

# 350 Wellington Road 7


Township of Wellington  
County of Centre Wellington

**Traffic Impact Study for  
Elora 7 OP Inc.**

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## Executive Summary

This report summarizes the traffic impact study for the proposed community, on a site municipally known as 350 Wellington Road 7, located on the south side of Wellington Road 7, midblock between David Street West and Wellington Road 18, in the Township of Centre Wellington [Township], County of Wellington [County]. The report assesses the impact of traffic related to the community on the adjacent roadway and provides recommendations to accommodate this traffic in a safe and efficient manner.

The proposed community will consist of 273 townhouse units.

The proposed community will have three access driveways onto Wellington Road 7 [North Access, Centre Access, South Access].

The scope of this analysis includes a review of the following intersections:

- Wellington Road 7 / Wellington Road 18;
- Wellington Road 7 / Middlebrook Road / David Street West;
- Wellington Road 7 / North Access
- Wellington Road 7 / Centre Access; and
- Wellington Road 7 / South Access.

## Conclusions

1. The proposed community is expected to generate a 110 AM and 140 PM peak hour trips.
2. Detailed intersection counts were conducted at the study intersection on Thursday August 4<sup>th</sup>, 2022.
3. An intersection operation analysis was completed at the study area intersections, using the existing (2022) and background (2027 & 2032) traffic volumes. This enabled a review of existing and future traffic deficiencies that would be present without the influence of the proposed community. The following improvements are recommended to coincide with the increase in posted speed limit to 60 km/h on Wellington Road 7:

### **Background (2027) Traffic Volumes**

- **Wellington Road 7 / Middlebrook Road / David Street West**
  - Widen Wellington Road 7 to provide a northbound left turn lane with a 15 metre storage length, 50 metre parallel length and 65 metre taper length.
  - Widen Wellington Road 7 to provide a southbound left turn lane with a 25 metre storage length, 50 metre parallel length and 80 metre taper length.
- 4. An estimate of the amount of traffic that would be generated by the Subject Site was prepared and assigned to the study area street and intersections.
- 5. An intersection operation analysis was completed under total (2027 & 2032) traffic volumes with the proposed community operational at the study area intersections. The following improvements are recommended prior to occupancy of the proposed development:
  - **Wellington Road 7 / North Access**
    - Widen Wellington Road 7 to provide a northbound left turn lane with a 15 metre storage length, 15 metre parallel length and 65 metre taper length.

- **Wellington Road 7 / Centre Access**
    - Widen Wellington Road 7 to provide a northbound left turn lane with a 15 metre storage length, 50 metre parallel length and 80 metre taper length.
  - **Wellington Road 7 / South Access**
    - Widen road to accommodate a northbound left turn lane with a 15 metre storage length, 50 metre parallel length and 80 metre taper length.
  - **Wellington Road 7 / South Street**
    - Widen road to accommodate a southbound left turn lane with a 15 metre storage length, 15 metre parallel length and 65 metre taper length.
  - **Wellington Road 7 / Middlebrook Road / David Street West**
    - Advance northbound and southbound left turn lane construction to coincide with above-noted road improvements.
6. The proposed North Access, Centre Access and South Access will operate efficiently as full-movement accesses, with one-way stop control for eastbound movements. A single ingress and egress lane at the North Access, Centre Access and South Access will provide the necessary capacity to service the proposed community.
  7. It is recommended the Client install a Level 2 Type C pedestrian crossing at the north leg of the Wellington Road 7 / Middlebrook Road / David Street West intersection.
  8. It is recommended the County maintain the posted 50km/h speed limit within the study area (between Middlebrook Road / David Street West and Wellington Road 18). The following traffic calming measures are recommended to support the posted 50km/h speed limit:
    - Construct a raised median island on Wellington Road 7, north of the subject site to provide a visual cue that will link the two adjacent low-speed sections on Wellington Road 7 (to be completed by the Client);
    - Provide enhanced street tree plantings on both sides of Wellington Road 7, between Middlebrook Road / David Street West and the bridge over the Grand River (to be completed by the Client); and
    - Extend the existing sidewalk from the bridge over the Grand River to Middlebrook Road, to activate the boulevard of Wellington Road 7 and also provide additional pedestrian access to the Elora Gorge Trail (to be completed by the Township).
  9. The proposed parking supply meets the minimum requirements in the Township's Zoning By-law 2009-045.
  10. In summary the proposed community will not cause any operational issues and will not add significant delay or congestion to the local roadway network.

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# 1 Introduction

## 1.1 Background

**Elora 7 OP Inc.** [The Client] is proposing a residential community located on a site municipally known as 350 Wellington Road 7, located on the south side of Wellington Road 7, midblock between David Street West and Wellington Road 18, in the Township of Centre Wellington [Township], County of Wellington [County].

The proposed community will consist of 273 townhouse units.

The proposed community will have three access driveways onto Wellington Road 7 [North Access, Centre Access, South Access].

The Client has retained **JD Northcote Engineering Inc.** [JD Engineering] to prepare this traffic impact study in support of the proposed community.

## 1.2 Study Area

**Figure 1** shows the location of the subject site and study area intersections in relation to the surrounding area. The Site Plan by MHBC is provided in **Appendix A**.

The subject site is bound by Wellington Road 7 to the northeast and undeveloped rural lands to the northwest, southwest and southeast.

Through consultation with the Township and County, the following intersections are included in this study:

- Wellington Road 7 / Wellington Road 18;
- Wellington Road 7 / Middlebrook Road / David Street West;
- Wellington Road 7 / North Access
- Wellington Road 7 / Centre Access; and
- Wellington Road 7 / South Access.

Figure 1 – Proposed Site Location and Study Area





### 1.3 Study Scope and Objectives

The purpose of this study is to identify the potential impacts to traffic flow at the site access and on the surrounding roadway network. The study analysis includes the following tasks:

- Consult with the Township and County to address any traffic-related issues or concerns they have with the proposed community;
- Determine existing traffic volumes and circulation patterns;
- Estimate future traffic volumes if the proposed community was not constructed, including the impact of additional proposed developments in the area;
- Complete level-of-service [LOS] analysis of horizon year (without the proposed community) traffic conditions and identify operational deficiencies;
- Estimate the amount of traffic that would be generated by the proposed community and assign to the roadway network;
- Complete LOS analysis of horizon year (with the proposed community) traffic conditions and identify additional operational deficiencies;
- Identify improvement options to address operational deficiencies;
- Review the suitability of the study area road network to accommodate future community growth;
- Complete a review of the proposed site accesses;
- Review the proposed parking supply and assess the suitability for the proposed community; and
- Document findings and recommendations in a final report.

### 1.4 Horizon Year and Analysis Periods

Traffic scenarios for the existing year (2022) and horizon years (2027 & 2032) were selected for analysis of traffic operations in the study area. The weekday morning [AM] and weekday afternoon [PM] peak hours have been selected as the analysis periods for this study.

## 2 Information Gathering

### 2.1 Street and Intersection Characteristics

**Wellington Road 7** is a two-lane arterial road with a posted speed limit of 50km/h in the study area. Wellington Road 7, south of David Street West has an urban cross-section with a sidewalk on the east side of the road. Wellington Road 7 north of David Street West has a rural cross-section with paved shoulders extending 268 metres, where it transitions with gravel shoulders for 781 metres and transitions north of this segment with paved shoulders in the study area. Wellington Road 7 is under jurisdiction of the County.

