</b> 20:55	21:10	21:18	21:31	—	21:41	21:55
<b>A</b> 21:25	21:40	21:48	22:01	—	22:11	22:25
<b>A</b> 21:55	22:10	22:18	22:31	—	22:41	22:55
<b>A</b> 22:25	22:40	22:48	23:01	—	23:11	23:17
<b>A</b> 22:55	23:10	23:18	23:31	—	23:41	23:47
<b>A</b> 23:25	23:40	23:48	23:57	—	0:06	0:12
<b>A</b> 23:55	0:10	0:18	0:27	—	0:36	0:42

**A** To King Street and Simpson Avenue  
**B** To Trulls Road and Highway 2

Saturday							West
King Eastbound @ Liberty Stop #1456	King Westbound @ Roenigk Stop #1433	Trulls Northbound @ Highway 2 Stop #93338	Highway 2 Westbound @ Trulls Stop #1219	Bond Westbound @ Simcoe Stop #1165	Oshawa Centre Terminal Stop #2595	Oshawa Station Stop #2585	
A 5:26	5:32	—	5:45	5:57	6:13	6:20	
A 5:56	6:02	—	6:15	6:27	6:43	6:50	
A 6:26	6:32	—	6:45	6:57	7:13	7:20	
A 6:55	7:02	—	7:15	7:28	7:42	7:50	
A 7:25	7:32	—	7:45	7:58	8:12	8:20	
A 7:55	8:02	—	8:15	8:28	8:42	8:50	
A 8:25	8:32	—	8:45	8:58	9:12	9:20	
A 8:55	9:02	—	9:15	9:28	9:42	9:50	
A 9:25	9:32	—	9:45	9:58	10:12	10:20	
A 9:55	10:02	—	10:15	10:28	10:42	10:50	
—	—	B 10:17	10:30	10:43	10:50	—	
A 10:25	10:32	—	10:45	10:58	11:12	11:20	
—	—	B 10:47	11:00	11:14	11:22	—	
A 10:54	11:02	—	11:15	11:29	11:41	11:50	
—	—	B 11:17	11:30	11:44	11:52	—	
A 11:24	11:32	—	11:45	11:59	12:11	12:20	
—	—	B 11:47	12:00	12:14	12:22	—	
A 11:54	12:02	—	12:15	12:29	12:41	12:50	
—	—	B 12:17	12:30	12:44	12:52	—	
A 12:24	12:32	—	12:45	12:59	13:11	13:20	
—	—	B 12:47	13:00	13:14	13:22	—	
A 12:54	13:02	—	13:15	13:29	13:41	13:50	
—	—	B 13:17	13:30	13:44	13:52	—	
A 13:24	13:32	—	13:45	13:59	14:11	14:20	
—	—	B 13:47	14:00	14:14	14:22	—	
A 13:54	14:02	—	14:15	14:29	14:41	14:50	
<b>A</b> To Oshawa Station via Oshawa Centre Terminal <b>B</b> To Oshawa Centre Terminal via George Reynolds Drive							

Saturday							West
King Eastbound @ Liberty Stop #1456	King Westbound @ Roenigk Stop #1433	Trulls Northbound @ Highway 2 Stop #93338	Highway 2 Westbound @ Trulls Stop #1219	Bond Westbound @ Simcoe Stop #1165	Oshawa Centre Terminal Stop #2595	Oshawa Station Stop #2585	
—	—	B 14:17	14:30	14:44	14:52	—	
A 14:24	14:32	—	14:45	14:59	15:11	15:20	
—	—	B 14:47	15:00	15:14	15:22	—	
A 14:54	15:02	—	15:15	15:29	15:41	15:50	
—	—	B 15:17	15:30	15:44	15:52	—	
A 15:24	15:32	—	15:45	15:59	16:11	16:20	
—	—	B 15:47	16:00	16:14	16:22	—	
A 15:54	16:02	—	16:15	16:29	16:41	16:50	
—	—	B 16:17	16:30	16:44	16:52	—	
A 16:24	16:32	—	16:45	16:59	17:11	17:20	
—	—	B 16:47	17:00	17:14	17:22	—	
A 16:54	17:02	—	17:15	17:29	17:41	17:50	
—	—	B 17:17	17:30	17:44	17:52	—	
A 17:25	17:32	—	17:45	17:58	18:12	18:20	
—	—	B 17:47	18:00	18:13	18:20	—	
A 17:55	18:02	—	18:15	18:28	18:42	18:50	
—	—	B 18:17	18:30	18:43	18:50	—	
A 18:25	18:32	—	18:45	18:58	19:12	19:20	
A 18:55	19:02	—	19:15	19:28	19:42	19:50	
A 19:25	19:32	—	19:45	19:58	20:12	20:20	
A 19:55	20:02	—	20:15	20:28	20:42	20:50	
A 20:25	20:32	—	20:45	20:58	21:12	21:20	
A 20:55	21:02	—	21:15	21:27	21:43	21:50	
A 21:25	21:32	—	21:45	21:57	22:13	22:20	
A 21:55	22:02	—	22:15	22:27	22:43	22:50	
A 22:25	22:32	—	22:45	22:57	23:13	23:20	
<b>A</b> To Oshawa Station via Oshawa Centre Terminal <b>B</b> To Oshawa Centre Terminal via George Reynolds Drive							

Saturday							East
Oshawa Station Stop #2585	Oshawa Centre Terminal Stop #2595	King Eastbound @ Simcoe Stop #1242	Highway 2 Eastbound @ Trulls Stop #1245	Trulls Northbound @ Highway 2 Stop #93338	Clarington Northbound @ Prince William Stop #93720	King Eastbound @ Liberty Stop #1456	
A 6:25	6:40	6:48	7:01	—	7:11	7:25	
A 6:55	7:10	7:18	7:31	—	7:41	7:55	
A 7:25	7:40	7:48	8:01	—	8:11	8:25	
A 7:55	8:10	8:18	8:31	—	8:41	8:55	
A 8:25	8:40	8:48	9:01	—	9:11	9:25	
A 8:55	9:10	9:18	9:31	—	9:41	9:55	
A 9:25	9:40	9:49	10:02	—	10:11	10:25	
—	B 9:55	10:04	—	10:17	—	—	
A 9:55	10:10	10:19	10:32	—	10:41	10:54	
—	B 10:25	10:34	—	10:47	—	—	
A 10:25	10:40	10:49	11:02	—	11:11	11:24	
—	B 10:55	11:04	—	11:17	—	—	
A 10:55	11:10	11:19	11:32	—	11:41	11:54	
—	B 11:25	11:34	—	11:47	—	—	
A 11:25	11:40	11:49	12:02	—	12:11	12:24	
—	B 11:55	12:04	—	12:17	—	—	
A 11:55	12:10	12:19	12:32	—	12:41	12:54	
—	B 12:25	12:34	—	12:47	—	—	
A 12:25	12:40	12:49	13:02	—	13:11	13:24	
—	B 12:55	13:04	—	13:17	—	—	
A 12:55	13:10	13:19	13:32	—	13:41	13:54	
—	B 13:25	13:34	—	13:47	—	—	
A 13:25	13:40	13:49	14:02	—	14:11	14:24	
—	B 13:55	14:04	—	14:17	—	—	
A 13:55	14:10	14:19	14:32	—	14:41	14:54	
—	B 14:25	14:34	—	14:47	—	—	
A 14:25	14:40	14:49	15:02	—	15:11	15:24	
<b>A</b> To King Street and Simpson Avenue							
<b>B</b> To Trulls Road and Highway 2							

Saturday							East
Oshawa Station Stop #2585	Oshawa Centre Terminal Stop #2595	King Eastbound @ Simcoe Stop #1242	Highway 2 Eastbound @ Trulls Stop #1245	Trulls Northbound @ Highway 2 Stop #93338	Clarington Northbound @ Prince William Stop #93720	King Eastbound @ Liberty Stop #1456	
—	B 14:55	15:04	—	15:17	—	—	
A 14:55	15:10	15:19	15:32	—	15:41	15:54	
—	B 15:25	15:34	—	15:47	—	—	
A 15:25	15:40	15:49	16:02	—	16:11	16:24	
—	B 15:55	16:04	—	16:17	—	—	
A 15:55	16:10	16:19	16:32	—	16:41	16:54	
—	B 16:25	16:34	—	16:47	—	—	
A 16:25	16:40	16:49	17:02	—	17:11	17:25	
—	B 16:55	17:04	—	17:17	—	—	
A 16:55	17:10	17:19	17:32	—	17:41	17:55	
—	B 17:25	17:34	—	17:47	—	—	
A 17:25	17:40	17:49	18:02	—	18:11	18:25	
—	B 17:55	18:04	—	18:17	—	—	
A 17:55	18:10	18:19	18:32	—	18:41	18:55	
A 18:25	18:40	18:49	19:02	—	19:11	19:25	
A 18:55	19:10	19:19	19:32	—	19:41	19:55	
A 19:25	19:40	19:49	20:02	—	20:11	20:25	
A 19:55	20:10	20:19	20:32	—	20:41	20:55	
A 20:25	20:40	20:49	21:02	—	21:11	21:25	
A 20:55	21:10	21:19	21:32	—	21:41	21:55	
A 21:25	21:40	21:49	22:02	—	22:11	22:25	
A 21:55	22:10	22:18	22:29	—	22:38	22:44	
A 22:25	22:40	22:48	22:59	—	23:08	23:14	
A 22:55	23:10	23:18	23:29	—	23:38	23:44	
<b>A</b> To King Street and Simpson Avenue							
<b>B</b> To Trulls Road and Highway 2							

Sunday							West
King Eastbound @ Liberty Stop #1456	King Westbound @ Roenigk Stop #1433	Trulls Northbound @ Highway 2 Stop #93338	Highway 2 Westbound @ Trulls Stop #1219	Bond Westbound @ Simcoe Stop #1165	Oshawa Centre Terminal Stop #2595	Oshawa Station Stop #2585	
A 5:26	5:32	—	5:45	5:57	6:13	6:20	
A 5:56	6:02	—	6:15	6:27	6:43	6:50	
A 6:26	6:32	—	6:45	6:57	7:13	7:20	
A 6:55	7:02	—	7:15	7:28	7:42	7:50	
A 7:25	7:32	—	7:45	7:58	8:12	8:20	
A 7:55	8:02	—	8:15	8:28	8:42	8:50	
A 8:25	8:32	—	8:45	8:58	9:12	9:20	
A 8:55	9:02	—	9:15	9:28	9:42	9:50	
A 9:25	9:32	—	9:45	9:58	10:12	10:20	
A 9:55	10:02	—	10:15	10:28	10:42	10:50	
A 10:25	10:32	—	10:45	10:58	11:12	11:20	
A 10:54	11:02	—	11:15	11:29	11:41	11:50	
A 11:24	11:32	—	11:45	11:59	12:11	12:20	
A 11:54	12:02	—	12:15	12:29	12:41	12:50	
A 12:24	12:32	—	12:45	12:59	13:11	13:20	
A 12:54	13:02	—	13:15	13:29	13:41	13:50	
A 13:24	13:32	—	13:45	13:59	14:11	14:20	
A 13:54	14:02	—	14:15	14:29	14:41	14:50	
A 14:24	14:32	—	14:45	14:59	15:11	15:20	
A 14:54	15:02	—	15:15	15:29	15:41	15:50	
A 15:24	15:32	—	15:45	15:59	16:11	16:20	
A 15:54	16:02	—	16:15	16:29	16:41	16:50	
A 16:24	16:32	—	16:45	16:59	17:11	17:20	
A 16:54	17:02	—	17:15	17:29	17:41	17:50	
A 17:25	17:32	—	17:45	17:58	18:12	18:20	
A 17:55	18:02	—	18:15	18:28	18:42	18:50	
A 18:25	18:32	—	18:45	18:58	19:12	19:20	
A 18:55	19:02	—	19:15	19:28	19:42	19:50	
A 19:25	19:32	—	19:45	19:58	20:12	20:20	
A 19:55	20:02	—	20:15	20:28	20:42	20:50	
A 20:25	20:32	—	20:45	20:58	21:12	21:20	
A 20:55	21:02	—	21:15	21:27	21:43	21:50	
A 21:25	21:32	—	21:45	21:57	22:13	22:20	
A 21:55	22:02	—	22:15	22:27	22:43	22:50	
A 22:25	22:32	—	22:45	22:57	23:13	23:20	

**A To Oshawa Station via Oshawa Centre Terminal**

Sunday							East
Oshawa Station Stop #2585	Oshawa Centre Terminal Stop #2595	King Eastbound @ Simcoe Stop #1242	Highway 2 Eastbound @ Trulls Stop #1245	Trulls Northbound @ Highway 2 Stop #93338	Clarington Northbound @ Prince William Stop #93720	King Eastbound @ Liberty Stop #1456	
A 6:25	6:40	6:48	7:01	—	7:11	7:25	
A 6:55	7:10	7:18	7:31	—	7:41	7:55	
A 7:25	7:40	7:48	8:01	—	8:11	8:25	
A 7:55	8:10	8:18	8:31	—	8:41	8:55	
A 8:25	8:40	8:48	9:01	—	9:11	9:25	
A 8:55	9:10	9:18	9:31	—	9:41	9:55	
A 9:25	9:40	9:49	10:02	—	10:11	10:25	
A 9:55	10:10	10:19	10:32	—	10:41	10:54	
A 10:25	10:40	10:49	11:02	—	11:11	11:24	
A 10:55	11:10	11:19	11:32	—	11:41	11:54	
A 11:25	11:40	11:49	12:02	—	12:11	12:24	
A 11:55	12:10	12:19	12:32	—	12:41	12:54	
A 12:25	12:40	12:49	13:02	—	13:11	13:24	
A 12:55	13:10	13:19	13:32	—	13:41	13:54	
A 13:25	13:40	13:49	14:02	—	14:11	14:24	
A 13:55	14:10	14:19	14:32	—	14:41	14:54	
A 14:25	14:40	14:49	15:02	—	15:11	15:24	
A 14:55	15:10	15:19	15:32	—	15:41	15:54	
A 15:25	15:40	15:49	16:02	—	16:11	16:24	
A 15:55	16:10	16:19	16:32	—	16:41	16:54	
A 16:25	16:40	16:49	17:02	—	17:11	17:25	
A 16:55	17:10	17:19	17:32	—	17:41	17:55	
A 17:25	17:40	17:49	18:02	—	18:11	18:25	
A 17:55	18:10	18:19	18:32	—	18:41	18:55	
A 18:25	18:40	18:49	19:02	—	19:11	19:25	
A 18:55	19:10	19:19	19:32	—	19:41	19:55	
A 19:25	19:40	19:49	20:02	—	20:11	20:25	
A 19:55	20:10	20:19	20:32	—	20:41	20:55	
A 20:25	20:40	20:49	21:02	—	21:11	21:25	
A 20:55	21:10	21:19	21:32	—	21:41	21:55	
A 21:25	21:40	21:49	22:02	—	22:11	22:25	
A 21:55	22:10	22:18	22:29	—	22:38	22:44	
A 22:25	22:40	22:48	22:59	—	23:08	23:14	
A 22:55	23:10	23:18	23:29	—	23:38	23:44	

**A To King Street and Simpson Avenue**

# **Appendix B**

**Peak hour factor and Synchro Report:  
Existing traffic conditions**

TMC 15 Min Report

Bowmanville Av (R.R.57) @ Stevens Rd (815)

TMC No: 0571200000 Intersection ID: 4475 Count ID: 35702018205 Count Date: 11/20/2019, Wed

Time	NORTH APPROACH									EAST APPROACH									SOUTH APPROACH									WEST APPROACH									Total				
	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped											
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right									
Period 1																																									
06:00	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*		
06:15	0	100	4	0	26	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	165	
06:30	0	108	13	0	23	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	199		
06:45	0	121	9	0	29	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	222		
07:00	0	116	7	0	30	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	51	0	0	18	0	0	0	0	0	2	0	2	1	0	1	0	0	0	231	
07:15	0	121	13	0	21	6	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	45	0	0	16	0	0	0	0	0	8	0	2	0	0	0	0	0	0	233	
07:30	0	106	14	0	38	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	49	0	0	20	0	0	0	0	0	6	0	3	3	0	0	0	0	247		
07:45	0	170	15	0	45	8	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	64	1	3	18	1	0	0	0	0	8	0	1	2	0	0	0	0	0	338	
08:00	0	143	45	0	35	7	0	0	0	0	2	0	1	0	0	1	0	0	0	0	20	74	1	1	16	0	0	0	0	0	12	0	2	7	0	1	0	0	0	368	
08:15	0	146	73	0	36	18	0	0	0	0	1	0	0	0	0	0	0	0	0	0	15	80	1	5	31	0	0	0	0	0	30	0	1	12	0	1	0	0	0	450	
08:30	0	150	34	0	32	9	0	0	0	0	0	0	0	1	0	0	0	0	0	0	5	78	0	2	18	0	0	0	0	0	22	0	1	9	0	0	0	0	0	361	
08:45	0	109	35	0	33	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	54	0	0	16	0	0	0	0	0	20	0	2	7	0	0	0	0	284		
09:00	0	109	35	0	24	7	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	75	1	2	18	0	0	0	0	0	20	0	4	5	0	1	0	0	0	305	
09:15	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	
Period 2																																									
11:30	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	
11:45	0	70	38	0	16	5	0	0	0	0	1	1	0	0	0	1	0	0	0	0	8	61	2	1	19	1	0	0	0	0	47	0	8	8	0	1	0	0	0	288	
12:00	0	71	49	0	25	4	0	0	0	0	0	0	1	0	0	0	0	0	0	0	6	74	0	0	14	0	0	0	0	0	57	0	9	6	0	3	0	0	0	319	
12:15	0	75	36	0	19	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	70	0	1	22	0	0	0	0	0	52	0	10	17	0	0	0	0	0	314	
12:30	1	76	40	1	23	7	0	0	0	0	2	0	0	1	0	0	0	0	0	0	6	74	1	2	23	0	0	0	0	0	44	0	5	6	0	1	0	0	0	313	
12:45	0	75	34	0	18	9	0	0	0	0	0	0	2	0	0	0	0	0	0	0	9	73	2	2	19	0	0	0	0	0	41	0	9	7	0	1	0	0	0	301	
13:00	0	80	39	0	26	15	0	0	0	0	0	0	0	0	0	0	0	0	0	5	74	0	0	30	0	0	0	0	0	52	0	7	8	0	4	0	0	0	340		
13:15	0	80	37	0	29	9	0	0	0	0	0	0	0	0	0	0	0	0	0	5	67	0	0	17	0	0	0	0	0	49	0	6	10	0	5	0	0	0	314		
13:30	0	61	38	0	23	6	0	0	0	0	2	0	0	0	0	0	0	0	0	2	70	1	2	21	0	0	0	0	0	54	0	7	9	0	3	0	0	0	299		
Period 3																																									
13:45	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	
15:00	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*
15:15	0	75	25	0	21	7	0	0	0	0	1	0	0	0	0	0	0	0	0	0	7	100	1	0	33	0	0	0	0	0	53	1	8	15	0	0	0	0	0	347	
15:30	0	72	26	0	27	8	0	0	0	0	0	1	0	0	0	0	0	0	0	2	112	0	0	35	0	0	0	0	0	62	1	5	5	0	0	0	0	0	2	358	
15:45	1	67	37	0	23	10	0	0	0	2	1	1	1	0	0	0	0	0	0	2	108	0	0	36	1	0	0	0	0	64	0	10	13	0	2	0	0	0	379		
16:00	2	125	56	0	30	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	7	131	0	1	32	0	0	0	0	60	0	9	16	0	2	0	0	0	482		
16:15	0	126	30	0	25	12	0	0	0	0	0	0	0	0	0	0	0	0	0	7	122	0	0	34	0	0	0	0	0	68	0	3	14	0	1	0	0	0	442		
16:30	0	76	43	0	20	7	0	0	0	0	2	0	0	0	0	0	0	0	0	3	147	0	1	36	0	0	0	0	0	71	1	7	18	0	1	0	0	0	433		
16:45	0	115	40	0	23	9	0	0	0	0	0	0	0	0	0	0	0	0	0	1	135	1	1	28	0	0	0	0	0	68	0	8	8	0	2	0	0	0	439		
17:00	0	96	44	1	38	11	0	0	0	0	0	0	0	0	0	0	0	0	0	2	155	1	0	31	0	0	0	0	0	89	0	11	18	0	0	0	0	0	497		
17:15	2	103	42	0	25	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	145	0	2	24	0	0	0	0	0	72	1	6	11	0	0	0	0	0	439		
17:30	0	129	44	0	17	8	0	0	0	0	1	0	0	0	0	0	0	0	0	2	159	0	0	28	0	0	0	0	0	81	0	11	18	0	1	0	0	0	499		
17:45	0	95	52	0	25	11	0	0	0	0	0	0	0	0	0	0	0	0	0	2	142	2	2	27	0	0	0	0	0	73	1	10	15	0	0	0	0	0	457		
18:00	2	112	46	0	16	3	0	0	0	0	2	0	0	0	0	0	0	0	0	7	113	0	2	12	0	0	0	0	0	62	1	12	8	1	1	0	0	0	400		
18:15	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	
18:30	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	

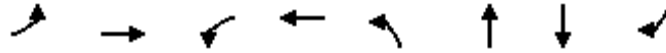
Intersection volume
338
368
450
361
0.843
1517

Intersection volume
497
439
499
457
0.948
1892

# Timings

## 1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021

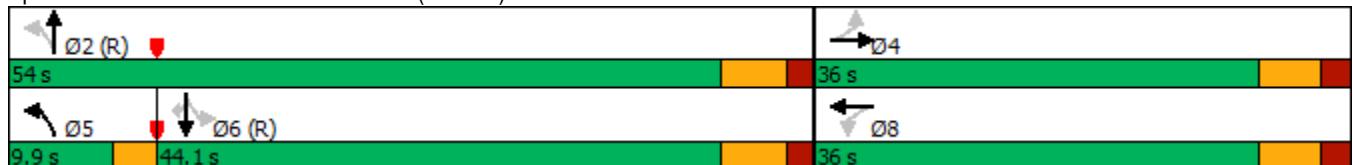


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations		↕		↕	↗	↖	↑	↗
Traffic Volume (vph)	102	0	4	0	52	379	757	209
Future Volume (vph)	102	0	4	0	52	379	757	209
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	NA	Perm
Protected Phases		4		8	5	2	6	
Permitted Phases	4		8		2			6
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	8.0	8.0	8.0	8.0	5.0	20.0	20.0	20.0
Minimum Split (s)	24.0	24.0	24.0	24.0	9.0	27.0	27.0	27.0
Total Split (s)	36.0	36.0	36.0	36.0	9.9	54.0	44.1	44.1
Total Split (%)	40.0%	40.0%	40.0%	40.0%	11.0%	60.0%	49.0%	49.0%
Yellow Time (s)	4.1	4.1	4.1	4.1	3.0	4.4	4.4	4.4
All-Red Time (s)	2.2	2.2	2.2	2.2	0.0	1.9	1.9	1.9
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.3		6.3	3.0	6.3	6.3	6.3
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)		11.6		11.6	69.1	65.8	58.0	58.0
Actuated g/C Ratio		0.13		0.13	0.77	0.73	0.64	0.64
v/c Ratio		0.63		0.04	0.21	0.40	0.87	0.27
Control Delay		30.2		0.4	5.0	6.5	27.3	4.0
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		30.2		0.4	5.0	6.5	27.3	4.0
LOS		C		A	A	A	C	A
Approach Delay		30.2		0.4		6.3	22.3	
Approach LOS		C		A		A	C	

### Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 35.1 (39%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 18.1  
 Intersection LOS: B  
 Intersection Capacity Utilization 62.9%  
 ICU Level of Service B  
 Analysis Period (min) 15

### Splits and Phases: 1: Bowmanville Ave (R.R. 57) & Stevens Rd





Queues

1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021



Lane Group	EBT	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	129	9	62	456	901	249
v/c Ratio	0.63	0.04	0.21	0.40	0.87	0.27
Control Delay	30.2	0.4	5.0	6.5	27.3	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.2	0.4	5.0	6.5	27.3	4.0
Queue Length 50th (m)	8.7	0.0	1.8	22.6	113.3	4.6
Queue Length 95th (m)	21.3	0.0	6.0	46.9	#214.8	15.5
Internal Link Dist (m)	270.0	96.4		165.1	295.3	
Turn Bay Length (m)			80.0			60.0
Base Capacity (vph)	408	404	305	1149	1031	937
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.02	0.20	0.40	0.87	0.27