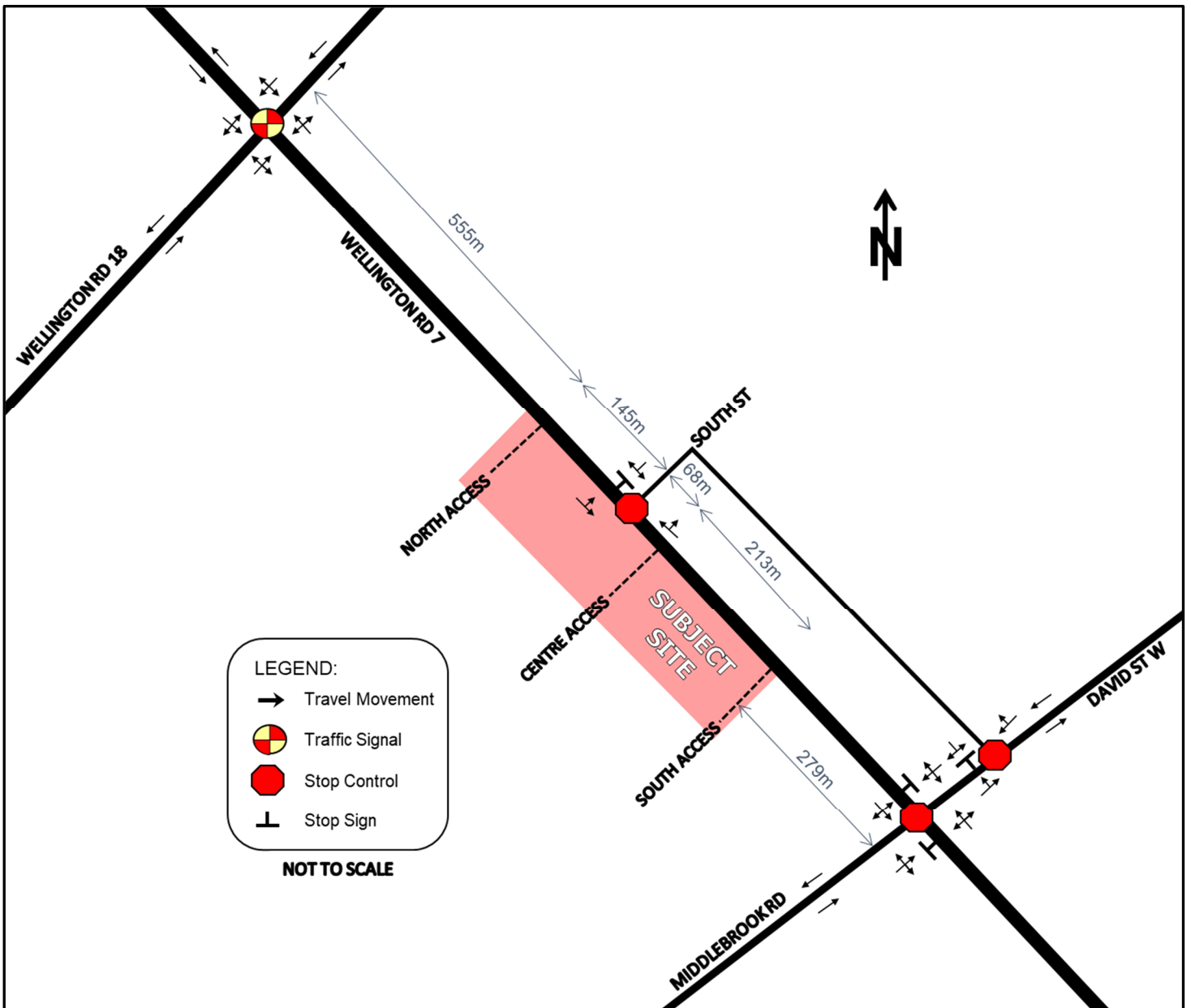
**Wellington Road 18 (Woolwich Street West)** is a two-lane arterial road with a posted speed limit of 50km/h in the study area. Wellington Road 18 east of Wellington Road 7 has an urban cross-section with a sidewalk on the north side of the road. Wellington Road 18 west of Wellington Road 7 has a rural cross-section with gravel shoulders. Wellington Road 18 is under jurisdiction of the County.

**Middlebrook Road** is a two-lane local road with a rural cross-section and gravel shoulders. Middlebrook Road has an unposted (assumed) speed limit of 60km/h within the study area and is under jurisdiction of the Township.

**David Street West** is a two-lane collector road with an urban cross-section and a sidewalk on both sides of the road in the study area. David Street West has an unposted (assumed) speed limit of 50km/h within the study area and is under jurisdiction of the Township.

The existing intersection spacing and lane configuration within the study area is illustrated in **Figure 2**.

**Figure 2 – Existing (2022) Intersection Spacing and Lane Configuration within Study Area**



## 2.2 Local Transportation Infrastructure Improvements

Based on a review of the County's Capital Budget (2022) and Township's Capital Budget (2022) there are no planned improvements that would impact traffic in the study area.

Based on a review of the County's Road Master Action Plan (December 2021) [RMAP] the following improvements were recommended in the plan:

Wellington Road 7 – from the Elora / Salem Community to the Highway 6 Junction (10 – 20 years)

- Widen the roadway and provide one additional lane per direction.

Wellington Road 7 – from Side Road 11 to First Line

- Increase speed limit from 50 km/h to 60 km/h; and
- Urbanization of the road segment.

Wellington Road 7 / Wellington Road 18 (2032)

- Install single lane roundabout; and
- Construct paved shoulders on Wellington Road 18.

Since the above noted improvements are not in the County's Capital Budget 10-year horizon (2022 - 2031) and the above noted improvements are generally planned in the long-term horizon, we have not assumed the above noted improvements in the analysis.

## 2.3 Transit Access

There is no transit service available in the Township. The County's RMAP identified a potential fixed-route transit service to operate in the County; however, there are no current plans to implement this transit system.

The RIDE WELL ride sharing service is provided by the County to provide on-demand shared rides. RIDE WELL provides connections within the County and City of Guelph as long as the origin or destination is within the County. RIDE WELL operates Monday to Friday from 06:00 – 19:00.

## 2.4 Other Developments within the Study Area

The Township is experiencing a growth in new urban development within the urban areas and in the rural areas adjacent to the boundaries of the Township. Based on correspondence with the Township, it was determined that utilization of conservative background growth factor would be sufficient in capturing the future development volumes in Section 2.5.

## 2.5 Background Traffic Growth

Based on the County's RMAP, a 0.4% nominal compound annual growth rate was applied to the County roads to account for background growth in the County.

The Township's Transportation Master Plan (2019) [TMP] generated traffic projections model based on a Emme traffic modelling software for the existing (2019) and future (2041) horizon years. Using on the Emme traffic model data, comparing the existing (2019) and future (2041) for the preferred alternative improvements in the Township scenarios, a background traffic growth rate was calculated. The background traffic growth rate calculated on Wellington Road 7, Wellington Road 18 and Middlebrook Road were 2.8%, 3.3% and 1.7% respectively. Based on direction provided by the Township, a conservative growth rate of 4.5% has been utilized on Wellington Road 7, Wellington Road 18,

Middlebrook Road and David Street West to ensure a conservative approach and account for the impact by the planned local development.

## 2.6 Traffic Counts

Detailed turning movement traffic and pedestrian counts were commissioned at the study area intersections. **Table 1** summarizes the traffic count data.

**Table 1 – Traffic Count Data**

Intersection (N-S Street / E-W Street)	Count Date	AM Peak Hour	PM Peak Hour	Source
Wellington Road 7 / Wellington Road 18	Thursday August 4 <sup>th</sup> , 2022	07:45 – 08:45	16:00 – 17:00	JD Eng.*
Wellington Road 7 / South Street	Thursday August 4 <sup>th</sup> , 2022	08:00 – 09:00	16:00 – 17:00	JD Eng.*
Wellington Road 7 / Middlebrook Road / David Street West	Thursday August 4 <sup>th</sup> , 2022	08:00 – 09:00	16:00 – 17:00	JD Eng.*

\*Counts were completed by Accu Traffic Inc. on behalf of JD Engineering.

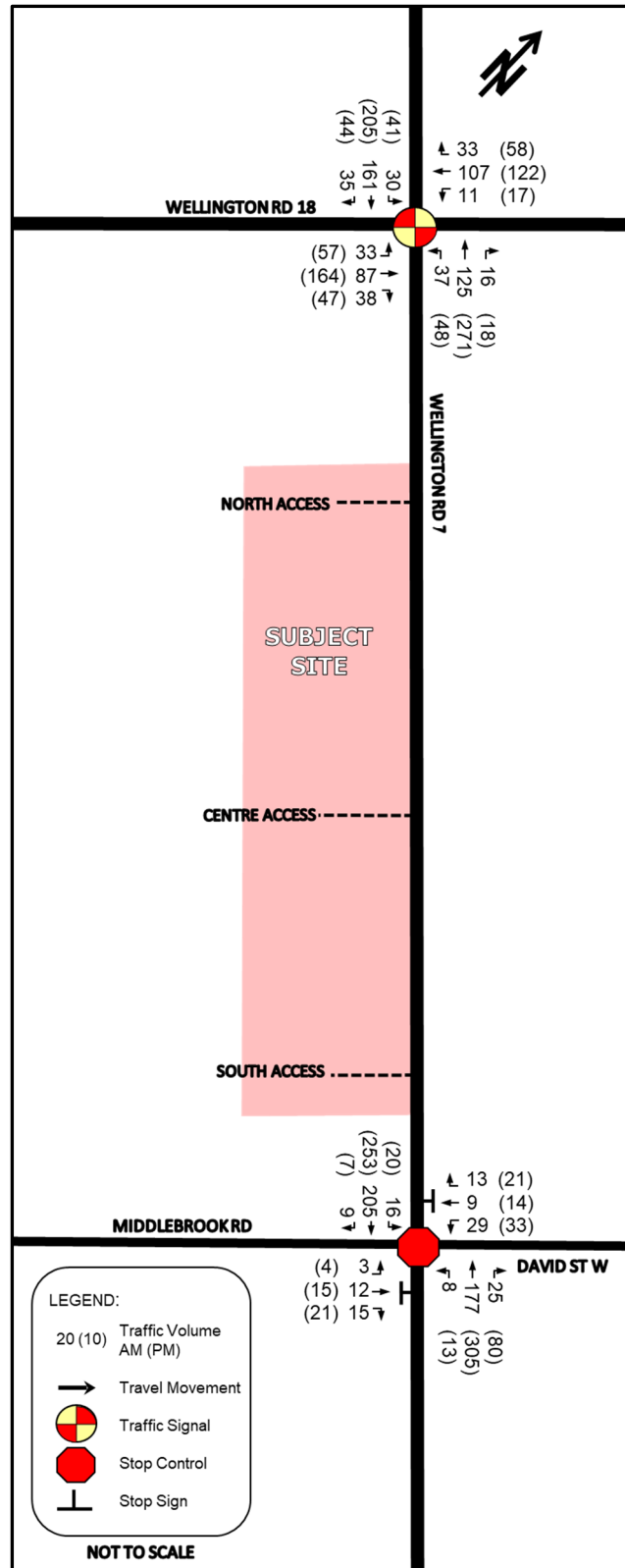
Detailed traffic count data can be found in **Appendix B**. The peak hours of traffic generation for the study area intersections generally aligned with the anticipated peak hour of traffic generation by the proposed community.

The through traffic volumes at the site access driveways have been estimated based on the north and south leg traffic at the Wellington Road 7 / South Street intersection.

Heavy vehicle percentages from the traffic count data have also been included in the Synchro analysis.

The existing (2022) AM and PM peak hour traffic volumes through the study are illustrated in **Figure 3**.

Figure 3 – Existing (2022) Traffic Volumes



## 2.7 Horizon Year Traffic Volumes

The background (2027 & 2032) horizon year traffic volumes without the proposed community were estimated using the background growth rate discussed in Section 2.4.

The background (2027 & 2032) horizon year traffic volumes are illustrated in **Figures 4** and **5** respectively.

Figure 4 – Background (2027) Traffic Volumes

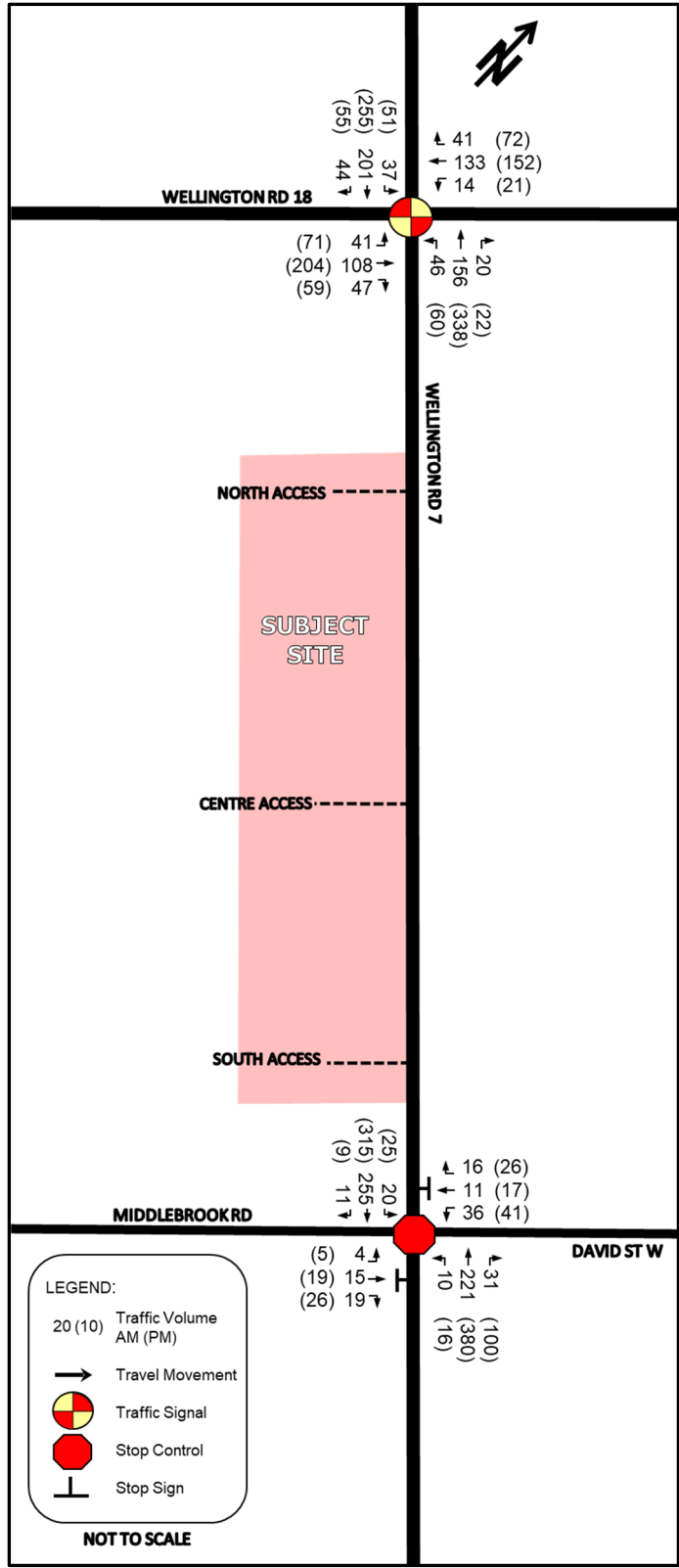
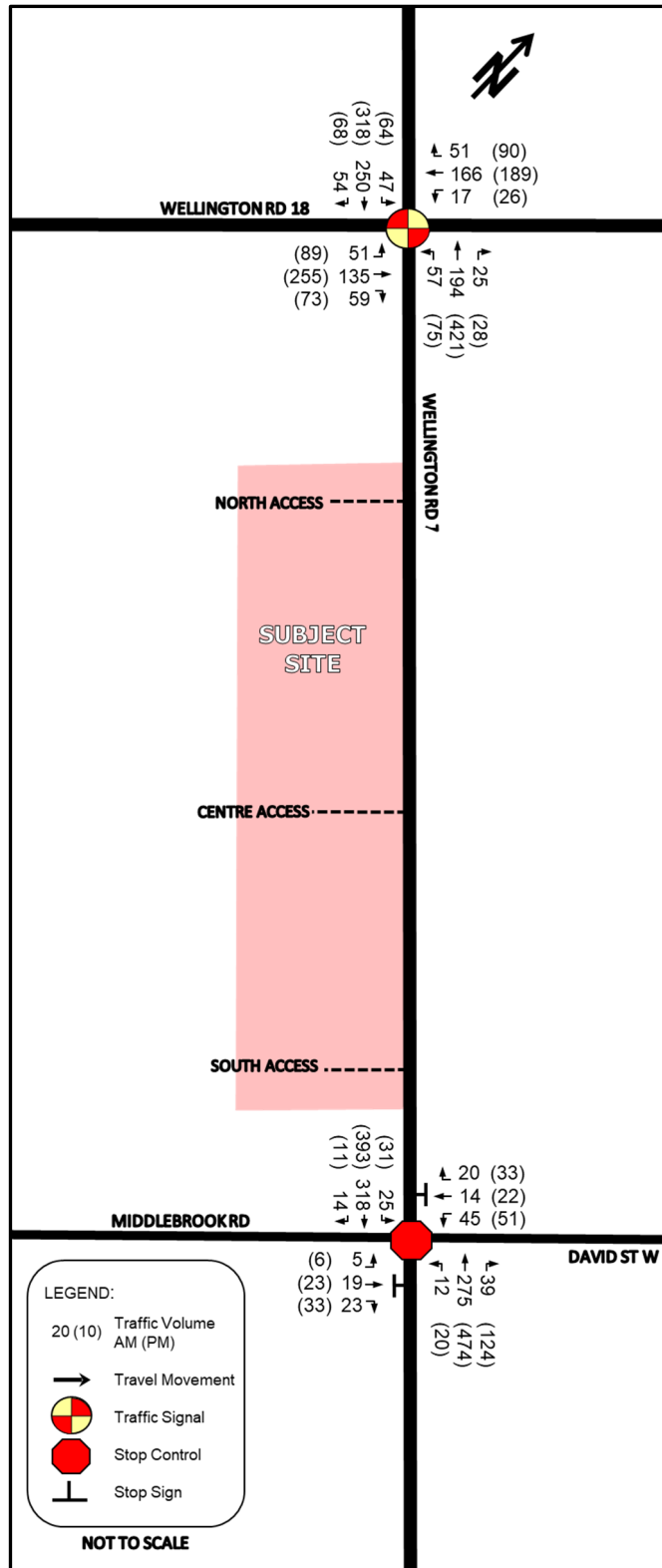