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis  
 1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	↕
Traffic Volume (vph)	102	0	7	4	0	3	52	379	4	0	757	209
Future Volume (vph)	102	0	7	4	0	3	52	379	4	0	757	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.3			6.3		3.0	6.3			6.3	6.3
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	1.00
Frt		0.99			0.94		1.00	1.00			1.00	0.85
Flt Protected		0.96			0.97		0.95	1.00			1.00	1.00
Satd. Flow (prot)		1411			1223		1508	1572			1601	1361
Flt Permitted		0.73			0.85		0.17	1.00			1.00	1.00
Satd. Flow (perm)		1082			1070		270	1572			1601	1361
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	121	0	8	5	0	4	62	451	5	0	901	249
RTOR Reduction (vph)	0	66	0	0	8	0	0	0	0	0	0	62
Lane Group Flow (vph)	0	63	0	0	1	0	62	456	0	0	901	187
Heavy Vehicles (%)	29%	0%	29%	25%	0%	67%	21%	22%	25%	0%	20%	20%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		11.6			11.6		65.8	65.8			57.4	57.4
Effective Green, g (s)		11.6			11.6		65.8	65.8			57.4	57.4
Actuated g/C Ratio		0.13			0.13		0.73	0.73			0.64	0.64
Clearance Time (s)		6.3			6.3		3.0	6.3			6.3	6.3
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		139			137		271	1149			1021	868
v/s Ratio Prot							0.01	c0.29			c0.56	
v/s Ratio Perm		c0.06			0.00		0.15					0.14
v/c Ratio		0.45			0.01		0.23	0.40			0.88	0.22
Uniform Delay, d1		36.3			34.2		8.8	4.6			13.5	6.8
Progression Factor		1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		2.3			0.0		0.4	1.0			11.0	0.6
Delay (s)		38.6			34.2		9.3	5.6			24.5	7.4
Level of Service		D			C		A	A			C	A
Approach Delay (s)		38.6			34.2			6.0			20.8	
Approach LOS		D			C			A			C	

Intersection Summary

HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Unsignalized Intersection Capacity Analysis

## 2: Stevens Rd & Munday Ct

10/21/2021



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Volume (veh/h)	4	0	0	0	0	7
Future Volume (Veh/h)	4	0	0	0	0	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	0	0	0	8
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)	120					
pX, platoon unblocked						
vC, conflicting volume	0				8	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				8	0
tC, single (s)	4.3				6.4	6.6
tC, 2 stage (s)						
tF (s)	2.4				3.5	3.7
p0 queue free %	100				100	99
cM capacity (veh/h)	1485				1010	976
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>SB 1</b>			
Volume Total	4	0	8			
Volume Left	4	0	0			
Volume Right	0	0	8			
cSH	1485	1700	976			
Volume to Capacity	0.00	0.00	0.01			
Queue Length 95th (m)	0.1	0.0	0.2			
Control Delay (s)	7.4	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	7.4	0.0	8.7			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay			8.3			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

# Timings

## 1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations		↕		↕	↗	↗	↗	↕	↗
Traffic Volume (vph)	377	2	1	0	11	711	3	528	217
Future Volume (vph)	377	2	1	0	11	711	3	528	217
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		4		8		2		6	
Permitted Phases	4		8		2		6		6
Detector Phase	4	4	8	8	2	2	6	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	24.0	24.0	24.0	24.0	27.0	27.0	27.0	27.0	27.0
Total Split (s)	39.6	39.6	39.6	39.6	50.4	50.4	50.4	50.4	50.4
Total Split (%)	44.0%	44.0%	44.0%	44.0%	56.0%	56.0%	56.0%	56.0%	56.0%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.4	4.4	4.4	4.4	4.4
All-Red Time (s)	2.2	2.2	2.2	2.2	1.9	1.9	1.9	1.9	1.9
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.3		6.3	6.3	6.3	6.3	6.3	6.3
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		32.8		32.8	44.6	44.6	44.6	44.6	44.6
Actuated g/C Ratio		0.36		0.36	0.50	0.50	0.50	0.50	0.50
v/c Ratio		0.97		0.00	0.06	0.91	0.03	0.70	0.28
Control Delay		65.2		18.0	13.0	38.3	13.0	23.7	2.8
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		65.2		18.0	13.0	38.3	13.0	23.7	2.8
LOS		E		B	B	D	B	C	A
Approach Delay		65.2		18.0		37.9		17.6	
Approach LOS		E		B		D		B	

### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 83.7 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 35.9

Intersection LOS: D

Intersection Capacity Utilization 69.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Bowmanville Ave (R.R. 57) & Stevens Rd



Queues

1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	440	1	12	751	3	556	228
v/c Ratio	0.97	0.00	0.06	0.91	0.03	0.70	0.28
Control Delay	65.2	18.0	13.0	38.3	13.0	23.7	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.2	18.0	13.0	38.3	13.0	23.7	2.8
Queue Length 50th (m)	71.9	0.1	1.0	115.2	0.3	71.8	0.0
Queue Length 95th (m)	#131.7	1.1	4.0	#190.0	1.8	110.6	11.0
Internal Link Dist (m)	270.0	96.4		165.1		295.3	
Turn Bay Length (m)			80.0		50.0		60.0
Base Capacity (vph)	460	469	218	827	112	793	812
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.00	0.06	0.91	0.03	0.70	0.28

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis  
 1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	↔
Traffic Volume (vph)	377	2	39	1	0	0	11	711	3	3	528	217
Future Volume (vph)	377	2	39	1	0	0	11	711	3	3	528	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.3			6.3		6.3	6.3		6.3	6.3	6.3
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.99			1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96			0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1582			1825		1342	1670		1372	1601	1408
Flt Permitted		0.75			0.66		0.31	1.00		0.16	1.00	1.00
Satd. Flow (perm)		1234			1269		442	1670		227	1601	1408
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	397	2	41	1	0	0	12	748	3	3	556	228
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	0	115
Lane Group Flow (vph)	0	436	0	0	1	0	12	751	0	3	556	113
Heavy Vehicles (%)	16%	0%	3%	0%	0%	0%	36%	15%	0%	33%	20%	16%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		32.8			32.8		44.6	44.6		44.6	44.6	44.6
Effective Green, g (s)		32.8			32.8		44.6	44.6		44.6	44.6	44.6
Actuated g/C Ratio		0.36			0.36		0.50	0.50		0.50	0.50	0.50
Clearance Time (s)		6.3			6.3		6.3	6.3		6.3	6.3	6.3
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		449			462		219	827		112	793	697
v/s Ratio Prot							c0.45				0.35	
v/s Ratio Perm		c0.35			0.00		0.03			0.01		0.08
v/c Ratio		0.97			0.00		0.05	0.91		0.03	0.70	0.16
Uniform Delay, d1		28.1			18.2		11.8	20.8		11.6	17.5	12.5
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		34.6			0.0		0.5	15.6		0.4	5.1	0.5
Delay (s)		62.7			18.2		12.2	36.4		12.0	22.7	13.0
Level of Service		E			B		B	D		B	C	B
Approach Delay (s)		62.7			18.2			36.1			19.8	
Approach LOS		E			B			D			B	

Intersection Summary

HCM 2000 Control Delay	35.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Unsignalized Intersection Capacity Analysis

## 2: Stevens Rd & Munday Ct

10/21/2021



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Volume (veh/h)	8	0	0	0	0	1
Future Volume (Veh/h)	8	0	0	0	0	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	0	0	0	0	1
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		120	165			
pX, platoon unblocked						
vC, conflicting volume	0			18	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0			18	0	
tC, single (s)	4.2			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.3			3.5	3.3	
p0 queue free %	99			100	100	
cM capacity (veh/h)	1554			994	1091	
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>SB 1</b>			
Volume Total	9	0	1			
Volume Left	9	0	0			
Volume Right	0	0	1			
cSH	1554	1700	1091			
Volume to Capacity	0.01	0.00	0.00			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	7.3	0.0	8.3			
Lane LOS	A		A			
Approach Delay (s)	7.3	0.0	8.3			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay			7.4			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

# **Appendix C**

**Planned improvements, traffic growth  
review and other background developments**



## Hong Shen

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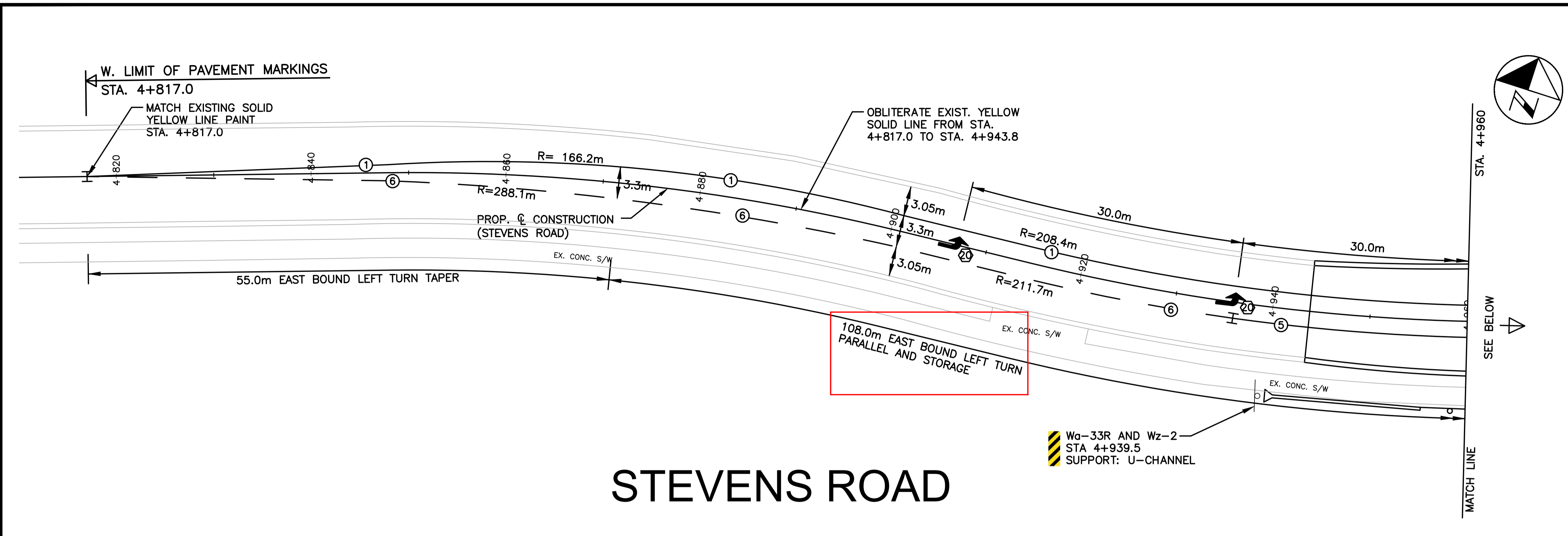
**From:** Glyn Reedman <Glyn.Reedman@Durham.ca>  
**Sent:** Tuesday, 28 September 2021 2:08 PM  
**To:** Roland Roovers  
**Cc:** Karen Richardson (InTouch); Hong Shen; Doug Robertson (InTouch)  
**Subject:** RE: Transportation Study ToR - 46 Stevens Road, Clarington  
**Attachments:** 000 OF 000 Regional Road 57-R 17.pdf; 000 OF 000 Regional Road 57-PM 3.pdf; 000 OF 000 Regional Road 57-PM 8.pdf; 000 OF 000 Regional Road 57-R 16.pdf

Hi Roland,

Thanks for your Terms of Reference for this TIS, our comments are as follows:

1. Attached are the 100% design drawings for the intersection works at Stevens Road and Bowmanville Avenue. The construction is scheduled for 2021 (advance contract) and 2022, so this should be completed at the time of opening year of this development.
2. The study should comply with the Region's Traffic Impact Study Guidelines, including the requirements for Synchro analysis. Please let me know if you require these.
3. We agree that using the 2019 count data for the intersection of Stevens Road and Bowmanville Avenue is appropriate, given the Covid restrictions on new or more recent counts. The most current intersection turning movement counts on the Regional roads (ATR counts and AADT data) can be downloaded from our web site through the interactive [traffic counts map](#). Traffic Signal timings are available for purchase from our Traffic Engineering & Operations Division ([traffic@durham.ca](mailto:traffic@durham.ca) 905-666-8116).
4. We agree that you should review AADT on the Bowmanville Avenue corridor to determine a suitable background traffic growth factor. Clarington should be able to advise on what background developments need to be taken into consideration, if any. This background growth should be applied to the 2019 data for the opening year as well as the horizon year.
5. We agree with your proposed assessment at opening year of 2023 plus the 5-year horizon.
6. Existing conditions should be noted by way of a site visit and any observations noted in the TIS.
7. As noted, the ITE Trip Generation Manual 10<sup>th</sup> Edition should be used for trip generation. Given the location no reduction should be provided for modal splits. We believe the proposed land-uses are included in the ITE manual.
8. As per the Region's TIS Guidelines, please include transit, active transportation and TDM discussions in the TIS. Recommendations should include infrastructure, network and program improvements to support non-auto travel. Please specifically identify who is responsible for initial implementation and on-going operation of the recommended TDM measures.

Regards



# STEVENS ROAD

PAVEMENT MARKING LEGEND			
IDENTIF.	TYPE	COLOUR	WIDTH (cm)
1	SOLID	YELLOW	10
2	DOUBLE SOLID	YELLOW	10
3	3-6-3 BROKEN	YELLOW	10
4	SOLID;3-6-3 BROKEN	YELLOW	10
5	SOLID	WHITE	10
6	3-3-3 BROKEN	WHITE	10
7	3-6-3 BROKEN	WHITE	10
8	3-9-3 BROKEN	WHITE	10
9	SOLID	WHITE	20
10	1-1-1 BROKEN	WHITE	20
11	3-3-3 BROKEN	WHITE	20
12	3-3-3 BROKEN	WHITE	30
13	SOLID	WHITE	30
14	SOLID	WHITE	45
15	SOLID	WHITE	60
16	1-1-1 BROKEN	WHITE	10
17	0.4-0.4-0.4	WHITE	40
20	SYMBOLS	-	-
OR [	LIMITS OF MARKINGS	-	-

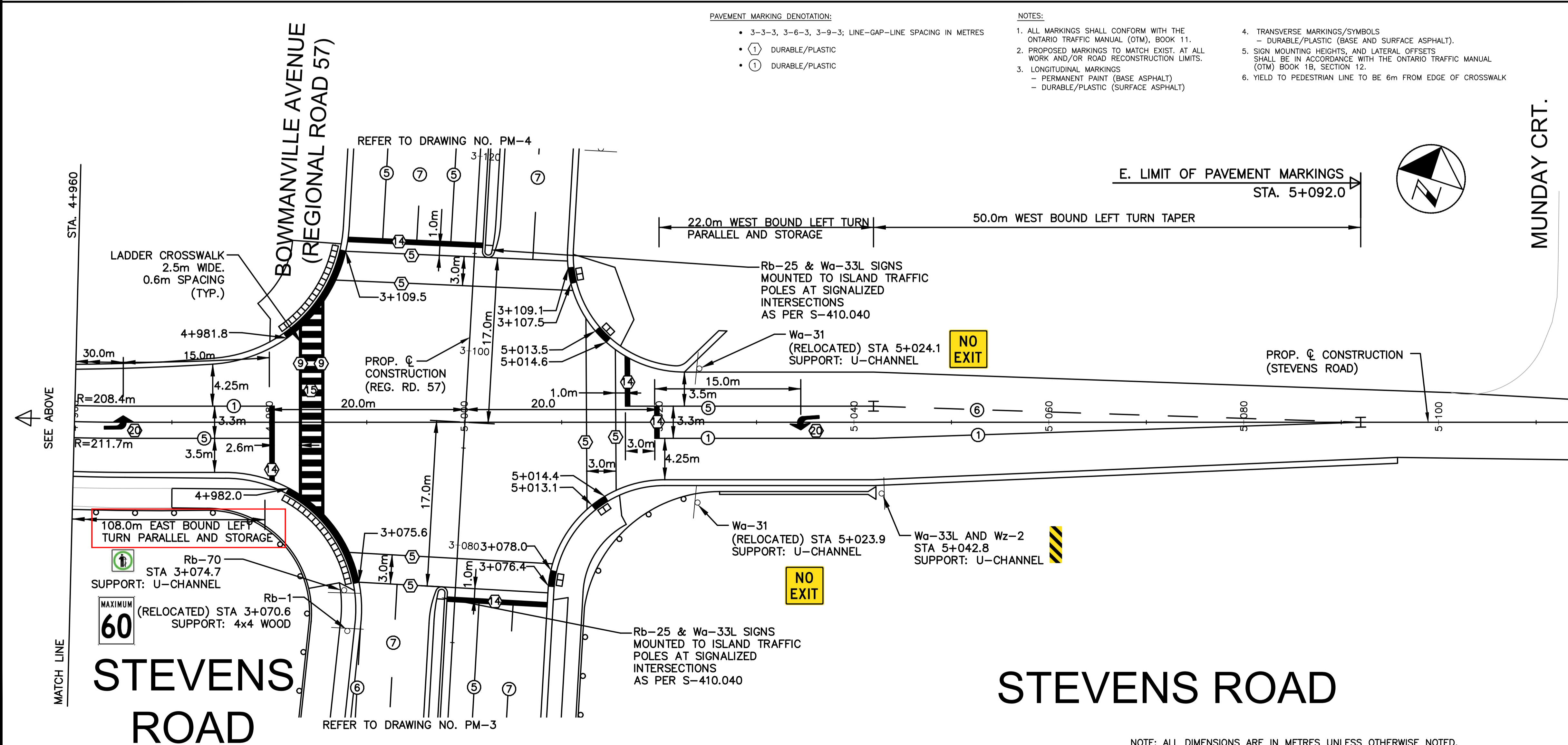
TRAFFIC SIGN SCHEDULE			
SIGN ID	DESCRIPTION	COMMENTS	QTY
Wa-33L	OBJECT MARKER	NEW	3
Wa-33R	OBJECT MARKER	NEW	1
Rb-25	KEEP RIGHT	NEW	2
Rb-70	DISMOUNT AND WALK	NEW	1
Wz-2	MARKER	NEW	2
Wa-31	NO EXIT	EXISTING	2
Rb-1	MAXIMUM SPEED	EXISTING	1

**PAVEMENT MARKING DENOTATION:**

- 3-3-3, 3-6-3, 3-9-3; LINE-GAP-LINE SPACING IN METRES
- ① DURABLE/PLASTIC
- ② DURABLE/PLASTIC

**NOTES:**

- ALL MARKINGS SHALL CONFORM WITH THE ONTARIO TRAFFIC MANUAL (OTM), BOOK 11.
- PROPOSED MARKINGS TO MATCH EXIST. AT ALL WORK AND/OR ROAD RECONSTRUCTION LIMITS.
- LONGITUDINAL MARKINGS
  - PERMANENT PAINT (BASE ASPHALT)
  - DURABLE/PLASTIC (SURFACE ASPHALT)
- TRANSVERSE MARKINGS/SYMBOLS
  - DURABLE/PLASTIC (BASE AND SURFACE ASPHALT).
- SIGN MOUNTING HEIGHTS, AND LATERAL OFFSETS SHALL BE IN ACCORDANCE WITH THE ONTARIO TRAFFIC MANUAL (OTM) BOOK 1B, SECTION 12.
- YIELD TO PEDESTRIAN LINE TO BE 6m FROM EDGE OF CROSSWALK.



# STEVENS ROAD

**CIMA+**  
 415 Baseline Road West, 2nd Floor,  
 Bowmanville, ON L1C 5M2 CANADA  
 T: 905 897-4464

NO.	DATE	NAME	REVISIONS
UTILITIES VERIFIED			
ROGERS	2018 01 02	VERIDIAN	2019 01 23
BELL CANADA	2019 02 04		
ENBRIDGE GAS	2017 11 14		
HYDRO ONE	2017 12 14		

CONTRACTOR TO BE RESPONSIBLE FOR LOCATION OF ALL EXISTING U/G & OVERHEAD UTILITIES. VARIOUS UTILITIES REQUIRE ADVANCE NOTICE PRIOR TO DIGGING. FOR STAKE OUT. THE REGION ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

SURVEY DATA DATE: 2015 05 12  
 SCALE: HORIZONTAL 1:500, VERTICAL 1:100

DRAWN: P. MERRETT	DATE: 2019 01 05
DESIGN: P. MERRETT	DATE: 2019-05-29
CHECKED: P. TURNER	DATE:
APPROVED: P. TURNER	DATE:

**THE REGIONAL MUNICIPALITY OF DURHAM**  
 WORKS DEPARTMENT  
 WHITBY ONTARIO

STEVENS ROAD PAVEMENT MARKINGS AND SIGNAGE FROM 180m WEST OF STEVENS ROAD TO 20m WEST OF MUNDAY COURT		
CONCESSION 1/2	REG. RD NO. 57	AREA MUNICIPALITY MUNICIPALITY OF CLARINGTON
DRAWING NUMBER PM-8	CONTRACT NUMBER D2021-34	SHEET NUMBER 1 OF XX

NOTE: ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.

Plotted - September 13, 2021 File: C:\Users\pmerrett\OneDrive - CIMA\Desktop\C14-202109 Regional Road 57A.DWG





Imagery ©2021 Google, Imagery ©2021 CNES / Airbus, First Base Solutions, Maxar Technologies, Map data ©2021 200 m

## Hong Shen

---

**From:** Gibson, Josh <JGibson@clarington.net>  
**Sent:** Monday, 4 October 2021 4:43 PM  
**To:** Roland Roovers  
**Cc:** Karen Richardson (InTouch); Glyn Reedman (InTouch); Hong Shen; Doug Robertson (InTouch)  
**Subject:** RE: Transportation Study ToR - 46 Stevens Road, Clarington  
**Attachments:** TIS Report Addendum\_Brookhill II\_ZBA-SBA.pdf

Some people who received this message don't often get email from jgibson@clarington.net. [Learn why this is important](#)

Good afternoon Roland,

There are two developments in the area that can be included as potential impacts to the study intersections. The first area is the Modo Brookhill development located directly north of the Walmart on the northwest corner of Bosewell Drive and Brookhill Boulevard, I have attached the traffic report for your reference. The second area is the Brookhill Phase 5 development which is located north of Ross Wright Avenue, unfortunately I'm not able to disclose any plans or reports at this time however; I can inform you of the number of units and housing types that are currently proposed (see below).