Figure 5 – Background (2032) Traffic Volumes





## 3 Intersection Operation without Proposed Community

### 3.1 Intersection Capacity Analysis Criteria

Existing and background horizon operational conditions were established to determine how the street network within the study area is currently functioning without the proposed community. This provides a base case scenario to compare with future development scenarios. Traffic operations within the study area were evaluated using the existing and future background traffic volumes with the existing road configuration and traffic control. The intersection performance was measured using the traffic analysis software, Synchro 11, a deterministic model that employs Highway Capacity Manual and Intersection Capacity Utilization methodologies for analyzing intersection operations. These procedures are accepted by provincial and municipal agencies throughout North America.

Synchro 11 enables the study area to be graphically defined in terms of streets and intersections, along with their geometric and traffic control characteristics. The user is able to evaluate both signalized and unsignalized intersections in relation to each other, thus not only providing level of service for the individual intersections, but also enabling an assessment of the impact the various intersections in a network have on each other in terms of spacing, traffic congestion, delay, and queuing.

The intersection operations were also evaluated in terms of the LOS. LOS is a common measure of the quality of performance at an intersection and is defined in terms of vehicular delay. This delay includes deceleration delay, queue move-up time, stopped delay, and acceleration delay. LOS is expressed on a scale of A through F, where LOS A represents very little delay (i.e. less than 10 seconds per vehicle) and LOS F represents very high delay (i.e. greater than 50 seconds per vehicle for a stop sign controlled intersection and greater than 80 seconds per vehicle for a signalized intersection).

The LOS criteria for signalized and stop sign-controlled intersections are shown in **Table 2**. A description of traffic performance characteristics is included for each LOS.

For County intersections, for signalized intersections V/C ratio greater than 0.85 for intersection operation, through or shared through / turning movements and greater than 0.95 for exclusive turning movements have been highlighted in the LOS tables. For unsignalized intersections LOS E or worse are considered to be critical movements and have been highlighted in the LOS tables.

The peak hour factor applied at the study area intersections in the analysis, are based on the traffic counts completed for the study area intersections, noted in Section 2.6, Table 1. For the driveways / intersections that did not have traffic counts completed, a general peak hour factor of 0.92 was applied.

**Table 2 – Level of Service Criteria for Intersections**

LOS	LOS Description	Control Delay (seconds per vehicle)	
		Signalized Intersections	Stop Controlled Intersections
A	Very low delay; most vehicles do not stop ( <b>Excellent</b> )	less than 10.0	less than 10.0
B	Higher delay; more vehicles stop ( <b>Very Good</b> )	between 10.0 and 20.0	between 10.0 and 15.0
C	Higher level of congestion; number of vehicles stopping is significant, although many still pass through intersection without stopping ( <b>Good</b> )	between 20.0 and 35.0	between 15.0 and 25.0
D	Congestion becomes noticeable; vehicles must sometimes wait through more than one red light; many vehicles stop ( <b>Satisfactory</b> )	between 35.0 and 55.0	between 25.0 and 35.0
E	Vehicles must often wait through more than one red light; considered by many agencies to be the limit of <b>acceptable</b> delay	between 55.0 and 80.0	between 35.0 and 50.0
F	This level is considered to be unacceptable to most drivers; occurs when arrival flow rates exceed the capacity of the intersection ( <b>Unacceptable</b> )	greater than 80.0	greater than 50.0

### 3.2 Existing (2022) Intersection Operation

The results of the LOS analysis under existing (2022) traffic volumes during the AM and PM peak hour can be found below in **Table 3**. Existing intersection geometry and traffic control have been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix C**.

**Table 3 – Existing (2022) LOS**

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Model	Storage				Model	Storage
Wellington Road 7 / Wellington Road 18 (signalized)	0.29	13.4	B	-	-	0.45	15.2	B	-	-
EB	0.55	25.6	C	32	-	0.70	28.4	C	55	-
WB	0.48	24.2	C	30	-	0.44	22.0	C	37	-
NB	0.18	4.5	A	18	-	0.35	7.6	A	45	-
SB	0.22	4.7	A	22	-	0.31	7.2	A	38	-
Wellington Road 7 / Middlebrook Road / David Street West (unsignalized)	-	2.3	A	-	-	-	2.5	A	-	-
EB	0.05	11.5	B	2	-	0.09	13.4	B	3	-
WB	0.11	12.9	B	3	-	0.19	16.6	C	6	-

The results of the LOS analysis indicate that the study area intersections are operating within the typical design limits noted in Section 3.1.

The anticipated queue for northbound and westbound movements at the Wellington Road 7 / Wellington Road 18 intersection extends past existing driveways to the gas station at the southeast corner of the intersection; however, the anticipated queue for each movement will be experienced for a short period of time at the end of each phase and is anticipated to clear after each cycle.

There are no other issues with the anticipated queuing in the study area.

An analysis was completed for left turn movements at the Wellington Road 7 / Middlebrook Road / David Street West intersection, based on the criteria outlined in Appendix 9A of the Ontario Ministry of Transportation Design Supplement for TAC Geometric Design Guide for Canadian Roads (dated June 2017) [MTO DS] (results are provided in **Appendix F**). For the purposes of this report, in the left turn analysis a design speed of 60 km/h (for a posted speed of 50 km/h) and 80 km/h (for a posted speed of 60 km/h) were reviewed to account for the planned increase in speed limit as noted in Section 2.2. Based on the above noted criteria, a left turn lane is not warranted at the Wellington Road 7 / Middlebrook Road / David Street West intersection.

A review of the need for additional auxiliary right turn lanes at the Wellington Road 7 / Middlebrook Road / David Street West intersection was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, additional auxiliary right turn lanes are not recommended in the study area.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the Wellington Road 7 / Middlebrook Road / David Street West intersection (results are provided in **Appendix G**).

No infrastructure improvements are required for the existing (2022) scenario.

### 3.3 Background (2027) Intersection Operation

The results of the LOS analysis under background (2027) traffic volumes during the AM and PM peak hour can be found below in **Table 4**. Existing traffic control has been utilized for this scenario.

An analysis was completed for left turn movements at the Wellington Road 7 / Middlebrook Road / David Street West intersection, based on the criteria outlined in Appendix 9A of the MTO DS (results are provided in **Appendix F**). For the purposes of this report, in the left turn analysis a design speed of 60 km/h (for a posted speed of 50 km/h) and 80 km/h (for a posted speed of 60 km/h) were reviewed to account for the planned increase in speed limit as noted in Section 2.2. Based on the above noted criteria, a southbound left turn lane for a 60 km/h design speed and a northbound and southbound left turn lane for an 80 km/h design speed is warranted at the Wellington Road 7 / Middlebrook Road / David Street West intersection. It is recommended northbound and southbound left turn lanes are constructed on Wellington Road 7 at Middlebrook Road / David Street West, to coincide with the increase in posted speed limit to 60 km/h on Wellington Road 7. The recommended configuration for the left turn lanes is provided below:

#### **Wellington Road 7 / Middlebrook Road / David Street West**

- Northbound left turn lane: 15 metre storage length, 50 metre parallel length and 65 metre taper length
- Southbound left turn lane: 25 metre storage length, 50 metre parallel length and 80 metre taper length

Detailed output of the Synchro analysis can be found in **Appendix D**.