Condominium Block = 95 units  
Townhouses = 57 units  
Single detached dwellings = 53 units

Regards,

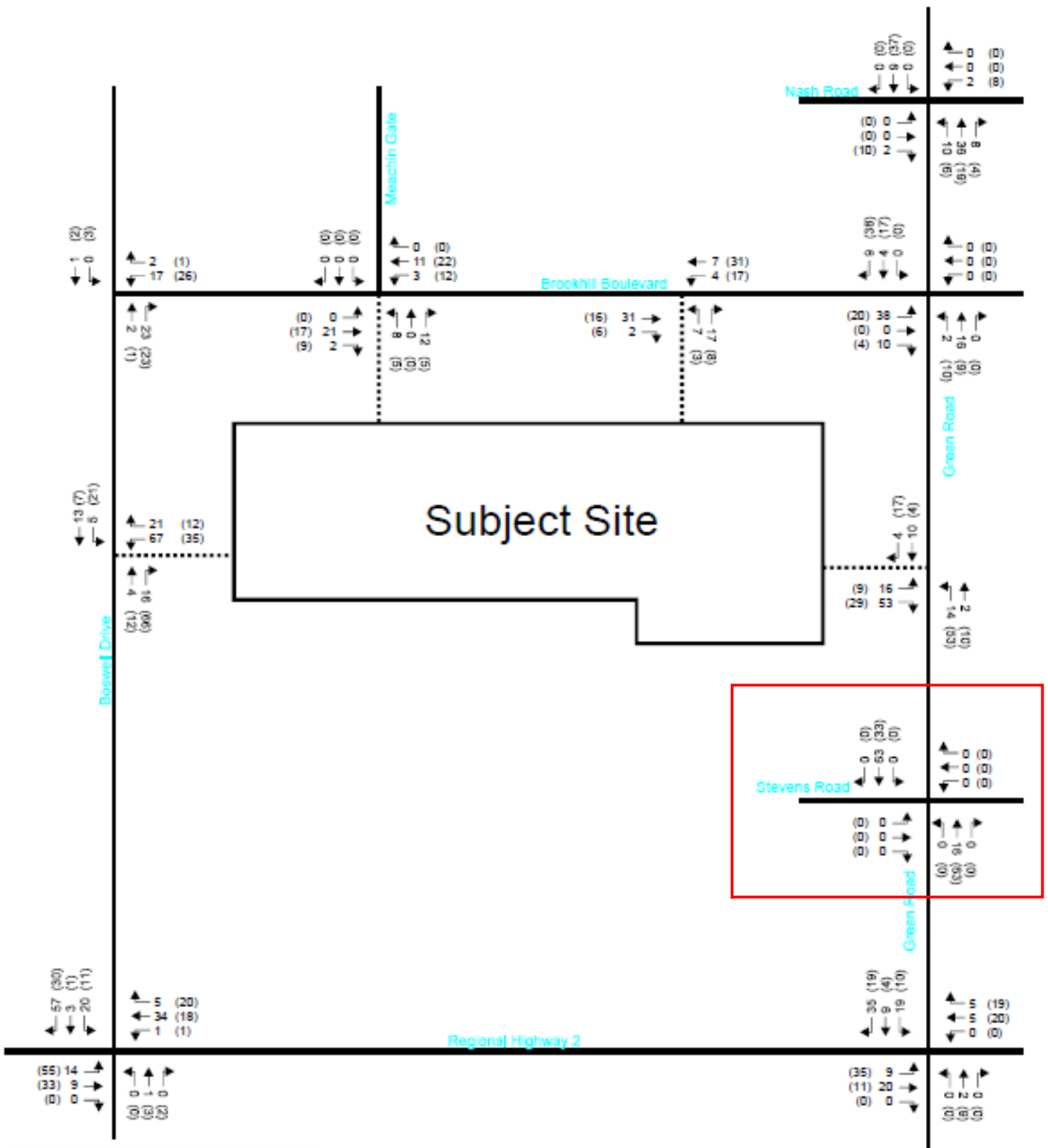
Josh Gibson, C.E.T.  
Development Review Technician  
Public Works Department  
Municipality of Clarington  
40 Temperance Street, Bowmanville ON L1C 3A6  
905-623-3379 ext. 2319 | 1-800-563-1195  
[www.clarington.net](http://www.clarington.net)

---

**From:** Richardson, Karen <KRichardson@clarington.net>  
**Sent:** October 4, 2021 3:58 PM  
**To:** Gibson, Josh <JGibson@clarington.net>  
**Subject:** FW: Transportation Study ToR - 46 Stevens Road, Clarington

FYI

Karen Richardson, P.Eng  
Manager, Development Engineering  
Public Works Department  
Municipality of Clarington  
40 Temperance Street, Bowmanville ON L1C 3A6  
905-623-3379 ext. 2327 | 1-800-563-1195 | 905 242 8744  
[www.clarington.net](http://www.clarington.net)



**Legend**

- ↑ Right Turn Movement
- Through Movement
- ↓ Left Turn Movement
- XX (XX) Weekday AM (Weekday PM) Peak Hour



Site Generated Traffic Volumes

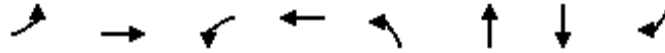
# **Appendix D**

**Synchro Report: Background traffic conditions**

# Timings

## 1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021

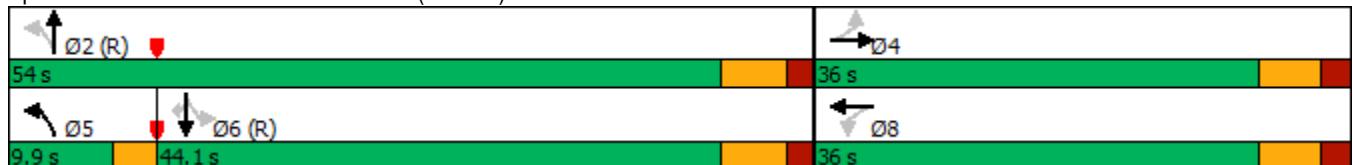


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↖	↗	↖	↕	↕	↖
Traffic Volume (vph)	102	0	4	0	54	396	792	209
Future Volume (vph)	102	0	4	0	54	396	792	209
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	NA	Perm
Protected Phases		4		8	5	2	6	
Permitted Phases	4		8		2			6
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	8.0	8.0	8.0	8.0	5.0	20.0	20.0	20.0
Minimum Split (s)	24.0	24.0	24.0	24.0	9.0	27.0	27.0	27.0
Total Split (s)	36.0	36.0	36.0	36.0	9.9	54.0	44.1	44.1
Total Split (%)	40.0%	40.0%	40.0%	40.0%	11.0%	60.0%	49.0%	49.0%
Yellow Time (s)	4.1	4.1	4.1	4.1	3.0	4.4	4.4	4.4
All-Red Time (s)	2.2	2.2	2.2	2.2	0.0	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	3.0	6.3	6.3	6.3
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	15.0	15.0	15.0	15.0	65.7	62.4	54.3	54.3
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.73	0.69	0.60	0.60
v/c Ratio	0.65	0.02	0.03	0.01	0.17	0.23	0.51	0.27
Control Delay	49.7	0.1	28.0	0.0	5.6	6.0	13.3	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.7	0.1	28.0	0.0	5.6	6.0	13.3	2.5
LOS	D	A	C	A	A	A	B	A
Approach Delay		46.6		15.6		6.0	11.0	
Approach LOS		D		B		A	B	

### Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 35.1 (39%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.65  
 Intersection Signal Delay: 12.0  
 Intersection LOS: B  
 Intersection Capacity Utilization 61.4%  
 ICU Level of Service B  
 Analysis Period (min) 15

### Splits and Phases: 1: Bowmanville Ave (R.R. 57) & Stevens Rd

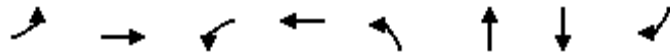




Queues

1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	121	8	5	4	64	476	943	249
v/c Ratio	0.65	0.02	0.03	0.01	0.17	0.23	0.51	0.27
Control Delay	49.7	0.1	28.0	0.0	5.6	6.0	13.3	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.7	0.1	28.0	0.0	5.6	6.0	13.3	2.5
Queue Length 50th (m)	19.8	0.0	0.8	0.0	2.6	13.5	47.2	0.0
Queue Length 95th (m)	31.2	0.0	3.2	0.0	7.2	23.4	72.5	9.0
Internal Link Dist (m)		270.0		96.4		165.1	295.3	
Turn Bay Length (m)	110.0		25.0		80.0			60.0
Base Capacity (vph)	370	561	381	553	376	2068	1836	920
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.01	0.01	0.01	0.17	0.23	0.51	0.27

Intersection Summary

HCM Signalized Intersection Capacity Analysis  
 1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕		↖	↗	↖
Traffic Volume (vph)	102	0	7	4	0	3	54	396	4	0	792	209
Future Volume (vph)	102	0	7	4	0	3	54	396	4	0	792	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3		6.3	6.3		3.0	6.3			6.3	6.3
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95			0.95	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1415	1266		1460	978		1508	2986			3042	1361
Flt Permitted	0.76	1.00		0.75	1.00		0.25	1.00			1.00	1.00
Satd. Flow (perm)	1125	1266		1156	978		393	2986			3042	1361
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	121	0	8	5	0	4	64	471	5	0	943	249
RTOR Reduction (vph)	0	7	0	0	3	0	0	1	0	0	0	100
Lane Group Flow (vph)	121	1	0	5	1	0	64	475	0	0	943	149
Heavy Vehicles (%)	29%	0%	29%	25%	0%	67%	21%	22%	25%	0%	20%	20%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	15.0	15.0		15.0	15.0		62.4	62.4			53.8	53.8
Effective Green, g (s)	15.0	15.0		15.0	15.0		62.4	62.4			53.8	53.8
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.69	0.69			0.60	0.60
Clearance Time (s)	6.3	6.3		6.3	6.3		3.0	6.3			6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	187	211		192	163		341	2070			1818	813
v/s Ratio Prot		0.00			0.00		0.01	c0.16			c0.31	
v/s Ratio Perm	c0.11			0.00			0.12					0.11
v/c Ratio	0.65	0.01		0.03	0.00		0.19	0.23			0.52	0.18
Uniform Delay, d1	35.0	31.3		31.4	31.3		5.1	5.0			10.6	8.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	7.5	0.0		0.1	0.0		0.3	0.3			1.1	0.5
Delay (s)	42.5	31.3		31.4	31.3		5.4	5.3			11.6	8.7
Level of Service	D	C		C	C		A	A			B	A
Approach Delay (s)		41.8			31.4			5.3			11.0	
Approach LOS		D			C			A			B	

Intersection Summary

HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Unsignalized Intersection Capacity Analysis

## 2: Stevens Rd & Munday Ct

10/21/2021



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗		↘	
Traffic Volume (veh/h)	4	0	0	0	0	7
Future Volume (Veh/h)	4	0	0	0	0	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	0	0	0	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		120				
pX, platoon unblocked						
vC, conflicting volume	0				8	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				8	0
tC, single (s)	4.3				6.4	6.6
tC, 2 stage (s)						
tF (s)	2.4				3.5	3.7
p0 queue free %	100				100	99
cM capacity (veh/h)	1485				1010	976
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	4	0	8			
Volume Left	4	0	0			
Volume Right	0	0	8			
cSH	1485	1700	976			
Volume to Capacity	0.00	0.00	0.01			
Queue Length 95th (m)	0.1	0.0	0.2			
Control Delay (s)	7.4	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	7.4	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			8.3			
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)			15			

# Timings

## 1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021

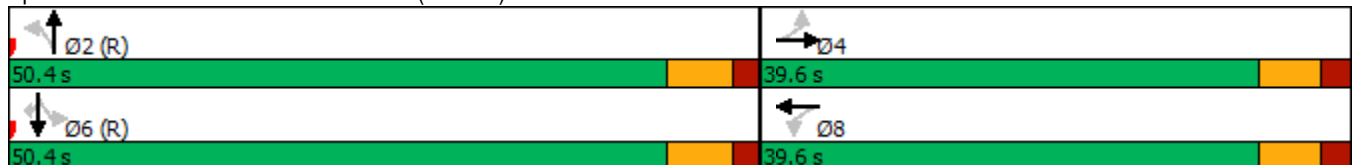


Lane Group	EBL	EBT	WBL	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↖	↗	↖	↖	↕	↖	↕	↖
Traffic Volume (vph)	377	2	1	12	744	3	552	217
Future Volume (vph)	377	2	1	12	744	3	552	217
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases		4			2		6	
Permitted Phases	4		8	2		6		6
Detector Phase	4	4	8	2	2	6	6	6
Switch Phase								
Minimum Initial (s)	8.0	8.0	8.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	24.0	24.0	24.0	27.0	27.0	27.0	27.0	27.0
Total Split (s)	39.6	39.6	39.6	50.4	50.4	50.4	50.4	50.4
Total Split (%)	44.0%	44.0%	44.0%	56.0%	56.0%	56.0%	56.0%	56.0%
Yellow Time (s)	4.1	4.1	4.1	4.4	4.4	4.4	4.4	4.4
All-Red Time (s)	2.2	2.2	2.2	1.9	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	31.1	31.1	31.1	46.3	46.3	46.3	46.3	46.3
Actuated g/C Ratio	0.35	0.35	0.35	0.51	0.51	0.51	0.51	0.51
v/c Ratio	0.92	0.08	0.00	0.04	0.48	0.01	0.37	0.27
Control Delay	56.0	6.7	18.0	12.7	15.9	12.0	14.5	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.0	6.7	18.0	12.7	15.9	12.0	14.5	2.7
LOS	E	A	B	B	B	B	B	A
Approach Delay		50.9			15.8		11.2	
Approach LOS		D			B		B	

### Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 83.7 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.92  
 Intersection Signal Delay: 21.6  
 Intersection LOS: C  
 Intersection Capacity Utilization 58.7%  
 ICU Level of Service B  
 Analysis Period (min) 15

### Splits and Phases: 1: Bowmanville Ave (R.R. 57) & Stevens Rd



Queues

1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021



Lane Group	EBL	EBT	WBL	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	397	45	1	13	786	3	581	228
v/c Ratio	0.92	0.08	0.00	0.04	0.48	0.01	0.37	0.27
Control Delay	56.0	6.7	18.0	12.7	15.9	12.0	14.5	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.0	6.7	18.0	12.7	15.9	12.0	14.5	2.7
Queue Length 50th (m)	62.2	0.2	0.1	1.1	46.2	0.3	31.8	0.0
Queue Length 95th (m)	#113.4	6.8	1.1	4.2	61.8	1.7	44.0	11.0
Internal Link Dist (m)		270.0			165.1		295.3	
Turn Bay Length (m)	110.0		25.0	80.0		50.0		60.0
Base Capacity (vph)	463	619	517	296	1631	225	1564	835
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.07	0.00	0.04	0.48	0.01	0.37	0.27

Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 1: Bowmansville Ave (R.R. 57) & Stevens Rd

10/21/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	377	2	41	1	0	0	12	744	3	3	552	217
Future Volume (vph)	377	2	41	1	0	0	12	744	3	3	552	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3		6.3			6.3	6.3		6.3	6.3	6.3
Lane Util. Factor	1.00	1.00		1.00			1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.86		1.00			1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95			0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1573	1600		1825			1342	3174		1372	3042	1408
Flt Permitted	0.76	1.00		0.73			0.41	1.00		0.30	1.00	1.00
Satd. Flow (perm)	1254	1600		1398			577	3174		437	3042	1408
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	397	2	43	1	0	0	13	783	3	3	581	228
RTOR Reduction (vph)	0	28	0	0	0	0	0	0	0	0	0	111
Lane Group Flow (vph)	397	17	0	1	0	0	13	786	0	3	581	117
Heavy Vehicles (%)	16%	0%	3%	0%	0%	0%	36%	15%	0%	33%	20%	16%
Turn Type	Perm	NA		Perm			Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	31.1	31.1		31.1			46.3	46.3		46.3	46.3	46.3
Effective Green, g (s)	31.1	31.1		31.1			46.3	46.3		46.3	46.3	46.3
Actuated g/C Ratio	0.35	0.35		0.35			0.51	0.51		0.51	0.51	0.51
Clearance Time (s)	6.3	6.3		6.3			6.3	6.3		6.3	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0			3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	433	552		483			296	1632		224	1564	724
v/s Ratio Prot		0.01						c0.25			0.19	
v/s Ratio Perm	c0.32			0.00			0.02			0.01		0.08
v/c Ratio	0.92	0.03		0.00			0.04	0.48		0.01	0.37	0.16
Uniform Delay, d1	28.2	19.5		19.3			10.9	14.1		10.7	13.1	11.6
Progression Factor	1.00	1.00		1.00			1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	23.9	0.0		0.0			0.3	1.0		0.1	0.7	0.5
Delay (s)	52.1	19.5		19.3			11.1	15.1		10.8	13.8	12.1
Level of Service	D	B		B			B	B		B	B	B
Approach Delay (s)		48.8			19.3			15.1			13.3	
Approach LOS		D			B			B			B	

### Intersection Summary

HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Unsignalized Intersection Capacity Analysis

## 2: Stevens Rd & Munday Ct

10/21/2021

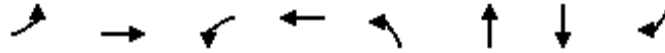


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	0	0	0	0	1
Future Volume (Veh/h)	8	0	0	0	0	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	0	0	0	0	1
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		120	165			
pX, platoon unblocked						
vC, conflicting volume	0			18	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0			18	0	
tC, single (s)	4.2			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.3			3.5	3.3	
p0 queue free %	99			100	100	
cM capacity (veh/h)	1554			994	1091	
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>SB 1</b>			
Volume Total	9	0	1			
Volume Left	9	0	0			
Volume Right	0	0	1			
cSH	1554	1700	1091			
Volume to Capacity	0.01	0.00	0.00			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	7.3	0.0	8.3			
Lane LOS	A		A			
Approach Delay (s)	7.3	0.0	8.3			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay			7.4			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

# Timings

## 1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷	↷	↶
Traffic Volume (vph)	102	0	4	0	54	396	792	209
Future Volume (vph)	102	0	4	0	54	396	792	209
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	NA	Perm
Protected Phases		4		8	5	2	6	
Permitted Phases	4		8		2			6
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	8.0	8.0	8.0	8.0	5.0	20.0	20.0	20.0
Minimum Split (s)	24.0	24.0	24.0	24.0	9.0	27.0	27.0	27.0
Total Split (s)	28.0	28.0	28.0	28.0	9.0	62.0	53.0	53.0
Total Split (%)	31.1%	31.1%	31.1%	31.1%	10.0%	68.9%	58.9%	58.9%
Yellow Time (s)	4.1	4.1	4.1	4.1	3.0	4.4	4.4	4.4
All-Red Time (s)	2.2	2.2	2.2	2.2	0.0	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	3.0	6.3	6.3	6.3
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	14.9	14.9	14.9	14.9	65.8	62.5	55.0	55.0
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.73	0.69	0.61	0.61
v/c Ratio	0.65	0.02	0.03	0.01	0.17	0.23	0.51	0.27
Control Delay	50.5	0.1	28.2	0.0	5.6	6.0	12.6	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.5	0.1	28.2	0.0	5.6	6.0	12.6	2.3
LOS	D	A	C	A	A	A	B	A
Approach Delay		47.3		15.7		5.9	10.5	
Approach LOS		D		B		A	B	

### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 35.1 (39%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 11.7

Intersection LOS: B

Intersection Capacity Utilization 61.4%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Bowmanville Ave (R.R. 57) & Stevens Rd

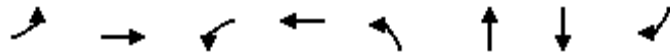




Queues

1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	121	8	5	4	64	476	943	249
v/c Ratio	0.65	0.02	0.03	0.01	0.17	0.23	0.51	0.27
Control Delay	50.5	0.1	28.2	0.0	5.6	6.0	12.6	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.5	0.1	28.2	0.0	5.6	6.0	12.6	2.3
Queue Length 50th (m)	19.8	0.0	0.8	0.0	2.6	13.4	47.1	0.0
Queue Length 95th (m)	31.4	0.0	3.2	0.0	7.1	23.0	67.4	8.3
Internal Link Dist (m)		270.0		96.4		165.1	295.3	
Turn Bay Length (m)	110.0		25.0		80.0			60.0
Base Capacity (vph)	271	465	278	546	367	2074	1858	928
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.02	0.02	0.01	0.17	0.23	0.51	0.27

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	0	7	4	0	3	54	396	4	0	792	209
Future Volume (vph)	102	0	7	4	0	3	54	396	4	0	792	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3		6.3	6.3		3.0	6.3			6.3	6.3
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95			0.95	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1415	1266		1460	978		1508	2986			3042	1361
Flt Permitted	0.76	1.00		0.75	1.00		0.25	1.00			1.00	1.00
Satd. Flow (perm)	1125	1266		1156	978		396	2986			3042	1361
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	121	0	8	5	0	4	64	471	5	0	943	249
RTOR Reduction (vph)	0	7	0	0	3	0	0	1	0	0	0	98
Lane Group Flow (vph)	121	1	0	5	1	0	64	475	0	0	943	151
Heavy Vehicles (%)	29%	0%	29%	25%	0%	67%	21%	22%	25%	0%	20%	20%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	14.9	14.9		14.9	14.9		62.5	62.5			54.4	54.4
Effective Green, g (s)	14.9	14.9		14.9	14.9		62.5	62.5			54.4	54.4
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.69	0.69			0.60	0.60
Clearance Time (s)	6.3	6.3		6.3	6.3		3.0	6.3			6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	186	209		191	161		338	2073			1838	822
v/s Ratio Prot		0.00			0.00		0.01	c0.16			c0.31	
v/s Ratio Perm	c0.11			0.00			0.12					0.11
v/c Ratio	0.65	0.01		0.03	0.00		0.19	0.23			0.51	0.18
Uniform Delay, d1	35.1	31.4		31.5	31.4		5.1	5.0			10.2	7.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	7.9	0.0		0.1	0.0		0.3	0.3			1.0	0.5
Delay (s)	43.0	31.4		31.5	31.4		5.3	5.3			11.2	8.4
Level of Service	D	C		C	C		A	A			B	A
Approach Delay (s)		42.3			31.5			5.3			10.6	
Approach LOS		D			C			A			B	

### Intersection Summary

HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

# Timings

## 1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021

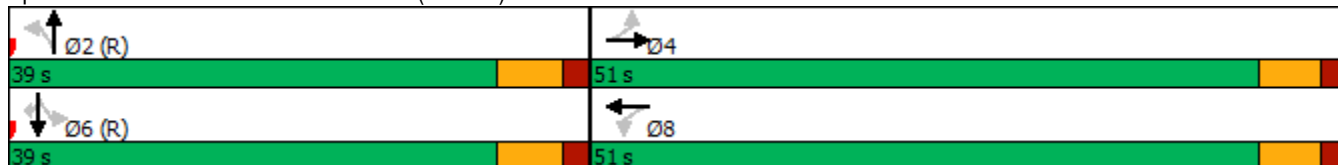


Lane Group	EBL	EBT	WBL	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↖	↗	↖	↖	↕	↖	↕	↖
Traffic Volume (vph)	377	2	1	12	744	3	552	217
Future Volume (vph)	377	2	1	12	744	3	552	217
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases		4			2		6	
Permitted Phases	4		8	2		6		6
Detector Phase	4	4	8	2	2	6	6	6
Switch Phase								
Minimum Initial (s)	8.0	8.0	8.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	24.0	24.0	24.0	27.0	27.0	27.0	27.0	27.0
Total Split (s)	51.0	51.0	51.0	39.0	39.0	39.0	39.0	39.0
Total Split (%)	56.7%	56.7%	56.7%	43.3%	43.3%	43.3%	43.3%	43.3%
Yellow Time (s)	4.1	4.1	4.1	4.4	4.4	4.4	4.4	4.4
All-Red Time (s)	2.2	2.2	2.2	1.9	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	34.8	34.8	34.8	42.6	42.6	42.6	42.6	42.6
Actuated g/C Ratio	0.39	0.39	0.39	0.47	0.47	0.47	0.47	0.47
v/c Ratio	0.82	0.07	0.00	0.05	0.52	0.02	0.40	0.29
Control Delay	38.0	4.6	13.0	17.8	20.0	17.7	18.3	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.0	4.6	13.0	17.8	20.0	17.7	18.3	3.8
LOS	D	A	B	B	C	B	B	A
Approach Delay		34.6			20.0		14.2	
Approach LOS		C			B		B	

### Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 83.7 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.82  
 Intersection Signal Delay: 20.9  
 Intersection LOS: C  
 Intersection Capacity Utilization 58.7%  
 ICU Level of Service B  
 Analysis Period (min) 15

### Splits and Phases: 1: Bowmanville Ave (R.R. 57) & Stevens Rd



Queues

1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021



Lane Group	EBL	EBT	WBL	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	397	45	1	13	786	3	581	228
v/c Ratio	0.82	0.07	0.00	0.05	0.52	0.02	0.40	0.29
Control Delay	38.0	4.6	13.0	17.8	20.0	17.7	18.3	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.0	4.6	13.0	17.8	20.0	17.7	18.3	3.8
Queue Length 50th (m)	59.6	0.2	0.1	1.2	48.8	0.3	33.5	0.0
Queue Length 95th (m)	79.9	5.3	0.9	5.4	79.6	2.2	56.7	14.1
Internal Link Dist (m)		270.0			165.1		295.3	
Turn Bay Length (m)	110.0		25.0	80.0		50.0		60.0
Base Capacity (vph)	622	816	694	266	1499	197	1438	785
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.06	0.00	0.05	0.52	0.02	0.40	0.29

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 1: Bowmanville Ave (R.R. 57) & Stevens Rd

10/21/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	377	2	41	1	0	0	12	744	3	3	552	217
Future Volume (vph)	377	2	41	1	0	0	12	744	3	3	552	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3		6.3			6.3	6.3		6.3	6.3	6.3
Lane Util. Factor	1.00	1.00		1.00			1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.86		1.00			1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95			0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1573	1600		1825			1342	3174		1372	3042	1408
Flt Permitted	0.76	1.00		0.73			0.40	1.00		0.29	1.00	1.00
Satd. Flow (perm)	1254	1600		1398			563	3174		417	3042	1408
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	397	2	43	1	0	0	13	783	3	3	581	228
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	0	0	0	120
Lane Group Flow (vph)	397	19	0	1	0	0	13	786	0	3	581	108
Heavy Vehicles (%)	16%	0%	3%	0%	0%	0%	36%	15%	0%	33%	20%	16%
Turn Type	Perm	NA		Perm			Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	34.8	34.8		34.8			42.6	42.6		42.6	42.6	42.6
Effective Green, g (s)	34.8	34.8		34.8			42.6	42.6		42.6	42.6	42.6
Actuated g/C Ratio	0.39	0.39		0.39			0.47	0.47		0.47	0.47	0.47
Clearance Time (s)	6.3	6.3		6.3			6.3	6.3		6.3	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0			3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	484	618		540			266	1502		197	1439	666
v/s Ratio Prot		0.01						c0.25			0.19	
v/s Ratio Perm	c0.32			0.00			0.02			0.01		0.08
v/c Ratio	0.82	0.03		0.00			0.05	0.52		0.02	0.40	0.16
Uniform Delay, d1	24.8	17.1		16.9			12.8	16.6		12.6	15.4	13.5
Progression Factor	1.00	1.00		1.00			1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	10.7	0.0		0.0			0.3	1.3		0.1	0.8	0.5
Delay (s)	35.5	17.1		16.9			13.1	17.9		12.7	16.3	14.0
Level of Service	D	B		B			B	B		B	B	B
Approach Delay (s)		33.6			16.9			17.8			15.6	
Approach LOS		C			B			B			B	

### Intersection Summary

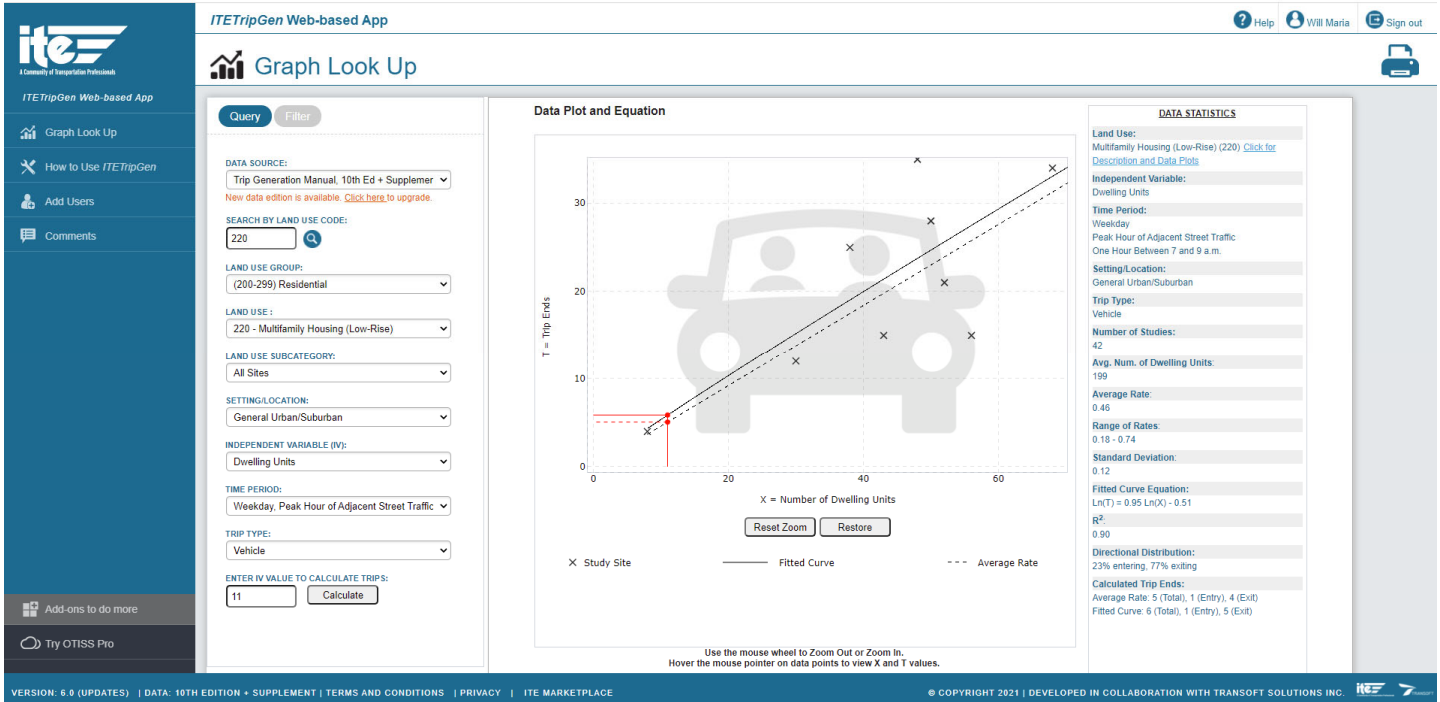
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

# **Appendix E**

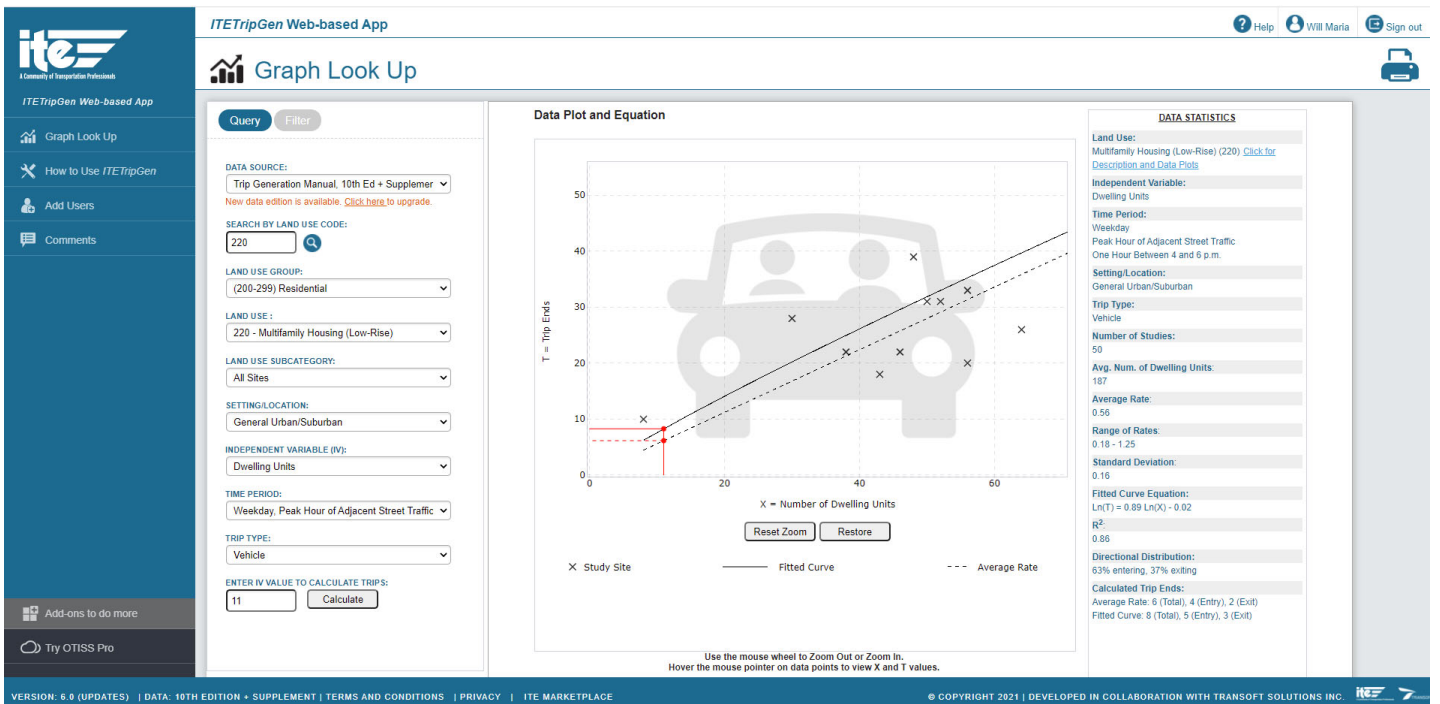
**ITE trip generation sheets, 2016 TTS data  
and summary**

# TRIP GENERATION – BUNGALOW TOWNHOME

## AM Peak Hour




## PM Peak Hour



# TRIP GENERATION – ASSISTED CARE FACILITY

## AM Peak Hour




ITE TripGen Web-based App

Help Will Maria Sign out

**Graph Look Up**

- Graph Look Up
- How to Use ITE TripGen
- Add Users
- Comments

**Graph Look Up**



**Query** Filter

DATA SOURCE: Trip Generation Manual, 10th Ed + Supplement  
New data edition is available. [Click here to upgrade.](#)

SEARCH BY LAND USE CODE:

LAND USE GROUP: (200-299) Residential

LAND USE: 254 - Assisted Living

LAND USE SUBCATEGORY: All Sites

SETTING/LOCATION: General Urban/Suburban

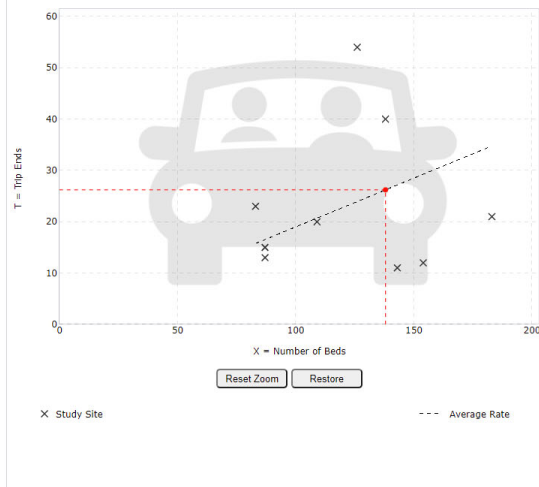
INDEPENDENT VARIABLE (IV): Beds

TIME PERIOD: Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE: Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:  Calculate

**Data Plot and Equation**



X Study Site      --- Average Rate

Use the mouse wheel to Zoom Out or Zoom In.  
Hover the mouse pointer on data points to view X and T values.

**DATA STATISTICS**

Land Use: Assisted Living (254) [Click for Description and Data Plots](#)

Independent Variable: Beds

Time Period: Weekday  
Peak Hour of Adjacent Street Traffic  
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Trip Type: Vehicle

Number of Studies: 9

Avg. Num. of Beds: 123

Average Rate: 0.19

Range of Rates: 0.08 - 0.43


Standard Deviation: 0.12

Fitted Curve Equation: Not Given


R<sup>2</sup>: \*\*\*\*

Directional Distribution: 63% entering, 37% exiting

Calculated Trip Ends: Average Rate: 26 (Total), 16 (Entry), 10 (Exit)

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## PM Peak Hour




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- Add Users
- Comments

**Graph Look Up**



**Query** Filter

DATA SOURCE: Trip Generation Manual, 10th Ed + Supplement  
New data edition is available. [Click here to upgrade.](#)

SEARCH BY LAND USE CODE:

LAND USE GROUP: (200-299) Residential

LAND USE: 254 - Assisted Living

LAND USE SUBCATEGORY: All Sites

SETTING/LOCATION: General Urban/Suburban

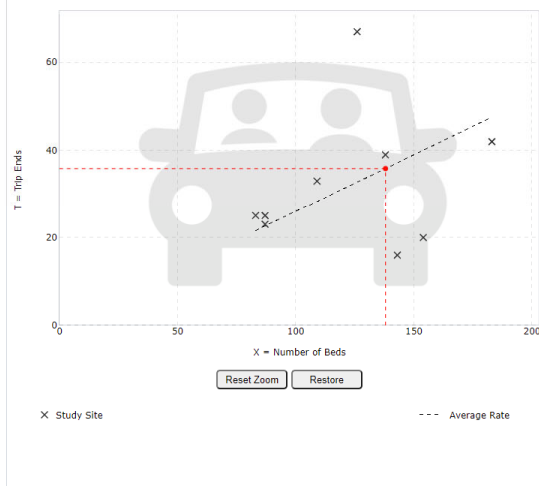
INDEPENDENT VARIABLE (IV): Beds

TIME PERIOD: Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE: Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:  Calculate

**Data Plot and Equation**



X Study Site      --- Average Rate

Use the mouse wheel to Zoom Out or Zoom In.  
Hover the mouse pointer on data points to view X and T values.

**DATA STATISTICS**

Land Use: Assisted Living (254) [Click for Description and Data Plots](#)

Independent Variable: Beds

Time Period: Weekday  
Peak Hour of Adjacent Street Traffic  
One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Trip Type: Vehicle

Number of Studies: 9

Avg. Num. of Beds: 123

Average Rate: 0.26

Range of Rates: 0.11 - 0.53


Standard Deviation: 0.13

Fitted Curve Equation: Not Given

R<sup>2</sup>: \*\*\*\*

Directional Distribution: 38% entering, 62% exiting


Calculated Trip Ends: Average Rate: 36 (Total), 14 (Entry), 22 (Exit)

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# TRIP GENERATION – MEMORY CARE FACILITY

## AM Peak Hour




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- Graph Look Up
- How to Use ITE TripGen
- Add Users
- Comments

**Graph Look Up**



**Query** Filter

DATA SOURCE:  
Trip Generation Manual, 10th Ed + Supplemer  
New data edition is available. [Click here to upgrade.](#)

SEARCH BY LAND USE CODE:  
 🔍

LAND USE GROUP:  
(200-299) Residential

LAND USE:  
254 - Assisted Living

LAND USE SUBCATEGORY:  
All Sites

SETTING/LOCATION:  
General Urban/Suburban

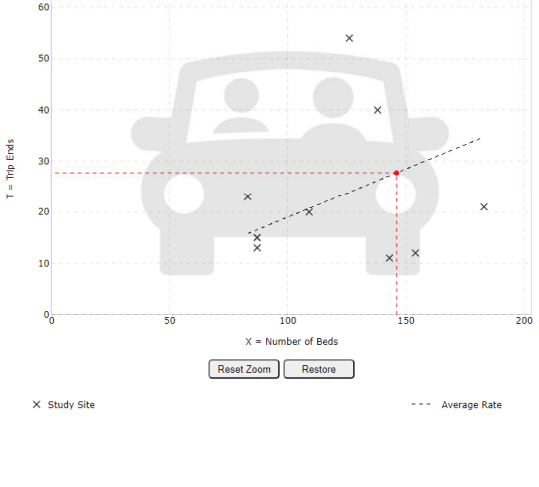
INDEPENDENT VARIABLE (IV):  
Beds

TIME PERIOD:  
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:  
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:  
 Calculate

**Data Plot and Equation**



X Study Site      --- Average Rate

Use the mouse wheel to Zoom Out or Zoom In.  
Hover the mouse pointer on data points to view X and T values.

**DATA STATISTICS**

Land Use:  
Assisted Living (254) [Click for Description and Data Plot](#)

Independent Variable:  
Beds

Time Period:  
Weekday  
Peak Hour of Adjacent Street Traffic  
One Hour Between 7 and 9 a.m.

Setting/Location:  
General Urban/Suburban

Trip Type:  
Vehicle

Number of Studies:  
9

Avg. Num. of Beds:  
123

Average Rate:  
0.19

Range of Rates:  
0.08 - 0.43


Standard Deviation:  
0.12

Fitted Curve Equation:  
Not Given


R<sup>2</sup>:  
\*\*\*\*

Directional Distribution:  
63% entering, 37% exiting

Calculated Trip Ends:  
Average Rate: 28 (Total), 17 (Entry), 11 (Exit)

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## PM Peak Hour




ITE TripGen Web-based App

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- Add Users
- Comments

**Graph Look Up**



**Query** Filter

DATA SOURCE:  
Trip Generation Manual, 10th Ed + Supplemer  
New data edition is available. [Click here to upgrade.](#)

SEARCH BY LAND USE CODE:  
 🔍

LAND USE GROUP:  
(200-299) Residential

LAND USE:  
254 - Assisted Living

LAND USE SUBCATEGORY:  
All Sites

SETTING/LOCATION:  
General Urban/Suburban

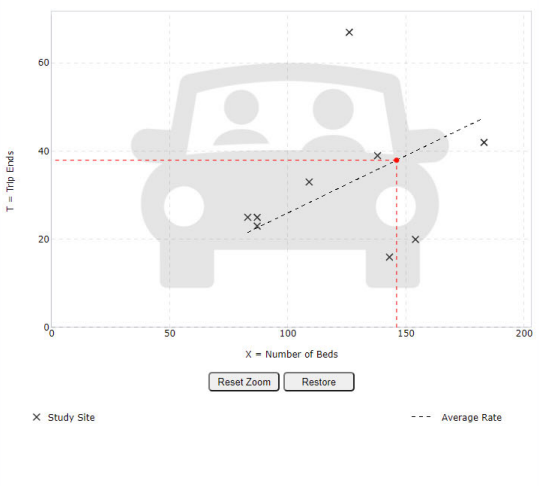
INDEPENDENT VARIABLE (IV):  
Beds

TIME PERIOD:  
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:  
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:  
 Calculate

**Data Plot and Equation**



X Study Site      --- Average Rate

Use the mouse wheel to Zoom Out or Zoom In.  
Hover the mouse pointer on data points to view X and T values.

**DATA STATISTICS**

Land Use:  
Assisted Living (254) [Click for Description and Data Plot](#)

Independent Variable:  
Beds

Time Period:  
Weekday  
Peak Hour of Adjacent Street Traffic  
One Hour Between 4 and 6 p.m.

Setting/Location:  
General Urban/Suburban

Trip Type:  
Vehicle

Number of Studies:  
9

Avg. Num. of Beds:  
123

Average Rate:  
0.26

Range of Rates:  
0.11 - 0.53


Standard Deviation:  
0.13

Fitted Curve Equation:  
Not Given

R<sup>2</sup>:  
\*\*\*\*


Directional Distribution:  
38% entering, 62% exiting

Calculated Trip Ends:  
Average Rate: 38 (Total), 14 (Entry), 24 (Exit)

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# TRIP GENERATION – SENIOR HOUSING

## AM Peak Hour




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- How to Use ITE TripGen
- Add Users
- Comments

**Graph Look Up**



**Query** Filter

DATA SOURCE:  
Trip Generation Manual, 10th Ed + Supplemer  
New data edition is available. [Click here to upgrade.](#)

SEARCH BY LAND USE CODE:

LAND USE GROUP:  
(200-299) Residential

LAND USE:  
252 - Senior Adult Housing - Attached

LAND USE SUBCATEGORY:  
All Sites

SETTING/LOCATION:  
General Urban/Suburban

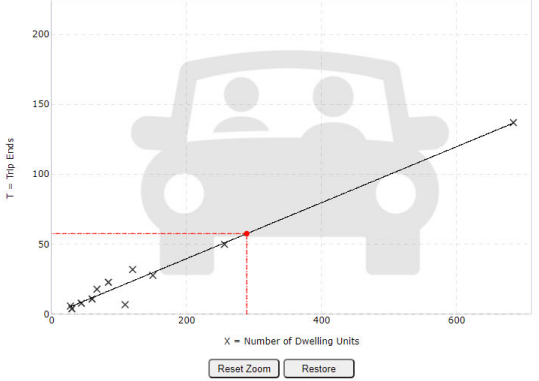
INDEPENDENT VARIABLE (IV):  
Dwelling Units

TIME PERIOD:  
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:  
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:  
 Calculate

**Data Plot and Equation**



X = Number of Dwelling Units

--- Average Rate

Use the mouse wheel to Zoom Out or Zoom In.  
Hover the mouse pointer on data points to view X and T values.

**DATA STATISTICS**

Land Use:  
Senior Adult Housing - Attached (252) [Click for Description and Data Plots](#)

Independent Variable:  
Dwelling Units

Time Period:  
Weekday  
Peak Hour of Adjacent Street Traffic  
One Hour Between 7 and 9 a.m.

Setting/Location:  
General Urban/Suburban

Trip Type:  
Vehicle

Number of Studies:  
11

Avg. Num. of Dwelling Units:  
148

Average Rate:  
0.20

Range of Rates:  
0.06 - 0.27


Standard Deviation:  
0.05

Fitted Curve Equation:  
 $T = 0.20(X) - 0.18$


$R^2$ :  
0.98

Directional Distribution:  
35% entering, 65% exiting

Calculated Trip Ends:  
Average Rate: 58 (Total), 20 (Entry), 38 (Exit)  
Fitted Curve: 58 (Total), 20 (Entry), 38 (Exit)

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## PM Peak Hour




ITE TripGen Web-based App

Help Will Maria Sign out

**Graph Look Up**

- Graph Look Up
- How to Use ITE TripGen
- Add Users
- Comments

**Graph Look Up**



**Query** Filter

DATA SOURCE:  
Trip Generation Manual, 10th Ed + Supplemer  
New data edition is available. [Click here to upgrade.](#)

SEARCH BY LAND USE CODE:

LAND USE GROUP:  
(200-299) Residential

LAND USE:  
252 - Senior Adult Housing - Attached

LAND USE SUBCATEGORY:  
All Sites

SETTING/LOCATION:  
General Urban/Suburban

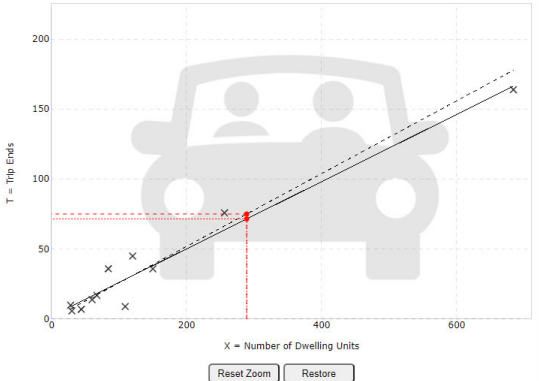
INDEPENDENT VARIABLE (IV):  
Dwelling Units

TIME PERIOD:  
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:  
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:  
 Calculate

**Data Plot and Equation**



X = Number of Dwelling Units

--- Average Rate

Use the mouse wheel to Zoom Out or Zoom In.  
Hover the mouse pointer on data points to view X and T values.

**DATA STATISTICS**

Land Use:  
Senior Adult Housing - Attached (252) [Click for Description and Data Plots](#)

Independent Variable:  
Dwelling Units

Time Period:  
Weekday  
Peak Hour of Adjacent Street Traffic  
One Hour Between 4 and 6 p.m.