**Table 4 – Background (2027) LOS**

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Model	Storage				Model	Storage
Wellington Road 7 / Wellington Road 18 (signalized)	0.37	14.4	B	-	-	0.58	17.7	B	-	-
EB	0.63	27.2	C	40	-	0.78	32.2	C	71	-
WB	0.54	24.2	C	38	-	0.49	21.7	C	46	-
NB	0.24	5.6	A	25	-	0.48	10.6	B	72	-
SB	0.29	5.9	A	31	-	0.41	9.8	A	59	-
Wellington Road 7 / Middlebrook Road / David Street West (unsignalized)	-	2.6	A	-	-	-	3.1	A	-	-
EB	0.08	12.7	B	2	-	0.14	16.0	C	4	-
WB	0.16	14.9	B	5	-	0.30	22.6	C	10	-

The results of the LOS analysis indicate that the study area intersections are operating within the typical design limits noted in Section 3.1.

The anticipated queue for northbound and westbound movements at the Wellington Road 7 / Wellington Road 18 intersection extends past existing driveways to the gas station at the southeast corner of the intersection; however, the anticipated queue for each movement will be experienced for a short period of time at the end of each phase and is anticipated to clear after each cycle.

There are no other issues with the anticipated queuing in the study area.

A review of the need for additional auxiliary right turn lanes at the Wellington Road 7 / Middlebrook Road / David Street West intersection was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, additional auxiliary right turn lanes are not recommended in the study area.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the Wellington Road 7 / Middlebrook Road / David Street West intersection (results are provided in **Appendix G**).

No infrastructure improvements are required for the background (2027) scenario.

### 3.4 Background (2032) Intersection Operation

The results of the LOS analysis under background (2032) traffic volumes during the AM and PM peak hour can be found below in **Table 5**. It is recommended the signal timing split at the Wellington Road 7 / Wellington Road 18 intersection is adjusted to optimize the use of the existing infrastructure.

Detailed output of the Synchro analysis can be found in **Appendix D**.

**Table 5 – Background (2032) LOS**

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Model	Storage				Model	Storage
Wellington Road 7 / Wellington Road 18 (signalized)	0.48	16.2	B	-	-	0.74	20.4	C	-	-
EB	0.72	30.3	C	51	-	0.83	31.1	C	83	-
WB	0.59	24.7	C	46	-	0.51	18.4	B	50	-
NB	0.32	7.2	A	37	-	0.69	17.5	B	130	-
SB	0.38	7.7	A	47	-	0.60	15.3	B	94	-
Wellington Road 7 / Middlebrook Road / David Street West (unsignalized)	-	3.1	A	-	-	-	5.1	A	-	-
EB	0.12	14.6	B	4	-	0.22	20.8	C	7	-
WB	0.25	19.0	C	8	-	0.55	42.4	E	24	-

The results of the LOS analysis indicate that the delay for the westbound direction at the Wellington Road 7 / Middlebrook Road / David Street West intersection is operating marginally outside the typical design limits noted in Section 3.1; however, there are no issues regarding the anticipated queuing for westbound movements and the delay marginally exceeds the design limits. Consequently, no further improvements are recommended. As noted in Section 2.2, the County RMAP identified a future widening of Wellington Road 7. Although no improvements are recommended based on this analysis, it is recommended that the County continue to monitor this area as development occurs to confirm the traffic growth assumptions applied in this report.

The results of the LOS analysis indicate that all other movements / intersections in the study area are operating within the typical design limits noted in Section 3.1.

The anticipated queue for northbound and westbound movements at the Wellington Road 7 / Wellington Road 18 intersection extends past existing driveways to the gas station at the southeast corner of the intersection; however, the anticipated queue for each movement will be experienced for a short period of time at the end of each phase and is anticipated to clear after each cycle.

There are no other issues with the anticipated queuing in the study area.

A review of the need for additional auxiliary right turn lanes at the Wellington Road 7 / Middlebrook Road / David Street West intersection was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, additional auxiliary right turn lanes are not recommended in the study area.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the Wellington Road 7 / Middlebrook Road / David Street West intersection (results are provided in **Appendix G**).

No infrastructure improvements are required for the background (2032) scenario.

## 4 Proposed Community

### 4.1 Traffic Generation

The traffic generation for the subject site has been based on the Institute of Transportation Engineers [ITE] Trip generation Manual (11<sup>th</sup> Edition) [ITE Trip Generation Manual]. The following ITE land use has been applied to estimate the traffic from the proposed community:

- ITE land use 220 (Multifamily Housing (Low-Rise)) – General Urban/Suburban Setting

The AM and PM peak hour traffic generation for the proposed community do not exactly align with the AM and PM peak hour in the traffic counts; consequently, we have applied the peak hour of adjacent street traffic values provided in the ITE Trip Generation Manual. The estimated trip generation of the proposed community is illustrated below in **Table 6**.

**Table 6 – Estimated Traffic Generation for the Subject Site**

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Multifamily Housing (Low-Rise) ITE Lane Use: 220	273 units	26	84	110	88	52	140

### 4.2 Traffic Assignment

For the purposes of this study, it has been assumed that all traffic generated by the proposed community will be new traffic and would not be in the study area if the community was not constructed.

The ITE data provides the anticipated percentage of new traffic entering and exiting during the peak hour. The distribution of traffic for the proposed community has been calculated based on the 2016 TTS data for traffic zone 8344, retrieved using the TTS IDRS (output attached as **Appendix I**). TTS data provides historical origin and destination work trip percentages for specific areas within the Township and southern Ontario.

Traffic distribution for the trips generated by the proposed community during the AM and PM peak hour is expected to generally follow commuter travel patterns. Our analysis is based on egress traffic during the AM peak hour. Logically, the distribution of ingress traffic will follow the inverse of the exiting traffic distribution. For each of the individual areas identified in the TTS data, we have selected the probable route of travel, assuming people will select their route primarily based on travel time.

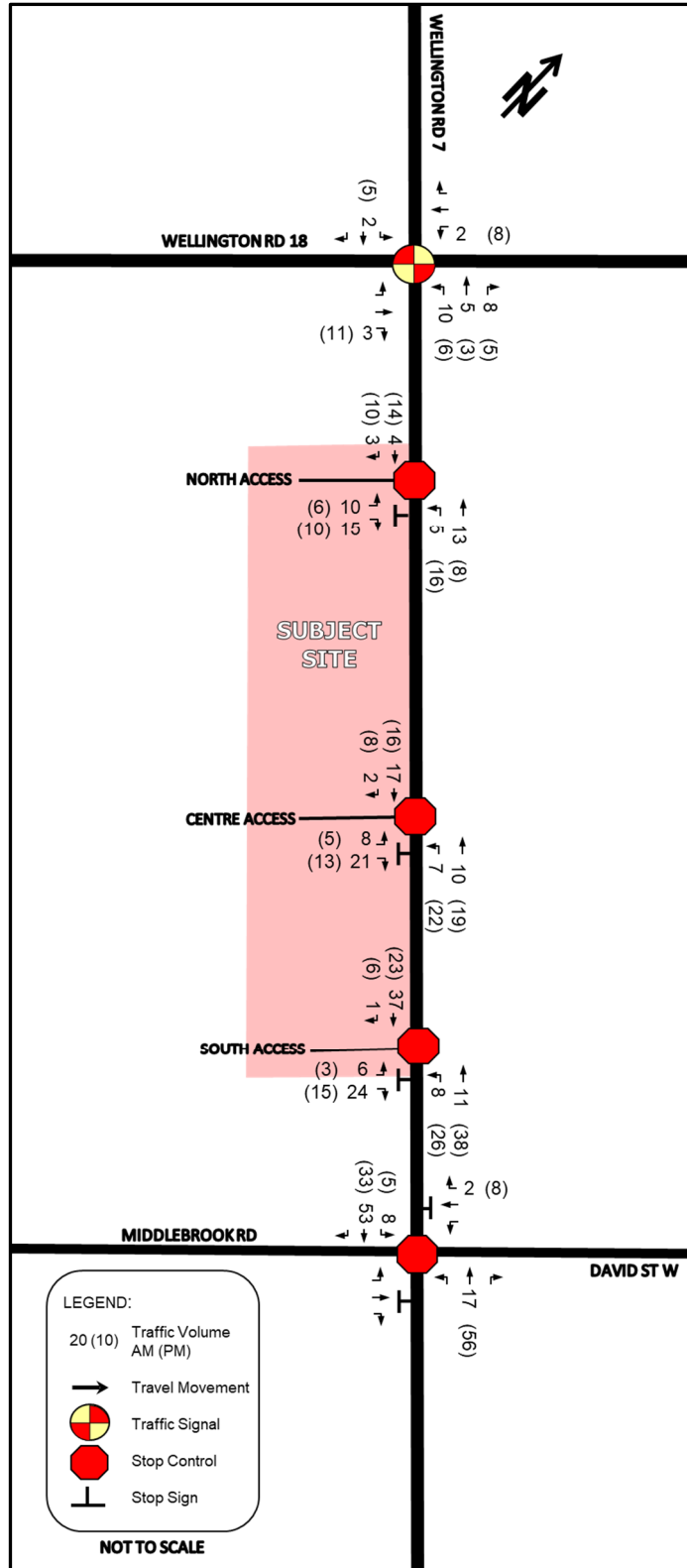
The residential distribution of trips is illustrated in **Table 7** using the methodology outlined above.