Setting/Location:  
General Urban/Suburban

Trip Type:  
Vehicle

Number of Studies:  
11

Avg. Num. of Dwelling Units:  
148

Average Rate:  
0.26

Range of Rates:  
0.08 - 0.43


Standard Deviation:  
0.08

Fitted Curve Equation:  
 $T = 0.24(X) + 2.26$

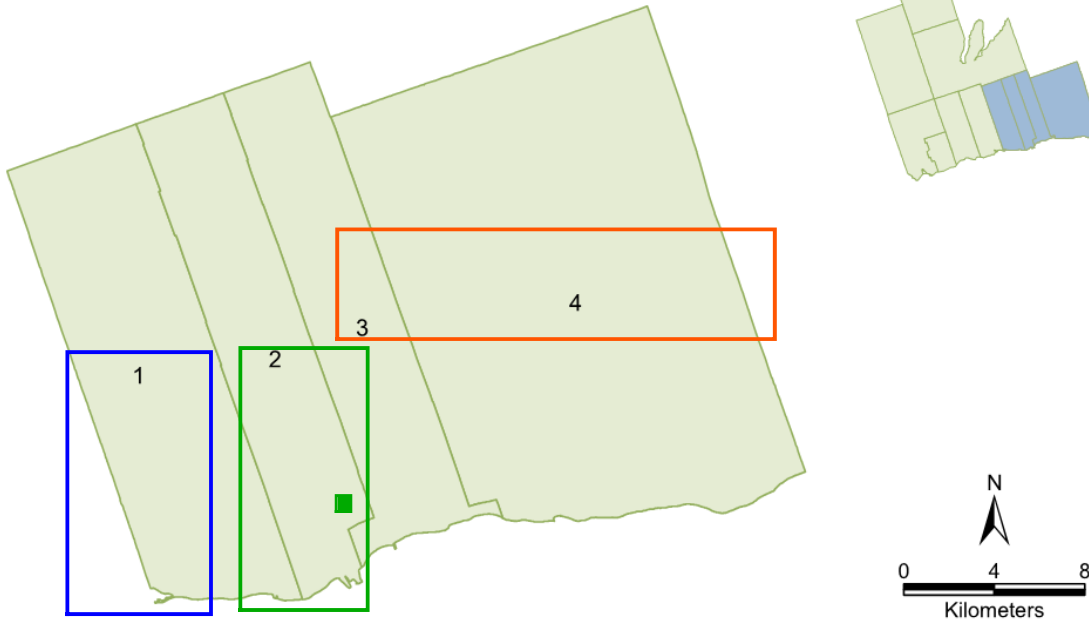
$R^2$ :  
0.96

Directional Distribution:  
55% entering, 45% exiting

Calculated Trip Ends:  
Average Rate: 75 (Total), 41 (Entry), 34 (Exit)  
Fitted Curve: 72 (Total), 39 (Entry), 33 (Exit)

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## MUNICIPALITY OF CLARINGTON



### MUNICIPALITY OF CLARINGTON

#### HOUSEHOLD CHARACTERISTICS

Households	Dwelling Type			Household Size					Number of Available Vehicles					Household Averages				
	House	Townhouse	Apartment	1	2	3	4	5+	0	1	2	3	4+	Persons	Workers	Drivers	Vehicles	Trips/Day
32,800	83%	8%	9%	17%	33%	18%	21%	11%	2%	26%	48%	16%	8%	2.8	1.6	2.0	2.1	5.6

#### POPULATION CHARACTERISTICS

Population	Age							Daily Trips per Person (age 11+)	Daily Work Trips per Worker	Population	Employment Type			Student	Licensed	Transit Pass
	0-10	11-15	16-25	26-45	46-64	65+	Median				Full Time	Part Time	At Home			
											Male	Female				
91,200	14%	6%	13%	27%	27%	13%	38.7	2.3	0.73	44,700	47%	7%	4%	20%	74%	8%
										46,400	33%	13%	3%	22%	72%	9%

#### TRIPS MADE BY RESIDENTS OF MUNICIPALITY OF CLARINGTON

Time Period	Trips	% 24hr	Trip Purpose				Mode of Travel						Median Trip Length (km)			
			HB-W	HB-S	HB-D	N-HB	Driver	Pass.	Transit	GO Train	Walk & Cycle	Other	Driver	Pass.	Transit	GO Train
6-9 AM	40,300	22.0%	50%	19%	20%	11%	73%	9%	2%	3%	7%	6%	13.1	3.0	9.9	60.0
24 Hrs	183,100		34%	10%	40%	16%	76%	13%	2%	1%	4%	3%	9.4	6.7	10.0	57.4

#### TRIPS MADE TO MUNICIPALITY OF CLARINGTON BY RESIDENTS OF THE TTS AREA

Time Period	Trips	% 24 hr	Trip Purpose				Mode of Travel						Median Trip Length (km)			
			Work	School	Home	Other	Driver	Pass.	Transit	GO Train	Walk & Cycle	Other	Driver	Pass.	Transit	GO Train
6-9 AM	24,400	17.1%	44%	26%	7%	23%	68%	11%	1%	*	10%	10%	7.3	2.5	7.1	*
24 Hrs	142,400		13%	5%	54%	28%	75%	14%	1%	1%	5%	4%	8.0	6.4	11.6	57.4

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of destination - pd\_dest  
 Column: Ward number of origin - ward\_orig

RowG:  
 ColG:(73)  
 TblG:

**AM OUT From Clarington Ward 2 (2016 TTS Ward 73) to Municipalities**

Filters:  
 (Start time of trip - start\_time In 600-900  
 and  
 Primary travel mode of trip - mode\_prime In D P T  
 and  
 Trip purpose of origin - purp\_orig In H)

Trip 2016  
 Table:

TTS Ward 73 (Clarington Ward 2)

		%	N-Bowmanville	S-Bowmanville	E-King St	W-King St	W-Stevens	N-Bowmanville	S-Bowmanville	E-King St	W-King St	W-Stevens		
PD 1 of Toronto	162	1.74%	10%	90%				0.2%	1.6%	0.0%	0.0%	0.0%	1.8%	
PD 3 of Toronto	56	0.60%	10%	90%				0.1%	0.5%	0.0%	0.0%	0.0%	0.6%	
PD 4 of Toronto	42	0.45%	10%	90%				0.0%	0.4%	0.0%	0.0%	0.0%	0.4%	
PD 5 of Toronto	109	1.17%	10%	90%				0.1%	1.1%	0.0%	0.0%	0.0%	1.2%	
PD 6 of Toronto	18	0.19%	10%	90%				0.0%	0.2%	0.0%	0.0%	0.0%	0.2%	
PD 8 of Toronto	11	0.12%	10%	90%				0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	
PD 9 of Toronto	8	0.09%	10%	90%				0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	
PD 11 of Toronto	15	0.16%	10%	90%				0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	
PD 12 of Toronto	66	0.71%	10%	90%				0.1%	0.6%	0.0%	0.0%	0.0%	0.7%	
PD 13 of Toronto	131	1.40%	10%	90%				0.1%	1.3%	0.0%	0.0%	0.0%	1.4%	
PD 15 of Toronto	17	0.18%	10%	90%				0.0%	0.2%	0.0%	0.0%	0.0%	0.2%	
PD 16 of Toronto	30	0.32%	10%	90%				0.0%	0.3%	0.0%	0.0%	0.0%	0.3%	
Brock	10	0.11%	100%	0%				0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	
Scugog	67	0.72%	100%	0%				0.7%	0.0%	0.0%	0.0%	0.0%	0.7%	
Pickering	479	5.13%		70%		10%	20%	0.0%	3.6%	0.0%	0.5%	1.0%	5.1%	
Ajax	387	4.15%		70%		10%	20%	0.0%	2.9%	0.0%	0.4%	0.8%	4.1%	
Whitby	1025	10.98%		70%		10%	20%	0.0%	7.7%	0.0%	1.1%	2.2%	11.0%	
Oshawa	2134	22.87%		70%		10%	20%	0.0%	16.0%	0.0%	2.3%	4.6%	22.9%	
<b>Clarington</b>	<b>4022</b>	<b>43.10%</b>	<b>53%</b>	<b>40%</b>	<b>0%</b>	<b>0%</b>	<b>7%</b>	<b>22.8%</b>	<b>17.2%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>3.0%</b>	<b>43.0%</b>	
Richmond Hill	42	0.45%	30%	70%				0.1%	0.3%	0.0%	0.0%	0.0%	0.4%	
Markham	70	0.75%	30%	70%				0.2%	0.5%	0.0%	0.0%	0.0%	0.7%	
Vaughan	30	0.32%	30%	70%				0.1%	0.2%	0.0%	0.0%	0.0%	0.3%	
Mississauga	73	0.78%	10%	90%				0.1%	0.7%	0.0%	0.0%	0.0%	0.8%	
Waterloo	9	0.10%	30%	70%				0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	
Cambridge	17	0.18%	30%	70%				0.1%	0.1%	0.0%	0.0%	0.0%	0.2%	
Kawartha Lakes	26	0.28%	100%	0%				0.3%	0.0%	0.0%	0.0%	0.0%	0.3%	
Peterborough	136	1.46%	100%	0%				1.5%	0.0%	0.0%	0.0%	0.0%	1.5%	
Cavan Monaghan	15	0.16%	100%	0%				0.2%	0.0%	0.0%	0.0%	0.0%	0.2%	
Northumberland	70	0.75%	0%	80%	20%			0.0%	0.6%	0.2%	0.0%	0.0%	0.8%	
Hastings	54	0.58%	100%	0%				0.6%	0.0%	0.0%	0.0%	0.0%	0.6%	
<b>External</b>	<b>67</b>													
Total	9331	100.00%						Total	27.4%	56.4%	0.2%	4.3%	11.6%	99.9%
								<b>AM OUT</b>	<b>27.0%</b>	<b>57.0%</b>	<b>0.0%</b>	<b>4.0%</b>	<b>12.0%</b>	<b>100.0%</b>
								<b>PM IN</b>	<b>27.0%</b>	<b>57.0%</b>	<b>0.0%</b>	<b>4.0%</b>	<b>12.0%</b>	<b>100.0%</b>
								<b>Report</b>	<b>27.0%</b>	<b>57.0%</b>	<b>0.0%</b>	<b>4.0%</b>	<b>12.0%</b>	<b>100.0%</b>

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Ward number of destination - ward\_dest  
 Column: Ward number of origin - ward\_orig

RowG:(72)(73)(74)(75)  
 ColG:(73)  
 TblG:

**AM OUT From Clarington Ward 2 (2016 TTS Ward 73) to Clarington Wards**

Filters:  
 (Start time of trip - start\_time In 600-900  
 and  
 Primary travel mode of trip - mode\_prime In D P T  
 and  
 Trip purpose of origin - purp\_orig In H)

Trip 2016  
 Table:

		TTS Ward 73 (Clarington Ward 2)												
		1	%	N-Bowmanville	S-Bowmanville	E-King St	W-King St	W-Stevens	N-Bowmanville	S-Bowmanville	E-King St	W-King St	W-Stevens	
1	644 NW	16.02%	50%	40%			10%	8.0%	6.4%	0.0%	0.0%	1.6%	16.0%	
2	1995	49.61%	50%	40%			10%	24.8%	19.8%	0.0%	0.0%	5.0%	49.6%	
3	1225 NE	30.47%	60%	40%				18.3%	12.2%	0.0%	0.0%	0.0%	30.5%	
4	157 NE	3.90%	60%	40%				2.3%	1.6%	0.0%	0.0%	0.0%	3.9%	
		4021	100.0%											100.0%
				AM OUT					53.4%	40.0%	0.0%	0.0%	6.6%	100.0%
				AM OUT					53.0%	40.0%	0.0%	0.0%	7.0%	100.0%
1	From Clarington Ward 1													
2	From Clarington Ward 2													
3	From Clarington Ward 3													
4	From Clarington Ward 4													

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of origin - pd\_orig  
 Column: Ward number of destination - ward\_dest

RowG:  
 ColG:(73)  
 TbIG:

**PM IN From Municipalities to Clarington Ward 2 (2016 TTS Ward 73)**

Filters:  
 (Start time of trip - start\_time In 1600-1900  
 and  
 Primary travel mode of trip - mode\_prime In D P T  
 and  
 Trip purpose of destination - purp\_dest In H)

Trip 2016  
 Table:

TTS Ward 73 (Clarington Ward 2)

	1	%	N-Bowmanville	S-Bowmanville	E-King St	W-King St	W-Stevens		N-Bowmanville	S-Bowmanville	E-King St	W-King St	W-Stevens	
PD 1 of Toronto	222	2.53%	10%	90%					0.3%	2.3%	0.0%	0.0%	0.0%	2.6%
PD 3 of Toronto	25	0.28%	10%	90%					0.0%	0.3%	0.0%	0.0%	0.0%	0.3%
PD 4 of Toronto	9	0.10%	10%	90%					0.0%	0.1%	0.0%	0.0%	0.0%	0.1%
PD 5 of Toronto	137	1.56%	10%	90%					0.2%	1.4%	0.0%	0.0%	0.0%	1.6%
PD 6 of Toronto	27	0.31%	10%	90%					0.0%	0.3%	0.0%	0.0%	0.0%	0.3%
PD 8 of Toronto	26	0.30%	10%	90%					0.0%	0.3%	0.0%	0.0%	0.0%	0.3%
PD 9 of Toronto	8	0.09%	10%	90%					0.0%	0.1%	0.0%	0.0%	0.0%	0.1%
PD 10 of Toronto	24	0.27%	10%	90%					0.0%	0.2%	0.0%	0.0%	0.0%	0.2%
PD 12 of Toronto	127	1.45%	10%	90%					0.1%	1.3%	0.0%	0.0%	0.0%	1.4%
PD 13 of Toronto	97	1.10%	10%	90%					0.1%	1.0%	0.0%	0.0%	0.0%	1.1%
PD 15 of Toronto	18	0.20%	10%	90%					0.0%	0.2%	0.0%	0.0%	0.0%	0.2%
PD 16 of Toronto	21	0.24%	10%	90%					0.0%	0.2%	0.0%	0.0%	0.0%	0.2%
Scugog	227	2.58%	100%	0%					2.6%	0.0%	0.0%	0.0%	0.0%	2.6%
Pickering	498	5.67%		70%		10%	20%		0.0%	4.0%	0.0%	0.6%	1.1%	5.7%
Ajax	305	3.47%		70%		10%	20%		0.0%	2.4%	0.0%	0.3%	0.7%	3.4%
Whitby	1022	11.63%		70%		10%	20%		0.0%	8.1%	0.0%	1.2%	2.3%	11.6%
Oshawa	2118	24.11%		70%		10%	20%		0.0%	16.9%	0.0%	2.4%	4.8%	24.1%
<b>Clarington</b>	<b>3318</b>	<b>37.78%</b>	<b>53%</b>	<b>40%</b>	<b>0%</b>	<b>0%</b>	<b>7%</b>		20.0%	15.1%	0.0%	0.0%	2.6%	37.7%
Richmond Hill	8	0.09%	30%	70%					0.0%	0.1%	0.0%	0.0%	0.0%	0.1%
Markham	124	1.41%	30%	70%					0.4%	1.0%	0.0%	0.0%	0.0%	1.4%
Vaughan	14	0.16%	30%	70%					0.0%	0.1%	0.0%	0.0%	0.0%	0.1%
Mississauga	90	1.02%	10%	90%					0.1%	0.9%	0.0%	0.0%	0.0%	1.0%
Welland	54	0.61%	10%	90%					0.1%	0.5%	0.0%	0.0%	0.0%	0.6%
Kawartha Lakes	40	0.46%	100%	0%					0.5%	0.0%	0.0%	0.0%	0.0%	0.5%
Peterborough	94	1.07%	100%	0%					1.1%	0.0%	0.0%	0.0%	0.0%	1.1%
Otonabee-South Monaghan	7	0.08%	100%	0%					0.1%	0.0%	0.0%	0.0%	0.0%	0.1%
Northumberland	45	0.51%	0%	80%	20%				0.0%	0.4%	0.1%	0.0%	0.0%	0.5%
Hastings	81	0.92%	100%	0%					0.9%	0.0%	0.0%	0.0%	0.0%	0.9%
<b>External</b>	<b>106</b>													

Total	26.5%	57.2%	0.1%	4.5%	11.5%	99.8%
<b>PM IN</b>	<b>27.0%</b>	<b>57.0%</b>	<b>0.0%</b>	<b>4.0%</b>	<b>12.0%</b>	<b>100.0%</b>

8786 100.00%

**PM IN ttsCross43865**

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Ward number of origin - ward\_orig  
 Column: Ward number of destination - ward\_dest

RowG:(72)(73)(74)(75)  
 ColG:(73)  
 TblG:

**PM IN From Clarington Wards to Ward 2 (2016 TTS Ward 73)**

Filters:  
 (Start time of trip - start\_time In 1600-1900  
 and  
 Primary travel mode of trip - mode\_prime In D P T  
 and  
 Trip purpose of destination - purp\_dest In H)

Trip 2016  
 Table:

		TTS Ward 73 (Clarington Ward 2)													
		1	%	N-Bowmanville	S-Bowmanville	E-King St	W-King St	W-Stevens	N-Bowmanville	S-Bowmanville	E-King St	W-King St	W-Stevens		
1	530 NW		15.97%	50%	40%			10%	8.0%	6.4%	0.0%	0.0%	1.6%	16.0%	
2	1707		51.43%	50%	40%			10%	25.7%	20.6%	0.0%	0.0%	5.1%	51.4%	
3	891 NE		26.85%	60%	40%				16.1%	10.7%	0.0%	0.0%	0.0%	26.8%	
4	191 NE		5.75%	60%	40%				3.5%	2.3%	0.0%	0.0%	0.0%	5.8%	
		<b>3319</b>	100.0%											100.0%	
									PM IN	53.3%	40.0%	0.0%	0.0%	6.7%	100.0%
									<b>PM IN</b>	<b>53.0%</b>	<b>40.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>7.0%</b>	100.0%
1	From Clarington Ward 1														
2	From Clarington Ward 2														
3	From Clarington Ward 3														
4	From Clarington Ward 4														

# **Appendix F**

**Synchro Report: Total traffic conditions**



# Timings

## 1: Bowmanville Ave (R.R. 57) & Stevens Rd

11/29/2021

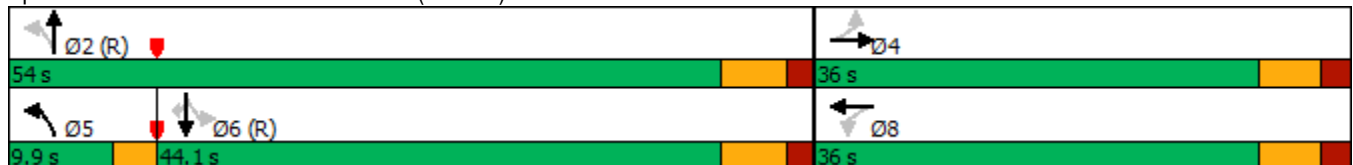


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↖	↗	↖	↗	↖	↕	↖	↕	↗
Traffic Volume (vph)	102	6	43	8	54	396	15	792	209
Future Volume (vph)	102	6	43	8	54	396	15	792	209
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA	Perm
Protected Phases		4		8	5	2		6	
Permitted Phases	4		8		2		6		6
Detector Phase	4	4	8	8	5	2	6	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	5.0	20.0	20.0	20.0	20.0
Minimum Split (s)	24.0	24.0	24.0	24.0	9.0	27.0	27.0	27.0	27.0
Total Split (s)	36.0	36.0	36.0	36.0	9.9	54.0	44.1	44.1	44.1
Total Split (%)	40.0%	40.0%	40.0%	40.0%	11.0%	60.0%	49.0%	49.0%	49.0%
Yellow Time (s)	4.1	4.1	4.1	4.1	3.0	4.4	4.4	4.4	4.4
All-Red Time (s)	2.2	2.2	2.2	2.2	0.0	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	3.0	6.3	6.3	6.3	6.3
Lead/Lag					Lead		Lag	Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	15.3	15.3	15.3	15.3	65.4	62.1	54.1	54.1	54.1
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.73	0.69	0.60	0.60	0.60
v/c Ratio	0.65	0.06	0.26	0.16	0.17	0.25	0.03	0.52	0.27
Control Delay	50.1	19.9	33.4	16.1	5.8	6.1	10.9	13.5	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.1	19.9	33.4	16.1	5.8	6.1	10.9	13.5	2.5
LOS	D	B	C	B	A	A	B	B	A
Approach Delay		46.8		26.5		6.1		11.2	
Approach LOS		D		C		A		B	

### Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 35.1 (39%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.65  
 Intersection Signal Delay: 12.8  
 Intersection LOS: B  
 Intersection Capacity Utilization 61.4%  
 ICU Level of Service B  
 Analysis Period (min) 15

### Splits and Phases: 1: Bowmanville Ave (R.R. 57) & Stevens Rd



Queues

1: Bowmanville Ave (R.R. 57) & Stevens Rd

11/29/2021



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	121	15	51	34	64	515	18	943	249
v/c Ratio	0.65	0.06	0.26	0.16	0.17	0.25	0.03	0.52	0.27
Control Delay	50.1	19.9	33.4	16.1	5.8	6.1	10.9	13.5	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.1	19.9	33.4	16.1	5.8	6.1	10.9	13.5	2.5
Queue Length 50th (m)	19.7	1.0	7.8	1.5	2.6	14.6	1.2	47.7	0.0
Queue Length 95th (m)	31.1	5.1	15.0	7.6	7.3	25.2	4.7	73.4	9.1
Internal Link Dist (m)		270.0		96.4		165.1		295.3	
Turn Bay Length (m)	110.0		25.0		80.0		50.0		60.0
Base Capacity (vph)	361	510	379	400	374	2039	533	1828	917
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.03	0.13	0.09	0.17	0.25	0.03	0.52	0.27

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 1: Bowmansville Ave (R.R. 57) & Stevens Rd

11/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕	↗	↖	↕	↗
Traffic Volume (vph)	102	6	7	43	8	20	54	396	37	15	792	209
Future Volume (vph)	102	6	7	43	8	20	54	396	37	15	792	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3		6.3	6.3		3.0	6.3		6.3	6.3	6.3
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.92		1.00	0.89		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1415	1531		1460	1166		1508	2947		1825	3042	1361
Flt Permitted	0.73	1.00		0.75	1.00		0.25	1.00		0.46	1.00	1.00
Satd. Flow (perm)	1095	1531		1149	1166		391	2947		887	3042	1361
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	121	7	8	51	10	24	64	471	44	18	943	249
RTOR Reduction (vph)	0	7	0	0	20	0	0	5	0	0	0	101
Lane Group Flow (vph)	121	8	0	51	14	0	64	510	0	18	943	148
Heavy Vehicles (%)	29%	0%	29%	25%	0%	67%	21%	22%	25%	0%	20%	20%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	15.3	15.3		15.3	15.3		62.1	62.1		53.5	53.5	53.5
Effective Green, g (s)	15.3	15.3		15.3	15.3		62.1	62.1		53.5	53.5	53.5
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.69	0.69		0.59	0.59	0.59
Clearance Time (s)	6.3	6.3		6.3	6.3		3.0	6.3		6.3	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	186	260		195	198		339	2033		527	1808	809
v/s Ratio Prot		0.01			0.01		0.01	c0.17			c0.31	
v/s Ratio Perm	c0.11			0.04			0.12			0.02		0.11
v/c Ratio	0.65	0.03		0.26	0.07		0.19	0.25		0.03	0.52	0.18
Uniform Delay, d1	34.9	31.2		32.4	31.4		5.2	5.2		7.6	10.7	8.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	7.9	0.1		0.7	0.2		0.3	0.3		0.1	1.1	0.5
Delay (s)	42.7	31.2		33.2	31.5		5.5	5.5		7.7	11.8	8.8
Level of Service	D	C		C	C		A	A		A	B	A
Approach Delay (s)		41.5			32.5			5.5			11.1	
Approach LOS		D			C			A			B	

### Intersection Summary

HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Unsignalized Intersection Capacity Analysis

## 2: Stevens Rd & Munday Ct

11/29/2021



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	54	64	0	0	7
Future Volume (Veh/h)	4	54	64	0	0	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	59	70	0	0	8
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		120				
pX, platoon unblocked						
vC, conflicting volume	70			137	70	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	70			137	70	
tC, single (s)	4.3			6.4	6.6	
tC, 2 stage (s)						
tF (s)	2.4			3.5	3.7	
p0 queue free %	100			100	99	
cM capacity (veh/h)	1397			854	889	
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>SB 1</b>			
Volume Total	63	70	8			
Volume Left	4	0	0			
Volume Right	0	0	8			
cSH	1397	1700	889			
Volume to Capacity	0.00	0.04	0.01			
Queue Length 95th (m)	0.1	0.0	0.2			
Control Delay (s)	0.5	0.0	9.1			
Lane LOS	A		A			
Approach Delay (s)	0.5	0.0	9.1			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay			0.7			
Intersection Capacity Utilization			16.1%	ICU Level of Service	A	
Analysis Period (min)			15			

# HCM Unsignalized Intersection Capacity Analysis

## 4: Stevens Rd & Access 1

11/29/2021



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗		↘	
Traffic Volume (veh/h)	54	0	0	0	0	64
Future Volume (Veh/h)	54	0	0	0	0	64
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	0	0	0	0	70
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		362				
pX, platoon unblocked						
vC, conflicting volume	0			118	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0			118	0	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	96			100	94	
cM capacity (veh/h)	1623			846	1085	
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>SB 1</b>			
Volume Total	59	0	70			
Volume Left	59	0	0			
Volume Right	0	0	70			
cSH	1623	1700	1085			
Volume to Capacity	0.04	0.00	0.06			
Queue Length 95th (m)	0.9	0.0	1.6			
Control Delay (s)	7.3	0.0	8.5			
Lane LOS	A		A			
Approach Delay (s)	7.3	0.0	8.5			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay			8.0			
Intersection Capacity Utilization			14.0%	ICU Level of Service	A	
Analysis Period (min)			15			

# Timings

## 1: Bowmanville Ave (R.R. 57) & Stevens Rd

11/29/2021



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↖	↗	↖	↗	↖	↗	↖	↗	↗
Traffic Volume (vph)	377	11	52	10	12	744	23	552	217
Future Volume (vph)	377	11	52	10	12	744	23	552	217
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		4		8		2		6	
Permitted Phases	4		8		2		6		6
Detector Phase	4	4	8	8	2	2	6	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	24.0	24.0	24.0	24.0	27.0	27.0	27.0	27.0	27.0
Total Split (s)	39.6	39.6	39.6	39.6	50.4	50.4	50.4	50.4	50.4
Total Split (%)	44.0%	44.0%	44.0%	44.0%	56.0%	56.0%	56.0%	56.0%	56.0%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.4	4.4	4.4	4.4	4.4
All-Red Time (s)	2.2	2.2	2.2	2.2	1.9	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	31.6	31.6	31.6	31.6	45.8	45.8	45.8	45.8	45.8
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.51	0.51	0.51	0.51	0.51
v/c Ratio	0.93	0.09	0.11	0.05	0.04	0.52	0.12	0.38	0.28
Control Delay	58.7	8.3	19.6	10.1	12.7	16.4	14.4	14.7	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.7	8.3	19.6	10.1	12.7	16.4	14.4	14.7	2.8
LOS	E	A	B	B	B	B	B	B	A
Approach Delay		52.5		15.9		16.3		11.4	
Approach LOS		D		B		B		B	

### Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 83.7 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay: 21.8  
 Intersection Capacity Utilization 60.1%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service B