**Table 7 – Proposed Community Traffic Distribution**

<b>Travel Direction (to / from)</b>	<b>Percentage of Total Traffic Generation</b>
<b>North</b> via Wellington Road 7	6%
<b>South</b> via Wellington Road 7	63%
<b>West</b> via Wellington Road 18	13%
<b>East</b> via Wellington Road 18	9%
<b>East</b> via David Street East	9%
<b>TOTAL</b>	<b>100%</b>

**Figures 6** illustrate the site traffic assignment for the proposed community, during the AM and PM peak hour.

Figure 6 – Proposed Community Traffic Assignment





### 4.3 Total Horizon Year Traffic Volumes with the Proposed Community

For the total (2027 & 2032) horizon year traffic volumes, the proposed community traffic was added to the background (2027 & 2032) traffic volumes. The resulting total (2027 & 2032) horizon year traffic volume for the AM and PM peak hour are illustrated in **Figures 7** and **8** respectively.

Figure 7 – Total (2027) Traffic Volumes

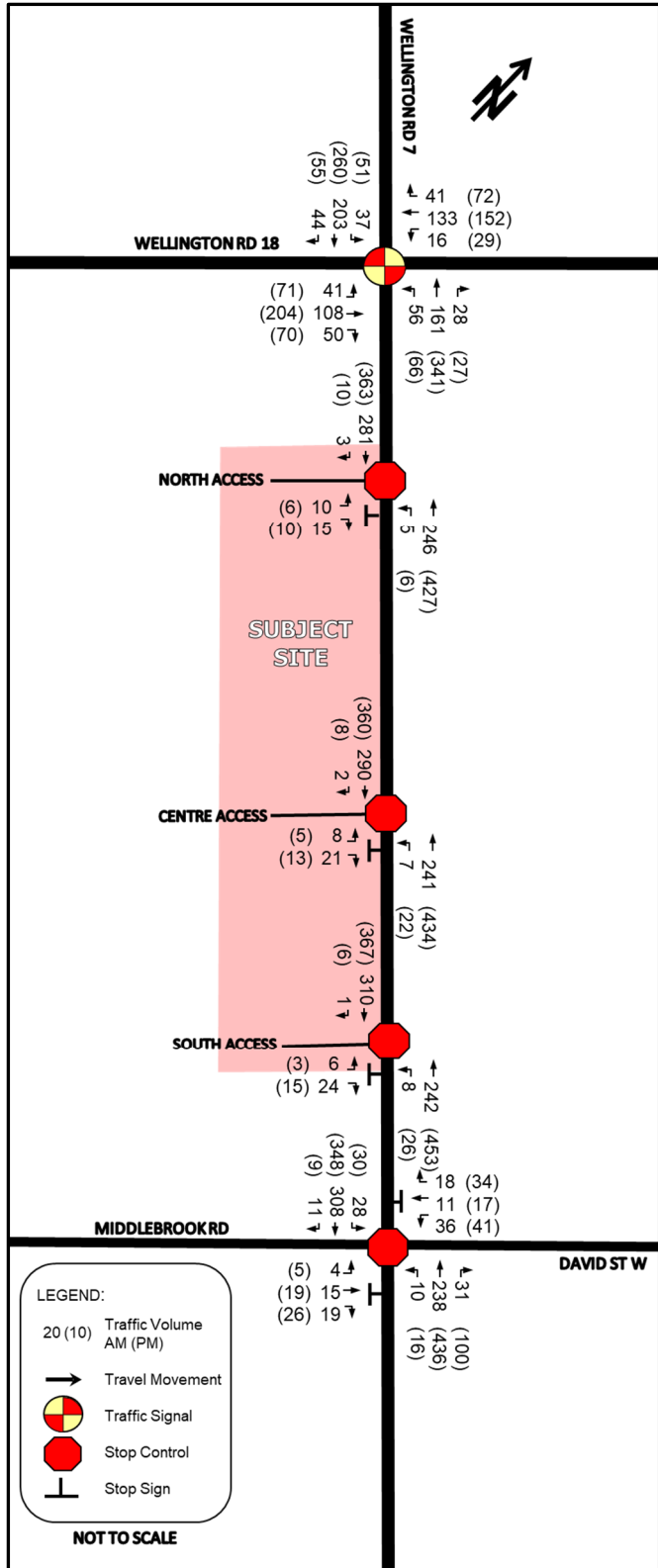
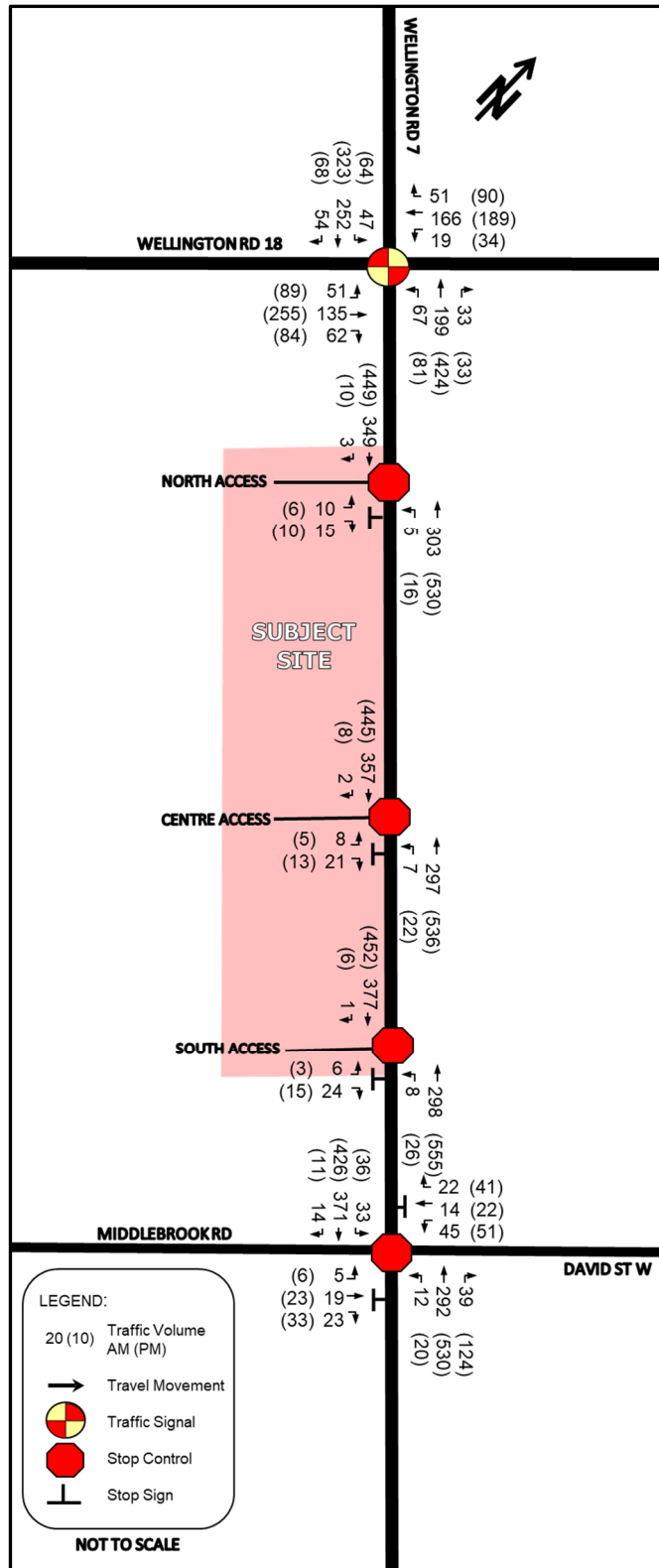


Figure 8 – Total (2032) Traffic Volumes



## 5 Intersection Operation with Proposed Community

### 5.1 Total (2027) Intersection Operation

The results of the LOS analysis under total (2027) traffic volumes during the AM and PM peak hour can be found below in **Table 8**. The intersection improvements recommended in Section 3.3 have been utilized for this scenario.