### Splits and Phases: 1: Bowmanville Ave (R.R. 57) & Stevens Rd



Queues

1: Bowmanville Ave (R.R. 57) & Stevens Rd

11/29/2021



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	397	55	55	34	13	834	24	581	228
v/c Ratio	0.93	0.09	0.11	0.05	0.04	0.52	0.12	0.38	0.28
Control Delay	58.7	8.3	19.6	10.1	12.7	16.4	14.4	14.7	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.7	8.3	19.6	10.1	12.7	16.4	14.4	14.7	2.8
Queue Length 50th (m)	63.1	1.3	6.2	1.2	1.1	49.4	2.2	31.8	0.0
Queue Length 95th (m)	#115.9	8.5	13.9	7.0	4.2	66.0	6.9	44.0	11.0
Internal Link Dist (m)		270.0		96.4		165.1		295.3	
Turn Bay Length (m)	110.0		25.0		80.0		50.0		60.0
Base Capacity (vph)	450	640	512	653	292	1619	205	1548	828
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.09	0.11	0.05	0.04	0.52	0.12	0.38	0.28

Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 1: Bowmansville Ave (R.R. 57) & Stevens Rd

11/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	377	11	41	52	10	22	12	744	48	23	552	217
Future Volume (vph)	377	11	41	52	10	22	12	744	48	23	552	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3		6.3	6.3		6.3	6.3		6.3	6.3	6.3
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.88		1.00	0.90		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1573	1657		1825	1726		1342	3170		1372	3042	1408
Flt Permitted	0.73	1.00		0.72	1.00		0.41	1.00		0.28	1.00	1.00
Satd. Flow (perm)	1217	1657		1385	1726		575	3170		403	3042	1408
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	397	12	43	55	11	23	13	783	51	24	581	228
RTOR Reduction (vph)	0	28	0	0	15	0	0	5	0	0	0	112
Lane Group Flow (vph)	397	27	0	55	19	0	13	829	0	24	581	116
Heavy Vehicles (%)	16%	0%	3%	0%	0%	0%	36%	15%	0%	33%	20%	16%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	31.6	31.6		31.6	31.6		45.8	45.8		45.8	45.8	45.8
Effective Green, g (s)	31.6	31.6		31.6	31.6		45.8	45.8		45.8	45.8	45.8
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.51	0.51		0.51	0.51	0.51
Clearance Time (s)	6.3	6.3		6.3	6.3		6.3	6.3		6.3	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	427	581		486	606		292	1613		205	1548	716
v/s Ratio Prot		0.02			0.01			c0.26			0.19	
v/s Ratio Perm	c0.33			0.04			0.02			0.06		0.08
v/c Ratio	0.93	0.05		0.11	0.03		0.04	0.51		0.12	0.38	0.16
Uniform Delay, d1	28.1	19.3		19.7	19.2		11.1	14.7		11.5	13.4	11.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	26.5	0.0		0.1	0.0		0.3	1.2		1.2	0.7	0.5
Delay (s)	54.6	19.3		19.8	19.2		11.4	15.9		12.7	14.1	12.3
Level of Service	D	B		B	B		B	B		B	B	B
Approach Delay (s)		50.3			19.6			15.8			13.6	
Approach LOS		D			B			B			B	

### Intersection Summary

HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



# HCM Unsignalized Intersection Capacity Analysis

## 2: Stevens Rd & Munday Ct

11/29/2021



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	74	83	0	0	1
Future Volume (Veh/h)	8	74	83	0	0	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	80	90	0	0	1
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		120				
pX, platoon unblocked						
vC, conflicting volume	90			188	90	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	90			188	90	
tC, single (s)	4.2			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.3			3.5	3.3	
p0 queue free %	99			100	100	
cM capacity (veh/h)	1439			796	973	
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>SB 1</b>			
Volume Total	89	90	1			
Volume Left	9	0	0			
Volume Right	0	0	1			
cSH	1439	1700	973			
Volume to Capacity	0.01	0.05	0.00			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	0.8	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	0.8	0.0	8.7			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay			0.4			
Intersection Capacity Utilization			20.6%	ICU Level of Service	A	
Analysis Period (min)			15			

# HCM Unsignalized Intersection Capacity Analysis

## 4: Stevens Rd & Access 1

11/29/2021



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗		↘	
Traffic Volume (veh/h)	74	0	0	0	0	83
Future Volume (Veh/h)	74	0	0	0	0	83
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	80	0	0	0	0	90
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		362				
pX, platoon unblocked						
vC, conflicting volume	0			160	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0			160	0	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	95			100	92	
cM capacity (veh/h)	1623			790	1085	
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>SB 1</b>			
Volume Total	80	0	90			
Volume Left	80	0	0			
Volume Right	0	0	90			
cSH	1623	1700	1085			
Volume to Capacity	0.05	0.00	0.08			
Queue Length 95th (m)	1.2	0.0	2.1			
Control Delay (s)	7.3	0.0	8.6			
Lane LOS	A		A			
Approach Delay (s)	7.3	0.0	8.6			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay			8.0			
Intersection Capacity Utilization			15.9%	ICU Level of Service	A	
Analysis Period (min)			15			

# Timings

## 1: Bowmanville Ave (R.R. 57) & Stevens Rd

11/29/2021

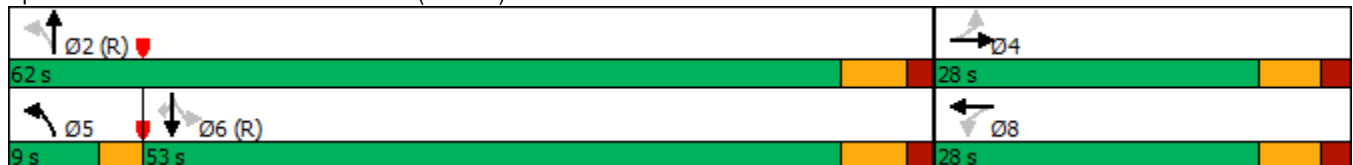


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↖	↗	↖	↗	↖	↕	↖	↕	↗
Traffic Volume (vph)	102	6	43	8	54	396	15	792	209
Future Volume (vph)	102	6	43	8	54	396	15	792	209
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA	Perm
Protected Phases		4		8	5	2		6	
Permitted Phases	4		8		2		6		6
Detector Phase	4	4	8	8	5	2	6	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	5.0	20.0	20.0	20.0	20.0
Minimum Split (s)	24.0	24.0	24.0	24.0	9.0	27.0	27.0	27.0	27.0
Total Split (s)	28.0	28.0	28.0	28.0	9.0	62.0	53.0	53.0	53.0
Total Split (%)	31.1%	31.1%	31.1%	31.1%	10.0%	68.9%	58.9%	58.9%	58.9%
Yellow Time (s)	4.1	4.1	4.1	4.1	3.0	4.4	4.4	4.4	4.4
All-Red Time (s)	2.2	2.2	2.2	2.2	0.0	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	3.0	6.3	6.3	6.3	6.3
Lead/Lag					Lead		Lag	Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	15.0	15.0	15.0	15.0	65.7	62.4	54.8	54.8	54.8
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.73	0.69	0.61	0.61	0.61
v/c Ratio	0.66	0.06	0.27	0.16	0.18	0.25	0.03	0.51	0.27
Control Delay	51.3	20.3	33.9	16.4	5.6	5.9	10.0	12.7	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	20.3	33.9	16.4	5.6	5.9	10.0	12.7	2.3
LOS	D	C	C	B	A	A	A	B	A
Approach Delay		47.9		26.9		5.9		10.5	
Approach LOS		D		C		A		B	

### Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 35.1 (39%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.66  
 Intersection Signal Delay: 12.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 61.4%  
 ICU Level of Service B  
 Analysis Period (min) 15

### Splits and Phases: 1: Bowmanville Ave (R.R. 57) & Stevens Rd



Queues

1: Bowmanville Ave (R.R. 57) & Stevens Rd

11/29/2021



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	121	15	51	34	64	515	18	943	249
v/c Ratio	0.66	0.06	0.27	0.16	0.18	0.25	0.03	0.51	0.27
Control Delay	51.3	20.3	33.9	16.4	5.6	5.9	10.0	12.7	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	20.3	33.9	16.4	5.6	5.9	10.0	12.7	2.3
Queue Length 50th (m)	19.8	1.0	7.8	1.5	2.6	14.4	1.2	47.5	0.0
Queue Length 95th (m)	31.6	5.1	15.2	7.8	7.1	24.3	4.3	67.4	8.3
Internal Link Dist (m)		270.0		96.4		165.1		295.3	
Turn Bay Length (m)	110.0		25.0		80.0		50.0		60.0
Base Capacity (vph)	264	375	277	299	366	2048	540	1852	926
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.04	0.18	0.11	0.17	0.25	0.03	0.51	0.27

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 1: Bowmansville Ave (R.R. 57) & Stevens Rd

11/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	6	7	43	8	20	54	396	37	15	792	209
Future Volume (vph)	102	6	7	43	8	20	54	396	37	15	792	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3		6.3	6.3		3.0	6.3		6.3	6.3	6.3
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.92		1.00	0.89		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1415	1531		1460	1166		1508	2947		1825	3042	1361
Flt Permitted	0.73	1.00		0.75	1.00		0.25	1.00		0.46	1.00	1.00
Satd. Flow (perm)	1095	1531		1149	1166		395	2947		887	3042	1361
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	121	7	8	51	10	24	64	471	44	18	943	249
RTOR Reduction (vph)	0	7	0	0	20	0	0	6	0	0	0	99
Lane Group Flow (vph)	121	8	0	51	14	0	64	509	0	18	943	150
Heavy Vehicles (%)	29%	0%	29%	25%	0%	67%	21%	22%	25%	0%	20%	20%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	15.0	15.0		15.0	15.0		62.4	62.4		54.3	54.3	54.3
Effective Green, g (s)	15.0	15.0		15.0	15.0		62.4	62.4		54.3	54.3	54.3
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.69	0.69		0.60	0.60	0.60
Clearance Time (s)	6.3	6.3		6.3	6.3		3.0	6.3		6.3	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	182	255		191	194		336	2043		535	1835	821
v/s Ratio Prot		0.01			0.01		0.01	c0.17			c0.31	
v/s Ratio Perm	c0.11			0.04			0.12			0.02		0.11
v/c Ratio	0.66	0.03		0.27	0.07		0.19	0.25		0.03	0.51	0.18
Uniform Delay, d1	35.1	31.4		32.7	31.6		5.1	5.1		7.2	10.3	8.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	8.8	0.1		0.8	0.2		0.3	0.3		0.1	1.0	0.5
Delay (s)	44.0	31.5		33.5	31.8		5.4	5.4		7.3	11.3	8.4
Level of Service	D	C		C	C		A	A		A	B	A
Approach Delay (s)		42.6			32.8			5.4			10.7	
Approach LOS		D			C			A			B	

### Intersection Summary

HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

# Timings

## 1: Bowmanville Ave (R.R. 57) & Stevens Rd

11/29/2021



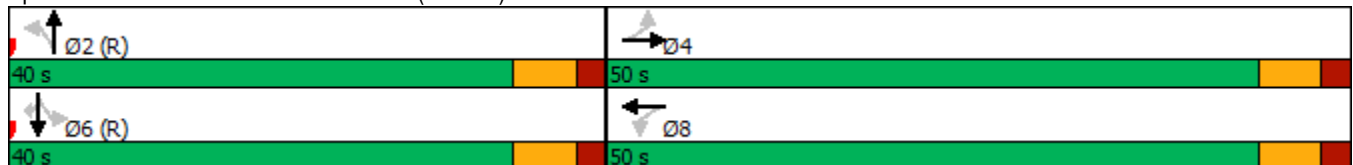
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↖	↗	↖	↗	↖	↗	↖	↗	↗
Traffic Volume (vph)	377	11	52	10	12	744	23	552	217
Future Volume (vph)	377	11	52	10	12	744	23	552	217
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		4		8		2		6	
Permitted Phases	4		8		2		6		6
Detector Phase	4	4	8	8	2	2	6	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	24.0	24.0	24.0	24.0	27.0	27.0	27.0	27.0	27.0
Total Split (s)	50.0	50.0	50.0	50.0	40.0	40.0	40.0	40.0	40.0
Total Split (%)	55.6%	55.6%	55.6%	55.6%	44.4%	44.4%	44.4%	44.4%	44.4%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.4	4.4	4.4	4.4	4.4
All-Red Time (s)	2.2	2.2	2.2	2.2	1.9	1.9	1.9	1.9	1.9
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	35.1	35.1	35.1	35.1	42.3	42.3	42.3	42.3	42.3
Actuated g/C Ratio	0.39	0.39	0.39	0.39	0.47	0.47	0.47	0.47	0.47
v/c Ratio	0.84	0.08	0.10	0.05	0.05	0.56	0.13	0.41	0.29
Control Delay	40.1	5.9	15.2	7.2	17.7	20.4	19.8	18.3	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.1	5.9	15.2	7.2	17.7	20.4	19.8	18.3	3.8
LOS	D	A	B	A	B	C	B	B	A
Approach Delay		36.0		12.1		20.4		14.4	
Approach LOS		D		B		C		B	

### Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 83.7 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 21.0  
 Intersection Capacity Utilization 60.1%  
 Analysis Period (min) 15

Intersection LOS: C  
 ICU Level of Service B

### Splits and Phases: 1: Bowmanville Ave (R.R. 57) & Stevens Rd



Queues

1: Bowmanville Ave (R.R. 57) & Stevens Rd

11/29/2021



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	397	55	55	34	13	834	24	581	228
v/c Ratio	0.84	0.08	0.10	0.05	0.05	0.56	0.13	0.41	0.29
Control Delay	40.1	5.9	15.2	7.2	17.7	20.4	19.8	18.3	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.1	5.9	15.2	7.2	17.7	20.4	19.8	18.3	3.8
Queue Length 50th (m)	59.6	1.2	5.8	1.1	1.2	53.1	2.3	34.0	0.0
Queue Length 95th (m)	83.8	6.8	11.1	5.6	5.3	83.5	8.8	55.5	13.8
Internal Link Dist (m)		270.0		96.4		165.1		295.3	
Turn Bay Length (m)	110.0		25.0		80.0		50.0		60.0
Base Capacity (vph)	590	826	672	850	264	1495	180	1430	782
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.07	0.08	0.04	0.05	0.56	0.13	0.41	0.29

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 1: Bowmansville Ave (R.R. 57) & Stevens Rd

11/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	377	11	41	52	10	22	12	744	48	23	552	217
Future Volume (vph)	377	11	41	52	10	22	12	744	48	23	552	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3		6.3	6.3		6.3	6.3		6.3	6.3	6.3
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.88		1.00	0.90		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1573	1657		1825	1726		1342	3170		1372	3042	1408
Flt Permitted	0.73	1.00		0.72	1.00		0.40	1.00		0.27	1.00	1.00
Satd. Flow (perm)	1217	1657		1385	1726		562	3170		383	3042	1408
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	397	12	43	55	11	23	13	783	51	24	581	228
RTOR Reduction (vph)	0	26	0	0	14	0	0	4	0	0	0	121
Lane Group Flow (vph)	397	29	0	55	20	0	13	830	0	24	581	107
Heavy Vehicles (%)	16%	0%	3%	0%	0%	0%	36%	15%	0%	33%	20%	16%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	35.1	35.1		35.1	35.1		42.3	42.3		42.3	42.3	42.3
Effective Green, g (s)	35.1	35.1		35.1	35.1		42.3	42.3		42.3	42.3	42.3
Actuated g/C Ratio	0.39	0.39		0.39	0.39		0.47	0.47		0.47	0.47	0.47
Clearance Time (s)	6.3	6.3		6.3	6.3		6.3	6.3		6.3	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	474	646		540	673		264	1489		180	1429	661
v/s Ratio Prot		0.02			0.01			c0.26			0.19	
v/s Ratio Perm	c0.33			0.04			0.02			0.06		0.08
v/c Ratio	0.84	0.04		0.10	0.03		0.05	0.56		0.13	0.41	0.16
Uniform Delay, d1	24.9	17.0		17.4	16.9		12.9	17.1		13.5	15.6	13.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.2	0.0		0.1	0.0		0.4	1.5		1.5	0.9	0.5
Delay (s)	37.1	17.1		17.5	17.0		13.3	18.6		15.0	16.5	14.2
Level of Service	D	B		B	B		B	B		B	B	B
Approach Delay (s)		34.6			17.3			18.6			15.8	
Approach LOS		C			B			B			B	

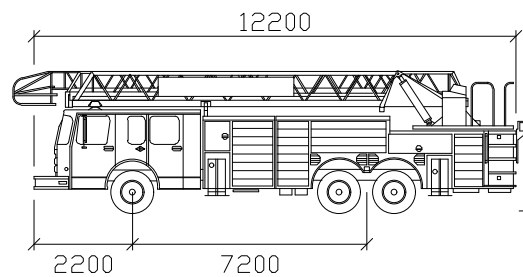
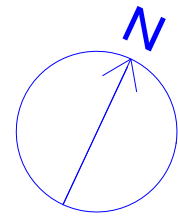
### Intersection Summary

HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



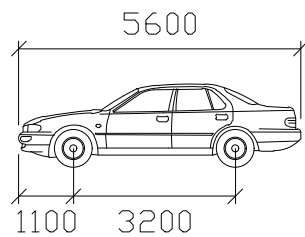
# **Appendix G**

**Site circulation review**



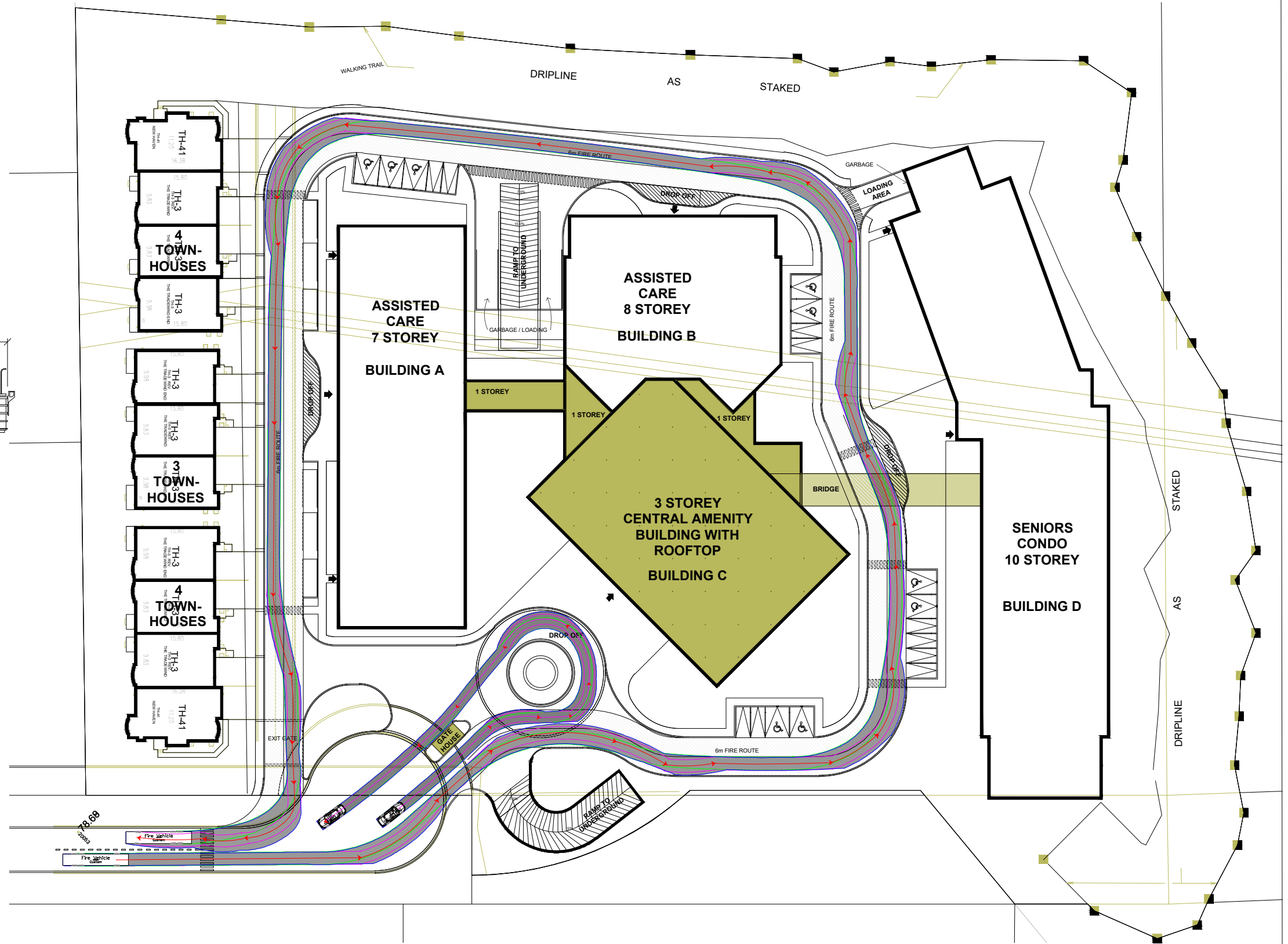
Fire Vehicle

	mm
Width	: 2200
Track	: 2400
Lock to Lock Time	: 6.0
Steering Angle	: 37.0



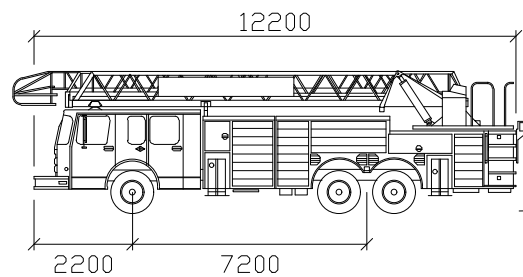
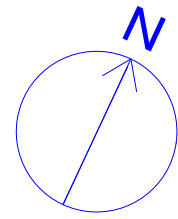
P

	mm
Width	: 2000
Track	: 2000
Lock to Lock Time	: 6.0
Steering Angle	: 35.9



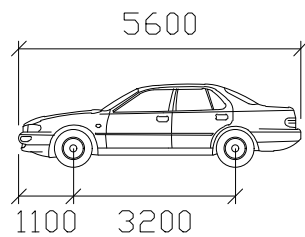
VEHICLE CIRCULATION PLAN - 46 STEVENS ROAD DEVELOPMENT  
FIRE TRUCK MANOEUVRES - 1

Figure AT-1	
Project No.	12563422
Date	July 12, 2022



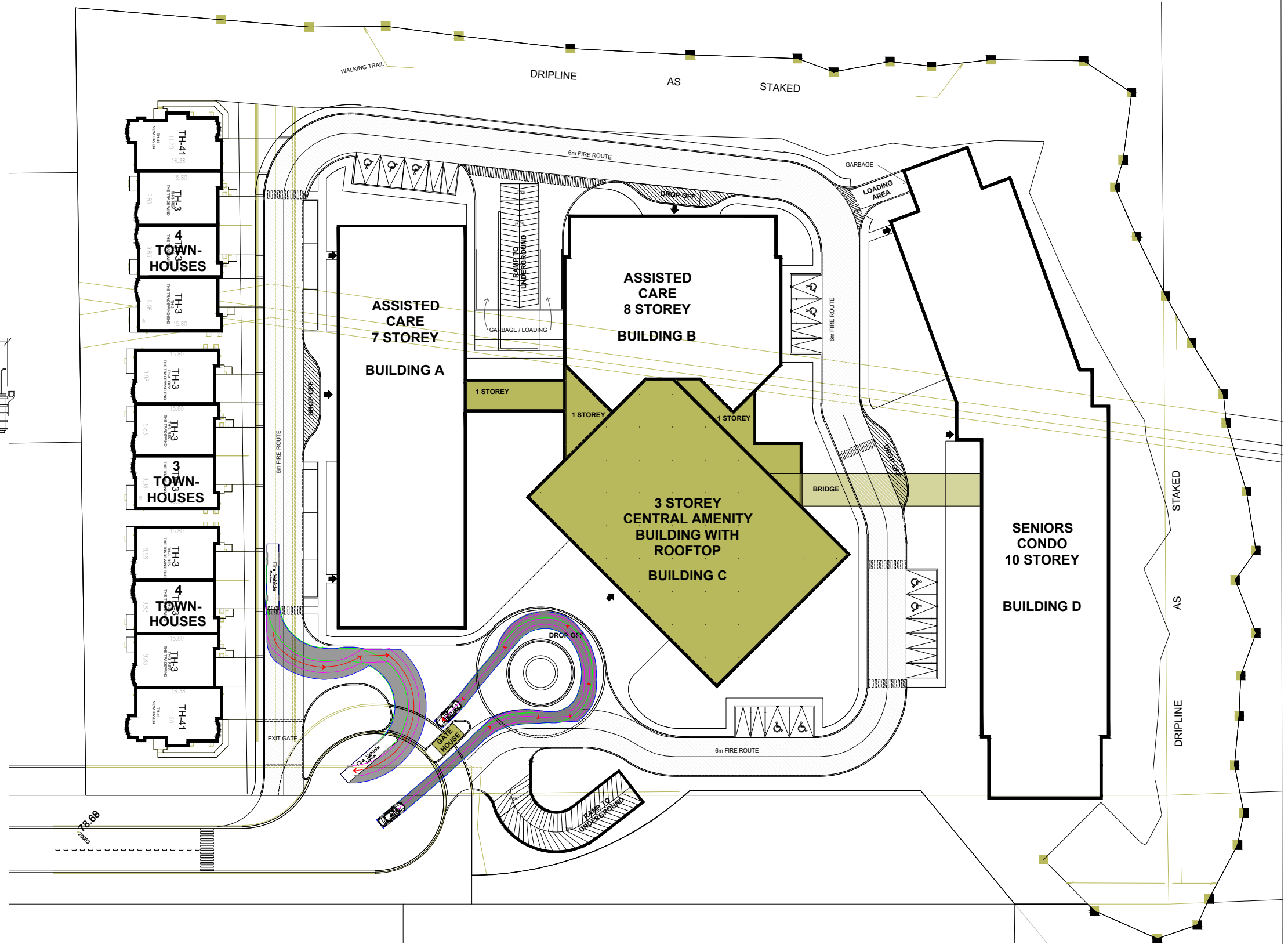
Fire Vehicle

mm  
 Width : 2200  
 Track : 2400  
 Lock to Lock Time : 6.0  
 Steering Angle : 37.0