An analysis was completed for left turn movements at the unsignalized intersections in the study area, based on the criteria outlined in Appendix 9A of the MTO DS (results are provided in **Appendix F**). For the purposes of this report, in the left turn analysis, a design speed of 60 km/h (for a posted speed of 50 km/h) and 80 km/h (for a posted speed of 60 km/h) on Wellington Road 7 were reviewed to account for the planned increase in speed limit as noted in Section 2.2.

Based on the above noted criteria, a northbound left turn lane is marginally warranted on Wellington Road 7 at the North Access, Centre Access and South Access for the 80 km/h design speed. In order to maintain the travel capacity for northbound traffic on Wellington Road 7, the following improvements are recommended:

#### Wellington Road 7 / North Access

- Widen Wellington Road 7 to provide a northbound left turn lane with a 15 metre storage length, 15 metre parallel length and 65 metre taper length.

#### Wellington Road 7 / Centre Access

- Widen Wellington Road 7 to provide a northbound left turn lane with a 15 metre storage length, 50 metre parallel length and 80 metre taper length.

#### Wellington Road 7 / South Access

- Widen Wellington Road 7 to provide a northbound left turn lane with a 15 metre storage length, 50 metre parallel length and 80 metre taper length.

In order to maintain the travel capacity for southbound traffic on Wellington Road 7, the following improvements are also recommended:

#### Wellington Road 7 / South Street

- Widen Wellington Road 7 to provide a southbound left turn lane with a 15 metre storage, 15 metre parallel length and 65 metre taper length.

In order to mitigate the impact of construction on Wellington Road 7, it is recommended that the above-noted improvements are completed along with the planned northbound and southbound left turn lane improvements at the Wellington Road 7 / Middlebrook Road / David Street West intersection (noted in Section 3.3). It is recommended that all road improvements are completed prior to occupancy of the proposed development.

Detailed output of the Synchro analysis can be found in **Appendix E**.

**Table 8 – Total (2027) LOS**

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Model	Storage				Model	Storage
Wellington Road 7 / Wellington Road 18 (signalized)	0.38	14.3	B	-	-	0.60	18.4	B	-	-
EB	0.63	27.2	C	41	-	0.81	33.8	C	74	-
WB	0.55	24.2	C	38	-	0.52	22.0	C	48	-
NB	0.27	5.8	A	28	-	0.50	11.0	B	76	-
SB	0.29	5.9	A	32	-	0.42	10.0	A	60	-
Wellington Road 7 / Middlebrook Road / David Street West (unsignalized)	-	2.6	A	-	-	-	3.4	A	-	-
EB	0.09	13.7	B	3	-	0.16	17.8	C	5	-
WB	0.18	16.5	C	6	-	0.37	26.6	D	14	-
Wellington Road 7 / North Access (unsignalized)	-	0.6	A	-	-	-	0.4	A	-	-
EB	0.04	11.3	B	2	-	0.04	13.2	B	1	-
NBL	0.00	7.9	A	1	-	0.01	8.1	A	1	-
Wellington Road 7 / Centre Access (unsignalized)	-	0.7	A	-	-	-	0.5	A	-	-
EB	0.05	11.0	B	2	-	0.04	12.5	B	1	-
NBL	0.01	7.9	A	1	-	0.02	8.1	A	1	-
Wellington Road 7 / South Access (unsignalized)	-	0.7	A	-	-	-	0.5	A	-	-
EB	0.05	11.0	B	2	-	0.04	11.9	B	1	-
NBL	0.01	7.9	A	1	-	0.02	8.2	A	1	-

The results of the LOS analysis indicate that all study area intersections are operating within the typical design limits noted in Section 3.1.

The anticipated queue for northbound and westbound movements at the Wellington Road 7 / Wellington Road 18 intersection extends past existing driveways to the gas station at the southeast corner of the intersection; however, the anticipated queue for each movement will be experienced for a short period of time at the end of each phase and is anticipated to clear after each cycle.

There are no other issues with the anticipated queuing in the study area.

A review of the need for additional auxiliary right turn lanes at the study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, additional auxiliary right turn lanes are not recommended in the study area.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the study area intersections (results are provided in **Appendix G**).

No infrastructure improvements are required for the total (2027) scenario.

## 5.2 Total (2032) Intersection Operation

The results of the LOS analysis under total (2032) traffic volumes during the AM and PM peak hour can be found below in **Table 9**. The intersection improvements recommended in Section 3.3 and 5.1 have been utilized in this scenario. Detailed output of the Synchro analysis can be found in **Appendix E**.

**Table 9 – Total (2032) LOS**

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Model	Storage				Model	Storage
Wellington Road 7 / Wellington Road 18 (signalized)	0.48	16.2	B	-	-	0.76	21.1	C	-	-
EB	0.72	30.2	C	52	-	0.83	31.4	C	85	-
WB	0.60	24.7	C	47	-	0.53	18.6	B	52	-
NB	0.36	7.7	A	42	-	0.71	18.8	B	138	-
SB	0.39	7.9	A	48	-	0.61	15.8	B	97	-
Wellington Road 7 / Middlebrook Road / David Street West (unsignalized)	-	3.2	A	-	-	-	6.5	B	-	-
EB	0.13	16.0	C	4	-	0.25	23.9	C	8	-
WB	0.29	21.7	C	10	-	0.67	58.0	F	32	-
Wellington Road 7 / North Access (unsignalized)	-	0.5	A	-	-	-	0.4	A	-	-
EB	0.05	12.3	B	2	-	0.05	15.3	C	2	-
NBL	0.00	8.0	A	1	-	0.02	8.4	A	1	-
Wellington Road 7 / Centre Access (unsignalized)	-	0.6	A	-	-	-	0.4	A	-	-
EB	0.06	11.9	B	2	-	0.05	14.2	B	2	-
NBL	0.01	8.1	A	1	-	0.02	8.4	A	1	-
Wellington Road 7 / South Access (unsignalized)	-	0.6	A	-	-	-	0.4	A	-	-
EB	0.06	11.8	B	2	-	0.04	13.2	B	1	-
NBL	0.01	8.1	A	1	-	0.03	8.4	A	1	-

The results of the LOS analysis indicate that the delay for the westbound direction at the Wellington Road 7 / Middlebrook Road / David Street West intersection is operating marginally outside the typical design limits noted in Section 3.1; however, there are no issues regarding the anticipated queuing for westbound movements and the delay marginally exceeds the design limits. Consequently, no further improvements are recommended. As noted in Section 2.2, the County RMAP identified a future widening of Wellington Road 7. Although no improvements are recommended based on this analysis, it is recommended that the County continue to monitor this area as development occurs to confirm the traffic growth assumptions applied in this report.

The results of the LOS analysis indicate that all other intersections in the study area are operating within the typical design limits noted in Section 3.1.

The anticipated queue for northbound and westbound movements at the Wellington Road 7 / Wellington Road 18 intersection extends past existing driveways to the gas station at the southeast corner of the intersection; however, the anticipated queue for each movement will be experienced for a short period of time at the end of each phase and is anticipated to clear after each cycle.

There are no other issues with the anticipated queuing in the study area.

A review of the need for additional auxiliary right turn lanes at the study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, additional auxiliary right turn lanes are not recommended in the study area.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the study area intersections (results are provided in **Appendix G**).

No infrastructure improvements are required for the total (2032) scenario.

### 5.3 Site Access

The North Access, Centre Access and South Access will operate efficiently as full-movement accesses, with one-way stop control for eastbound movements. A single ingress and egress lane at the North Access, Centre Access and South Access will provide the necessary capacity to service the proposed community. As noted in Section 5.1, it is recommended Wellington Road 7 is widened to accommodate a northbound left turn lane at the North Access, Centre Access and South Access driveways.