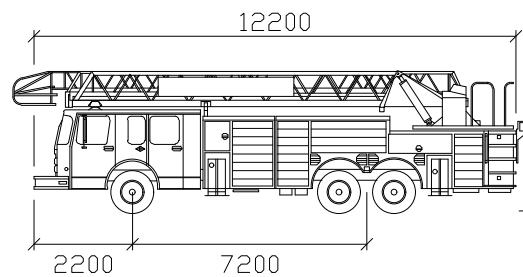
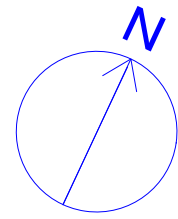
P

mm  
 Width : 2000  
 Track : 2000  
 Lock to Lock Time : 6.0  
 Steering Angle : 35.9



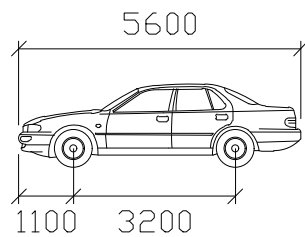
VEHICLE CIRCULATION PLAN - 46 STEVENS ROAD DEVELOPMENT  
 FIRE TRUCK MANOEUVRES - 2

Figure AT-2	
Project No.	12563422
Date	July 12, 2022



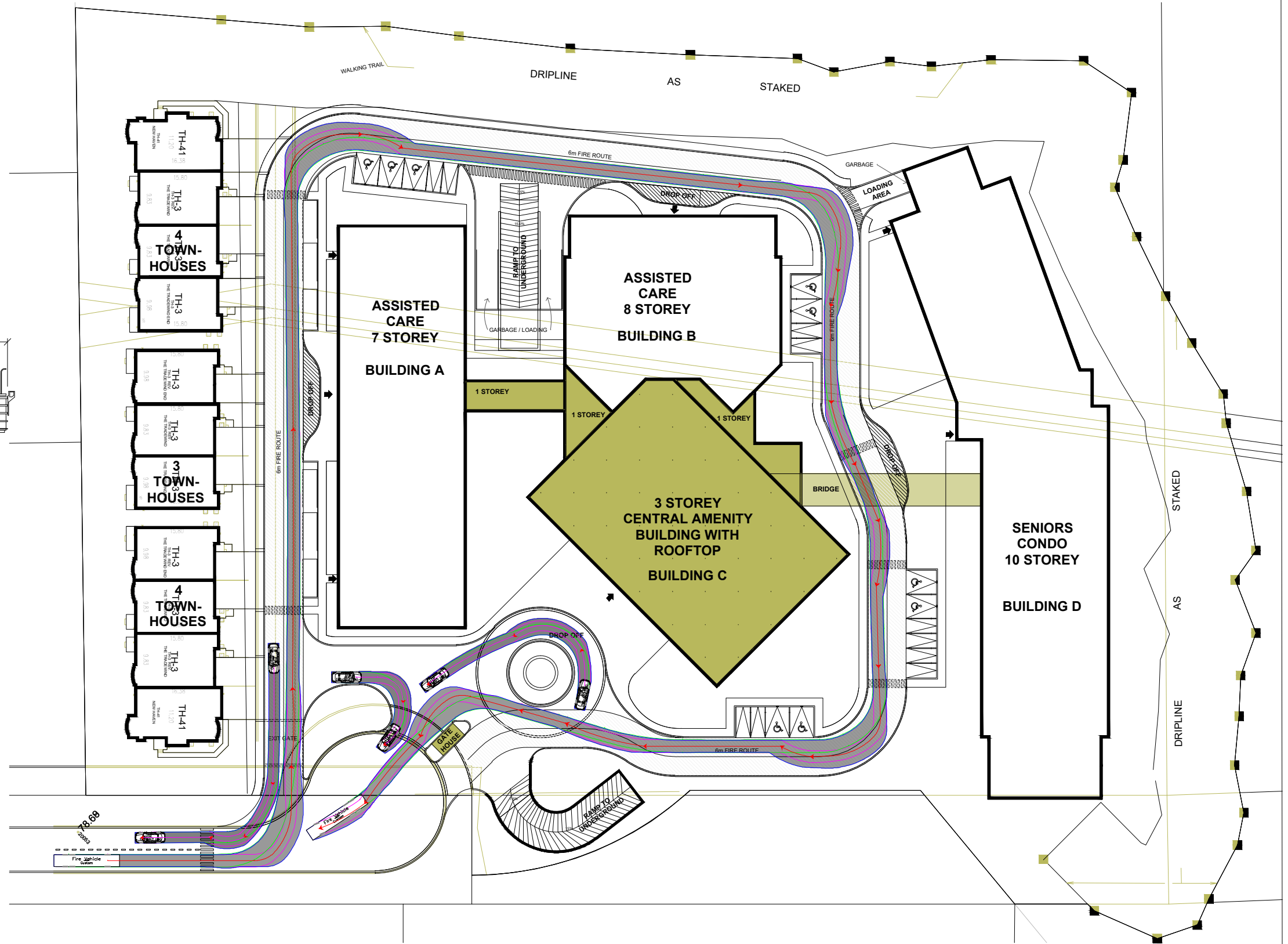
Fire Vehicle

mm  
 Width : 2200  
 Track : 2400  
 Lock to Lock Time : 6.0  
 Steering Angle : 37.0



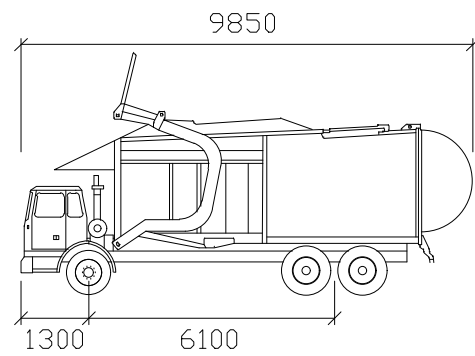
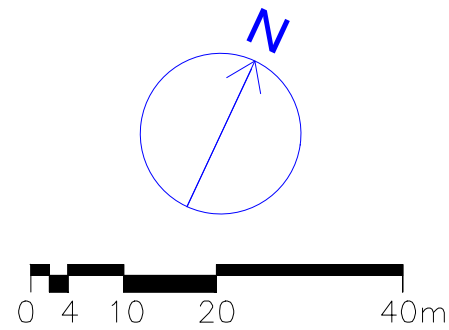
P

mm  
 Width : 2000  
 Track : 2000  
 Lock to Lock Time : 6.0  
 Steering Angle : 35.9



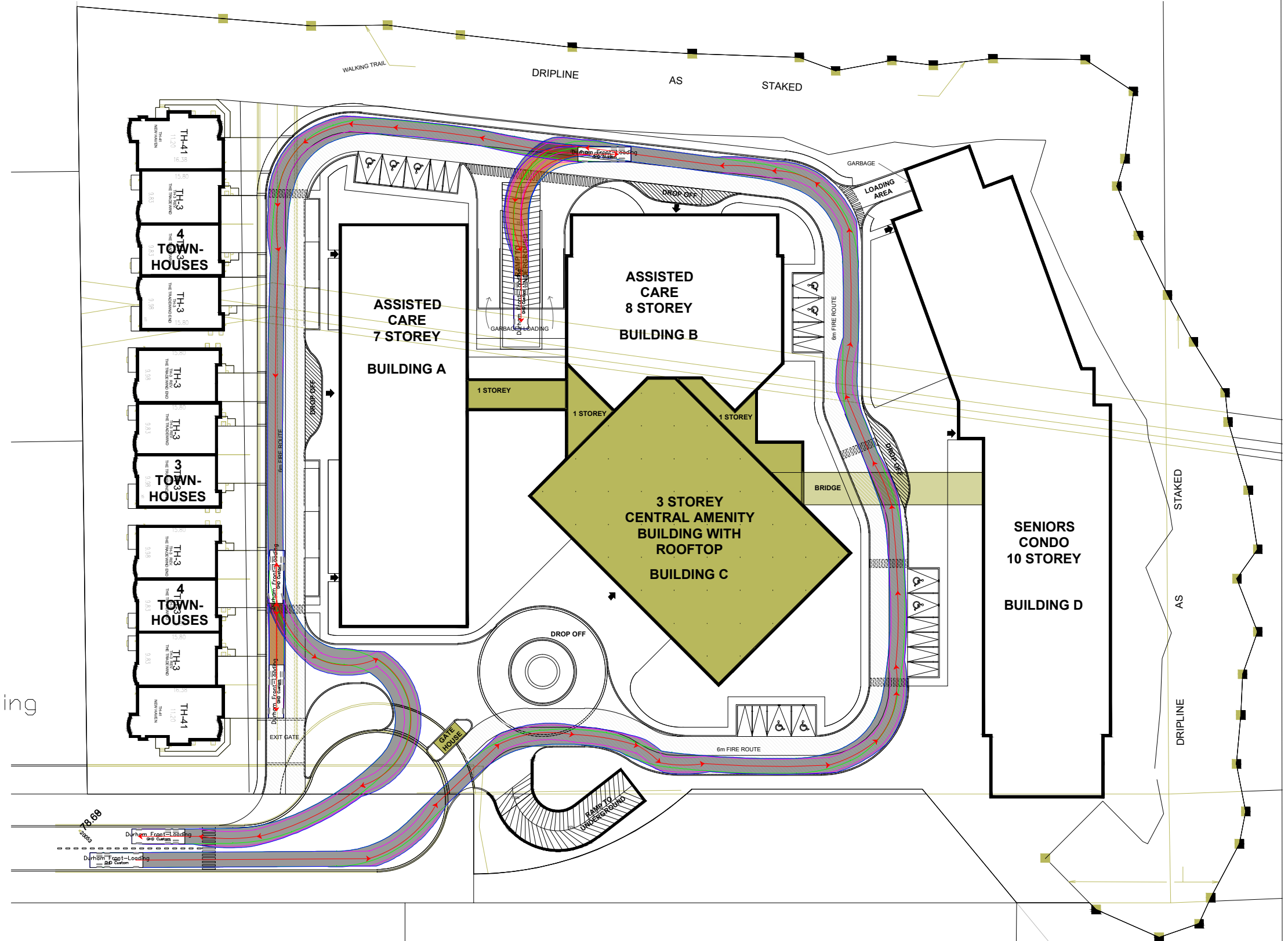
VEHICLE CIRCULATION PLAN - 46 STEVENS ROAD DEVELOPMENT  
 FIRE TRUCK MANOEUVRES - 3

Figure AT-3	
Project No.	12563422
Date	July 12, 2022



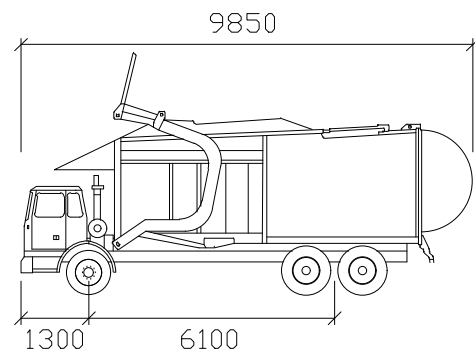
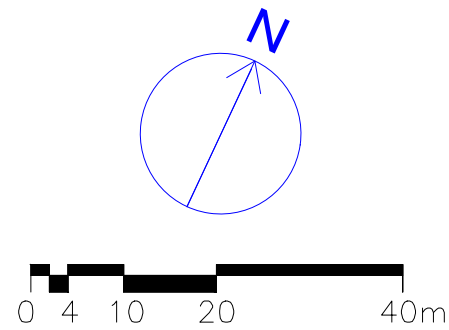
Durham Front-Loading

- mm
- Width : 2770
- Track : 2770
- Lock to Lock Time 6.0
- Steering Angle : 28.0



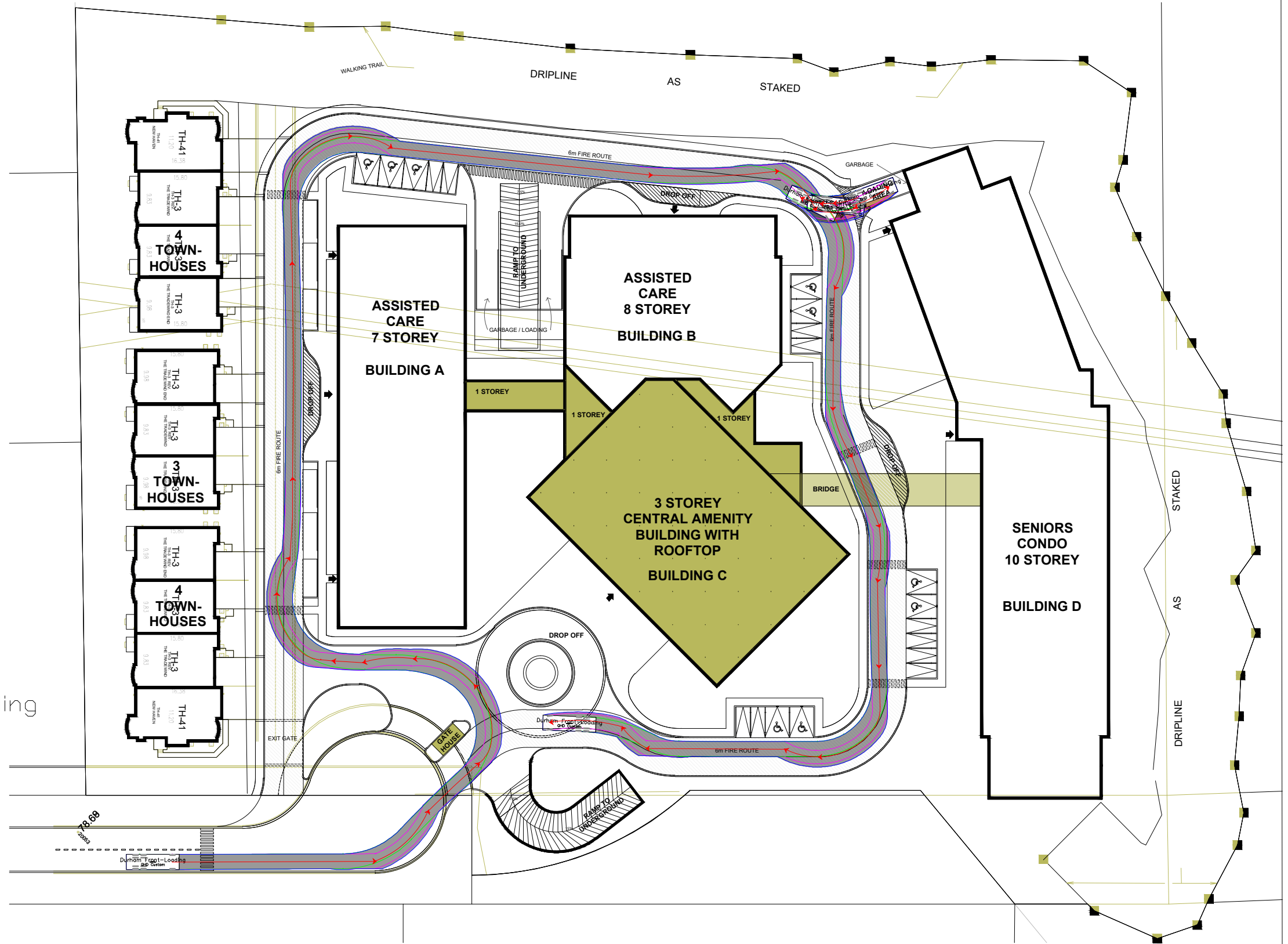
VEHICLE CIRCULATION PLAN - 46 STEVENS ROAD DEVELOPMENT  
 FRONT-LOADING GARBAGE TRUCK MANOEUVRES - 1

Figure AT-4	
Project No.	12563422
Date	July 12, 2022



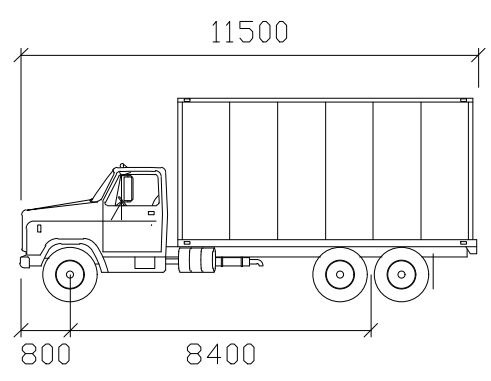
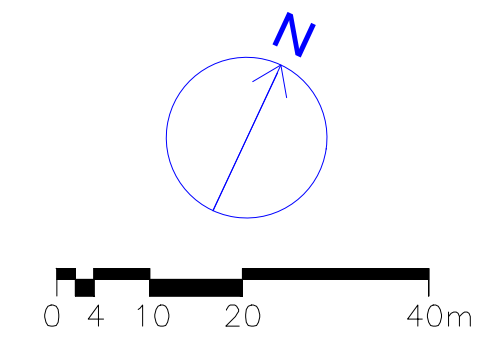
Durham Front-Loading

	mm
Width	: 2770
Track	: 2770
Lock to Lock Time	6.0
Steering Angle	: 28.0



VEHICLE CIRCULATION PLAN - 46 STEVENS ROAD DEVELOPMENT  
FRONT-LOADING GARBAGE TRUCK MANOEUVRES - 2

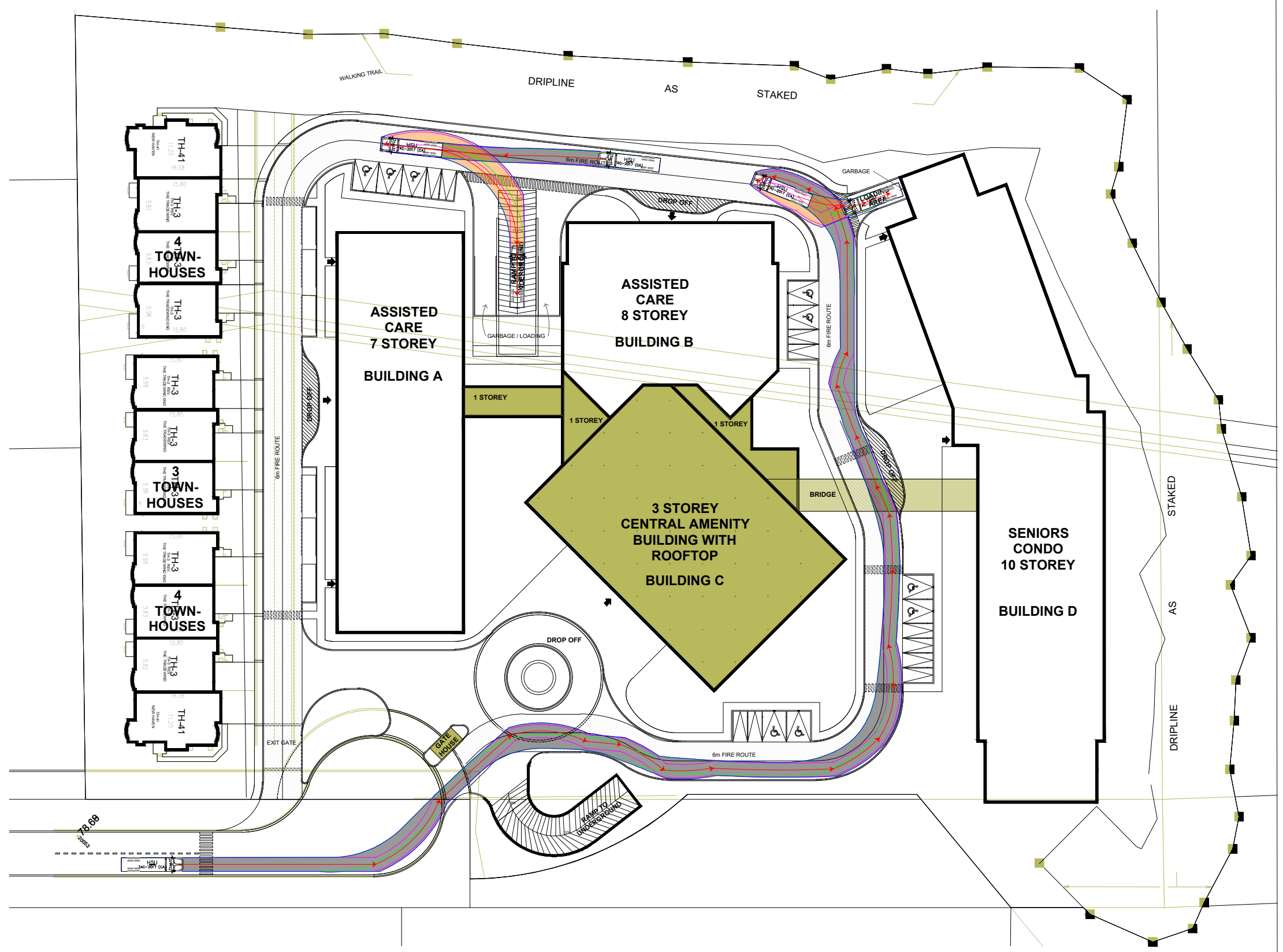
Figure AT-5	
Project No.	12563422
Date	July 12, 2022



HSU

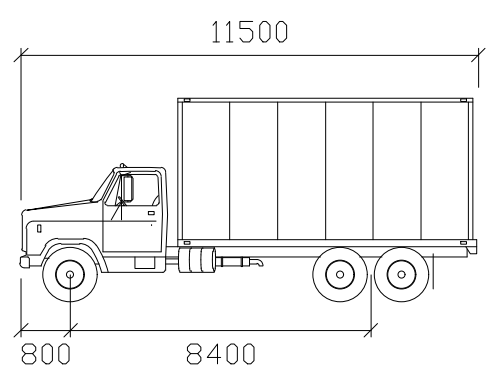
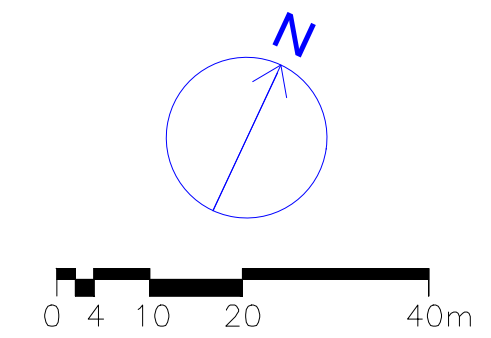
mm

Width : 2600  
 Track : 2600  
 Lock to Lock Time : 6.0  
 Steering Angle : 40.0

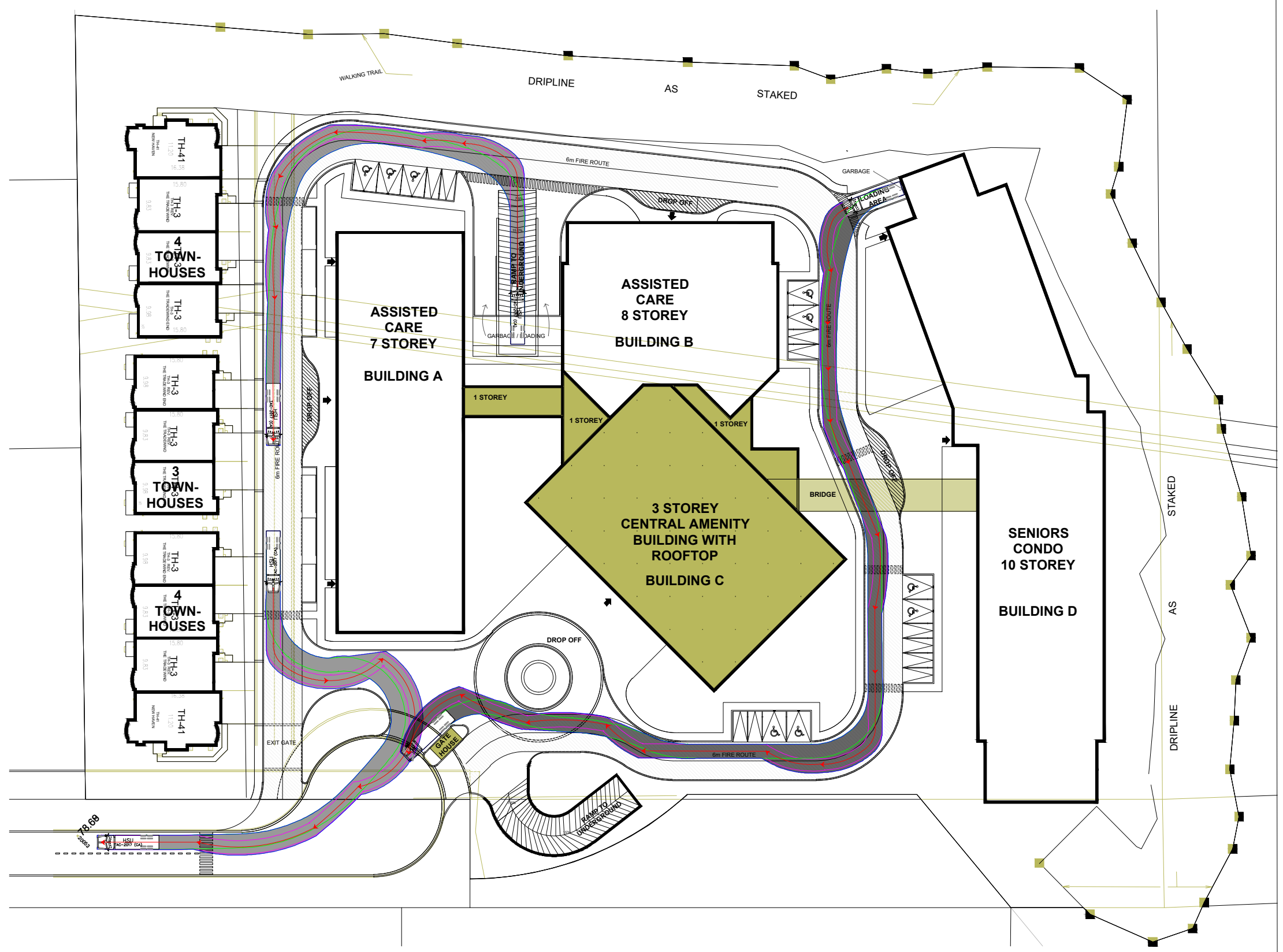


VEHICLE CIRCULATION PLAN - 46 STEVENS ROAD DEVELOPMENT  
 HEAVY SINGLE UNIT (HSU) TRUCK MANOEUVRES - 1

Figure AT-6	
Project No.	12563422
Date	July 12, 2022



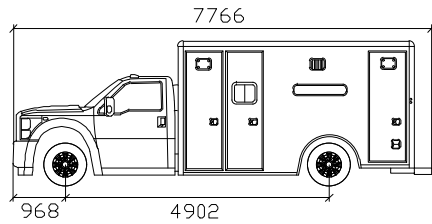
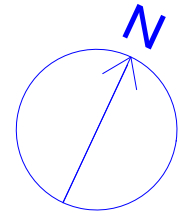
HSU  
 mm  
 Width : 2600  
 Track : 2600  
 Lock to Lock Time : 6.0  
 Steering Angle : 40.0



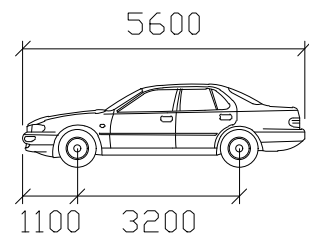
VEHICLE CIRCULATION PLAN - 46 STEVENS ROAD DEVELOPMENT  
 HEAVY SINGLE UNIT (HSU) TRUCK MANOEUVRES - 2

Figure AT-7	
Project No.	12563422
Date	July 12, 2022

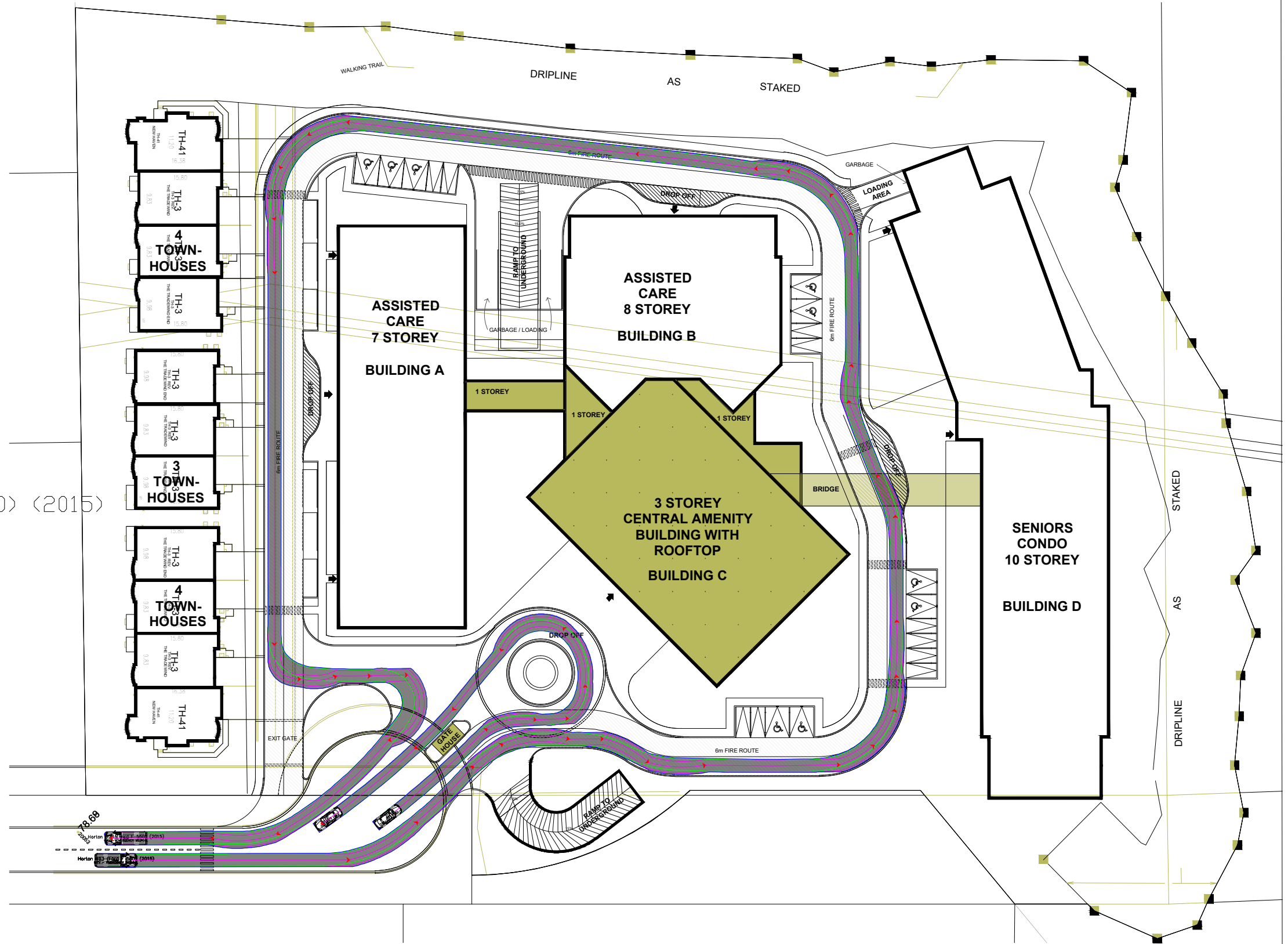




Horton 623 (Ford F 550) (2015)  
 Width : 2438 mm  
 Track : 2200  
 Lock to Lock Time : 6.0  
 Steering Angle : 46.6

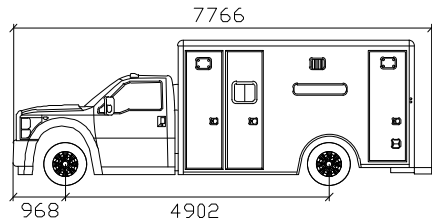
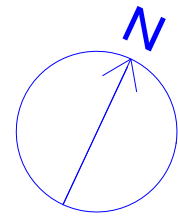


P  
 Width : 2000 mm  
 Track : 2000  
 Lock to Lock Time : 6.0  
 Steering Angle : 35.9



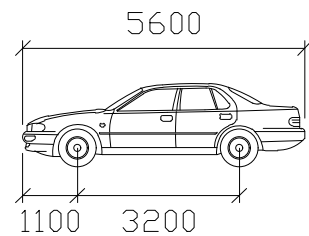
VEHICLE CIRCULATION PLAN - 46 STEVENS ROAD DEVELOPMENT  
 AMBULANCE VEHICLE MANOEUVRES - 1

Figure AT-8	
Project No.	12563422
Date	July 12, 2022

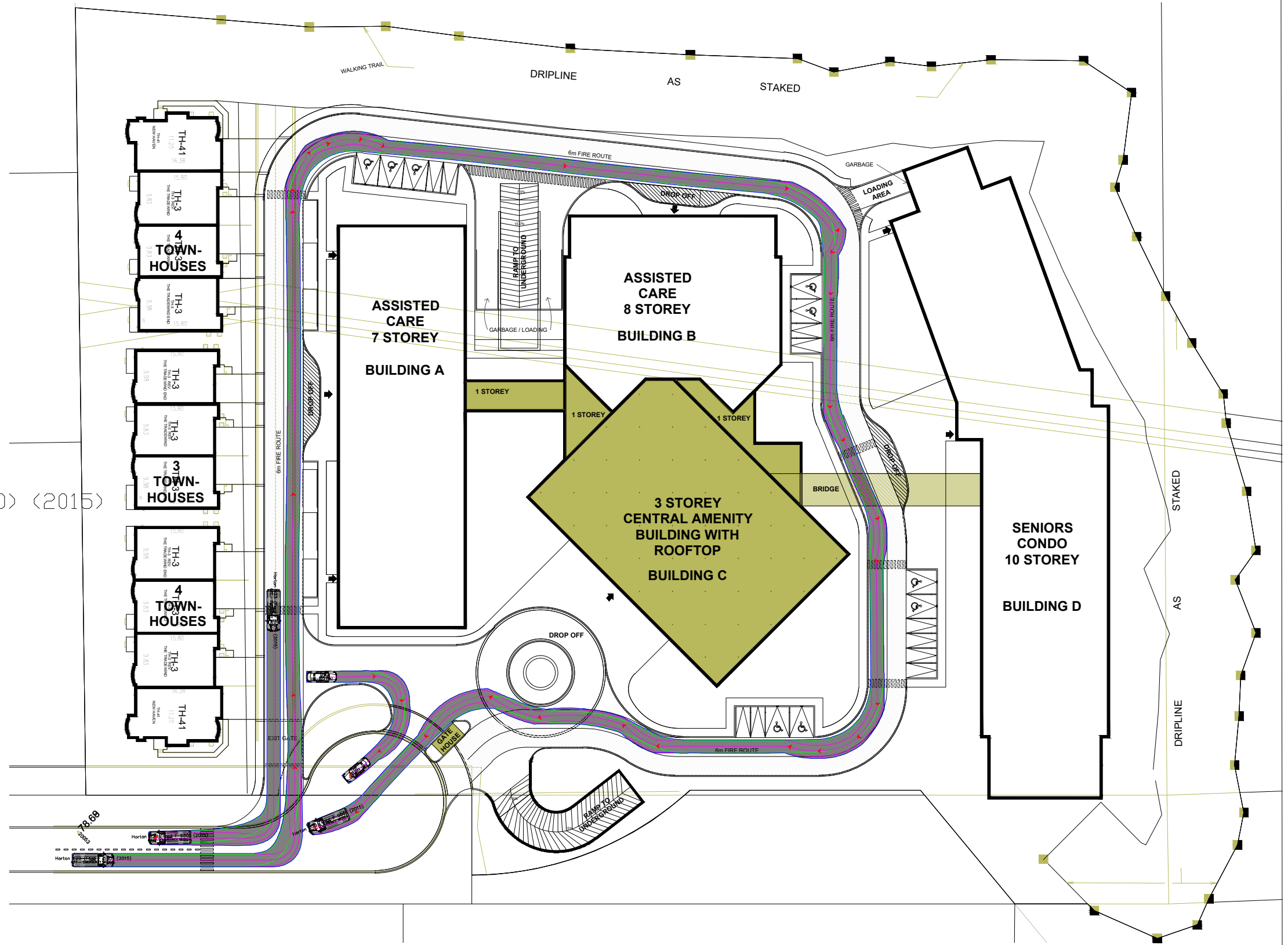


Horton 623 (Ford F 550) (2015)

mm  
 Width : 2438  
 Track : 2200  
 Lock to Lock Time : 6.0  
 Steering Angle : 46.6



P  
 mm  
 Width : 2000  
 Track : 2000  
 Lock to Lock Time : 6.0  
 Steering Angle : 35.9

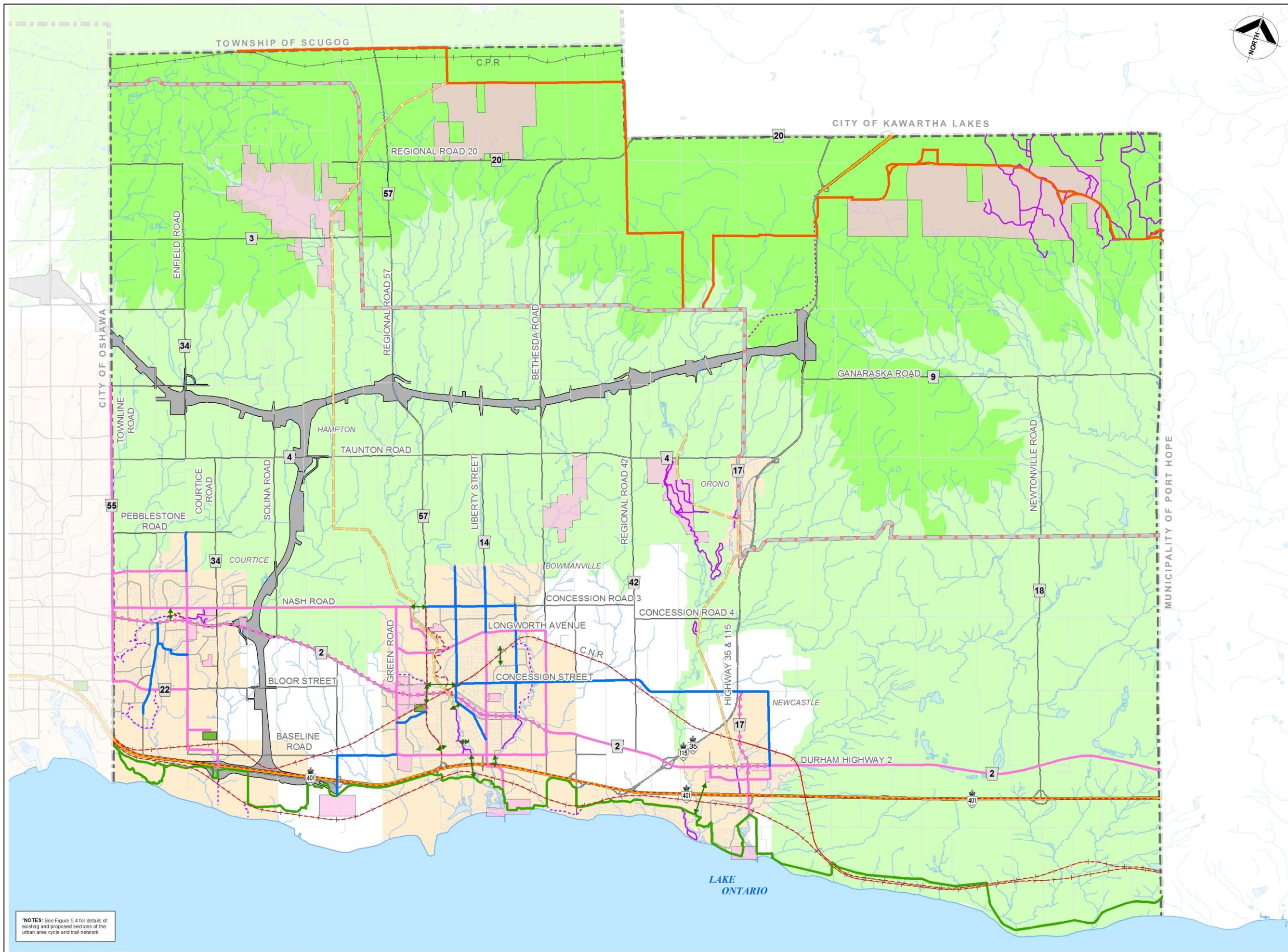


VEHICLE CIRCULATION PLAN - 46 STEVENS ROAD DEVELOPMENT  
 AMBULANCE VEHICLE MANOEUVRES - 2

Figure AT-9	
Project No.	12563422
Date	July 12, 2022

# **Appendix H**

**Excerpts of Clarington Transportation  
Master Plan and Durham Region TMP**



- Primary Cycling Network (Spines)**
- Clarington Initiative
  - Regional Cycling Plan Network
- Secondary Cycling Network\***
- Clarington Cycle Lane and Shared Routes
- Trail Network**
- Waterfront Trail
  - Potential Regional Trail Connections
  - Greenbelt Cycle Route
  - Oak Ridge Moraine Trail
  - Existing Trail
  - Proposed Trail
- Destinations, Barriers and Links**
- Key Linkage
  - Pedestrian/Cyclist Barrier
  - Key Active Transportation Destination
  - Future GO Station
- Other Features**
- Freeway
  - Arterial Road
  - Collector Road
  - Local Road
  - Railway
  - Municipal Boundary
  - Watercourse
  - Highway 407 Corridor
  - Waterbody
  - Oak Ridges Moraine
  - Urban Area
  - Greenbelt

**AECOM**

AECOM Canada Ltd.  
300 Water Street Whitby, Ontario, Canada L1N 9J2  
T905.668.9363 F 905.668.0221

CLIENT:

**Clarington**  
Leading the Way

PROJECT:

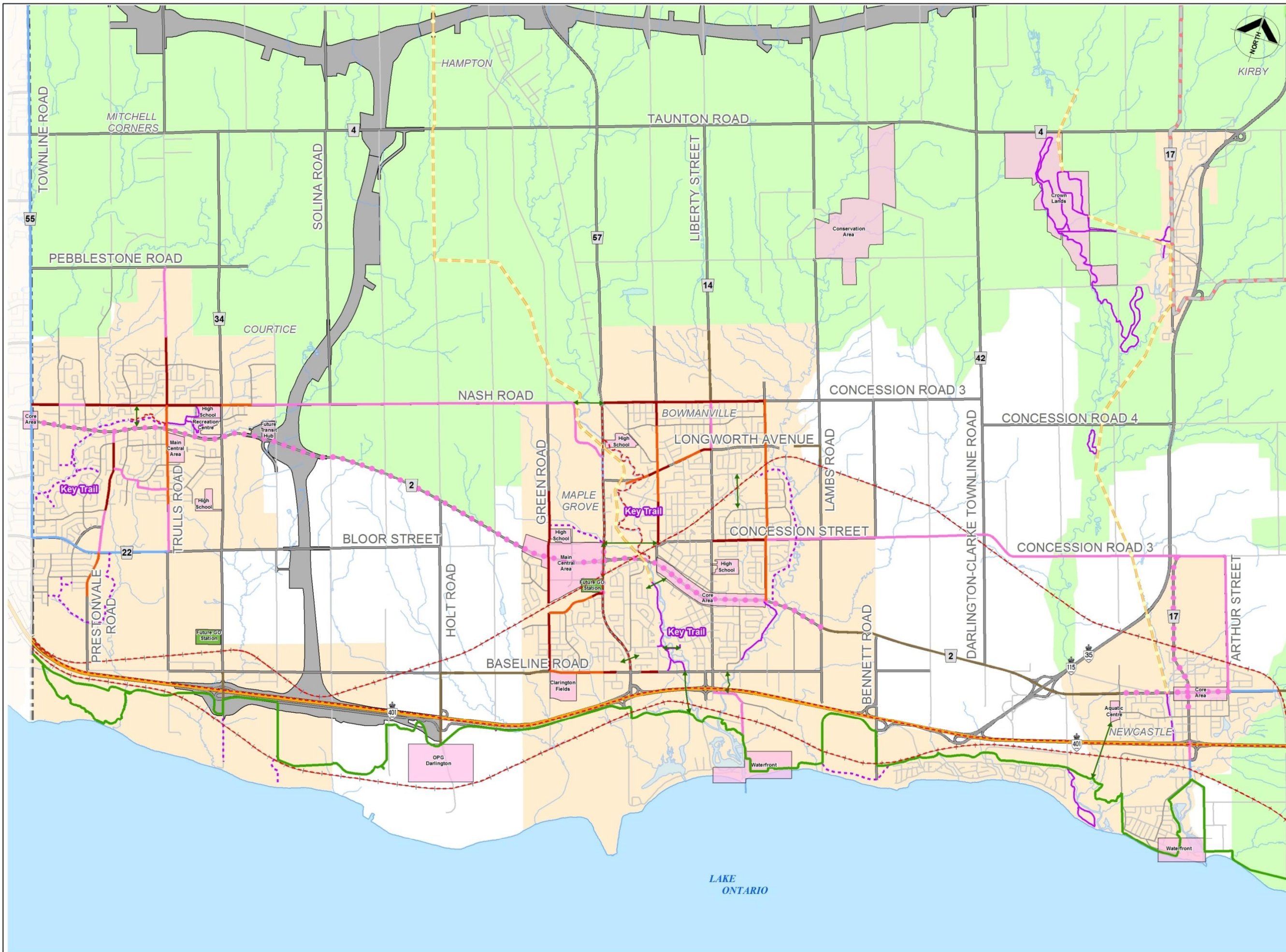


DRAWING:

**ACTIVE TRANSPORTATION (MUNICIPAL)**

PREPARED BY:	CHECKED BY:	PROJECT No.:
	N. DAY	60264232
DESIGNED BY:	APPROVED BY:	FIGURE:
M. TRACEY	S. HARMSWORTH	<b>ES-1</b>
SCALE:	DATE:	
1: 100,000	JUNE 2014	

\*NOTES: See Figure 5.4 for details of existing and proposed sections of the urban area cycle and trail network.



**Proposed Cycle and Trail Network**

- Cycle Lane
- Multi Use Path
- Paved Shoulder
- Signed / Shared Lanes
- Proposed Trails
- Greenbelt Cycle Route

**Trail Network**

- Existing Cycle Lane / Shared Route
- Clarington Initiative
- Waterfront Trail
- Potential Regional Trail Connections
- Existing Trail

**Destination, Barriers and Links**

- Pedestrian/Cyclist Barrier
- Key Linkage
- Key Active Transportation Destination
- Future GO Station

**Other Features**

- Freeway
- Arterial Road
- Collector Road
- Local Road
- Municipal Boundary
- Watercourse
- Highway 407 Corridor
- Waterbody
- Urban Area
- Greenbelt

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CLIENT: **Clarington**  
 Leading the Way

PROJECT: **CTMP** | Clarington Transportation Master Plan

DRAWING: **ACTIVE TRANSPORTATION (LOCAL)**

PREPARED BY: -	CHECKED BY: N. DAY	PROJECT No: 60264232
DESIGNED BY: M. TRACEY	APPROVED BY: S. HARMSWORTH	FIGURE: ES-2
SCALE: 1:100,000	DATE: JUNE 2014	

2031 Higher-Order Transit Network

**Durham Region Transit (DRT)**

- Rapid Transit (Exclusive Lanes)
- Protect for Future Rapid Transit\*
- High Frequency Bus in HOV Lane
- Protect for Future HOV\*
- High Frequency Bus in Shared Lane
- Other Transit Spine\*\*

**GO Train Services**

- Existing GO Station
- Future GO Station
- Existing GO Line
- Future GO Line
- Protect for Future GO Line\*

**Provincial Transit**

- Future Provincial Transitway
- Existing Commuter Lot
- Future Commuter Lot
- Interchange
- Railway
- Urban Area
- Area Municipal Boundary
- Regional Boundary

Peak Period Service Headway (minutes)

Notes:  
 \*Protect for future transit corridors anticipated beyond 2031.  
 \*\*Other Transit Spine can be a combination of DRT and GO Bus service.