The proposed spacing between the North Access and South Street (139 metres– measured edge of driveway to edge of road), Centre Access and South Street (62 metres– measured edge of driveway to edge of road) and the South Access and Middlebrook Road (273 metres– measured edge of driveway to edge of road) exceeds the minimum driveway spacing requirements identified in the Transportation Association of Canada *Design Guide for Canadian Roads* (2017) [TAC Guidelines], Figure 8.8.2 – 35 metres for an arterial road at an unsignalized intersection.

The proposed spacing between the Centre Access and South Access (207 metres – measured edge to edge of driveway) are greater than the minimum driveway spacing requirements as per the TAC Guidelines – Figure 8.9.2 (Driveway Spacing Guidelines – Locals and Collectors).

Based on the Synchro analysis, there are no issues regarding the anticipated queuing on Wellington Road 7 at the site access driveways, as noted in Section 5.2.

Where feasible, driveways and roadways on opposite sides of an arterial road should be aligned. In this case, based on the preferred internal layout of the subject site, the location of the Centre Access does not align with South Street. South Street is a local road that provides access to single-family detached residential units at the south end and the existing Elora Municipal Cemetery at the north end. Based on our review of the existing and future development potential along South Street and the existing road network, there will be negligible traffic interaction between the Centre Access and South Street. Consequently, the proposed configuration of the North Access, Centre Access and South Access will not cause any operational or traffic safety issues.

### 5.4 Pedestrian Connectivity Review

In order to provide high-quality pedestrian access for the proposed community, it is recommended a sidewalk is constructed on the west side of Wellington Road 7 from the North Access to Middlebrook Road / David Street West.

As noted in Section 5.3, signalization is not warranted at the Wellington Road 7 / Middlebrook Road / David Street West intersection and the vehicular and pedestrian volume at this intersection do not warrant pedestrian crossing infrastructure. In the existing condition, pedestrians are required to cross

Wellington Road 7 via the unmarked crosswalk at the Wellington Road 7 / Middlebrook Road / David Street West intersection.

A review for the warrant for a pedestrian crossing infrastructure was completed at the north leg of the Wellington Road 7 / Middlebrook Road / David Street West intersection, based on Ontario Traffic Manual Book 15 Pedestrian Crossing Facilities. The total (2032) traffic volumes were used in the pedestrian crossing warrant<sup>3</sup>. Based on the OTM Book 15 criteria, a pedestrian crossing is not warranted at the north leg of the Wellington Road 7 / Middlebrook Road / David Street West intersection (warrant provided in **Appendix H**).

Notwithstanding, based on our review of the pedestrian network, and the need for a high-quality pedestrian crossing for pedestrian connectivity, it is recommended the Client install a Level 2 Type C pedestrian crossing at the north leg of the Wellington Road 7 / Middlebrook Road / David Street West intersection.

## 5.5 Sight Distance Review

A review of the available sight distance for the proposed site access driveways was completed as part of this analysis. The minimum sight distance requirements for a 60 km/h posted speed limit on Wellington Road 7 was reviewed to identify potential issues associated with the increased speed limit proposed as noted in Section 2.2.

The sight distance north of the North Access, south of the Centre Access and north of the South Access are greater than 200 metres and meet the minimum sight distance requirements as identified in the County's Entrance Permit Policy (2022) – 135 metres and 165 metres for a 50 km/h and 60 km/h posted speed, respectively.

The sight distance south of the North Access is 175 metres<sup>4</sup>, north of the Centre Access is 185 metres<sup>2</sup> and south of the South Access is 167 metres<sup>5</sup> which all meet the minimum sight distance requirements as identified in the County's Entrance Permit Policy – 135 metres and 165 metres for a 50 km/h and 60 km/h posted speed, respectively.

## 5.6 Speed Management Review

As noted in Section 2.2, the RMAP recommended an increase in the posted speed limit (from 50km/h to 60km/h) on Wellington Road 7 between Sideroad 11 and First Line. In order to assess the impact of that recommended change in the posted speed limit, our analysis has included a review of the posted 50km/h scenario and the posted 60km/h scenario. It is acknowledged that an increase in the posted speed may be appropriate at the north and south end of the noted corridor; however, it is our recommendation to maintain the posted 50km/h speed limit within the study area included in our analysis (between Middlebrook Road / David Street West and Wellington Road 18).

It is acknowledged that the existing configuration of Wellington Road 7, in the study area, may warrant an increase in the posted speed limit; however, the following proposed changes to the study area will have a traffic calming effect:

- 1) The proposed community will add an urban edge to the west side of Wellington Road 7. The proposed community includes closely spaced street trees, sidewalk and the townhouse building face, all located within 15 metres of the edge of the existing road. The proposed

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<sup>3</sup> 8-hour and 4-hour pedestrian crossing warrants were reviewed.

<sup>4</sup> Limited by the vertical curve on Wellington Road 7.

<sup>5</sup> Limited by the vertical curve and slight horizontal curve on Wellington Road 7.



- community also includes building entrances and private walkways along the frontage of the subject site, which will activate the corridor.
- 2) The proposed community will include the reconstruction of the west side of Wellington Road 7 from a rural cross-section to an urban cross-section, along the frontage of the subject site and also south of the subject site to Middlebrook Road / David Street West.
  - 3) The proposed community will include the construction of the North Access, Centre Access and South Access on Wellington Road 7, which will demand additional driver attention.
  - 4) The construction of the proposed pedestrian crossing on Wellington Road 7, north of Middlebrook Road / David Street West (as outlined in Section 5.4), will demand additional driver attention and periodically stop traffic on Wellington Road 7.

The existing Elora Lions Park and Elora & District Community Centre at the southwest and southeast corner of the Wellington Road 7 / Middlebrook Road / David Street West intersection, also supports the need to control the speed of traffic in the study area. The Township could facilitate this by permitting the Client to provide enhanced street tree plantings on both sides of the road through this area and extending the existing sidewalk from the bridge over the Grand River to Middlebrook Road. This missing pedestrian link would activate the boulevard of Wellington Road 7, which would have a traffic calming effect and also provide additional pedestrian access to the Elora Gorge Trail, facilitated by the proposed pedestrian crossing of Wellington Road 7 at Middlebrook Road / David Street West.

South of Wellington Road 18, the existing residential development on both sides of Wellington Road 7 will have a traffic calming effect and the existing 50km/h posted speed limit is appropriate for this section.

There is a section of Wellington Road 7, just north of the subject site and south of the above-noted existing residential area, where the existing vertical / horizontal road profile and the roadside characteristics are consistent with higher-speed roads (the section is approximately 250 metres in length). In order to influence driver behavior through this short section, it is recommended that a 15-metre-long, 1.5 – 2.5-metre-wide raised median is installed. It is recommended that the raised median include hardy landscaping (trees or shrubs), which would require minimal maintenance, but would provide a visual cue that will link the two adjacent low-speed sections on Wellington Road 7. The exact configuration and location will be confirmed through detailed design; however, based on our preliminary assessment, there is sufficient space to install the raised median without impacting existing driveways in the area.

## 5.7 Parking Review

The parking supply for the proposed community meets the minimum parking requirements specified in the Township’s Zoning By-law 2009-045 [ZBL]. Each townhouse unit is proposed with two tandem parking spaces (surface driveway parking plus garage parking). The proposed parking breakdown for the proposed community is provided in **Table 12**.

**Table 10 - Zoning By-law Parking Requirements**

Category	Zoning By-Law Section	Parking Standard	Size	Parking (Spaces)	
				Required	Provided
Residential (Cluster Townhouse)	5.5.1	Resident: 1 space per unit plus 0.5 spaces per unit for the first 20 units and 0.25 spaces per unit for each additional unit Visitor Parking: 50% of additional parking	273 units	310 resident spaces <u>37 visitor spaces</u> 347 spaces total	546 resident spaces <u>56 visitor spaces</u> 602 spaces total
Barrier-Free Parking	6.4.3	15 spaces for required parking between 301 – 400 spaces	-	15 spaces	15 spaces

Although tandem parking spaces are not defined in the ZBL, the tandem parking spaces are provided in addition to the minimum visitor parking supply and supplement the minimum provision of one parking space per unit for residential parking, as identified in the zoning by-law. Consequently, the proposed tandem parking is acceptable for the proposed application and the overall parking supply is sufficient for the intended use.

## 6 Summary

**Elora 7 OP Inc.** retained **JD Engineering** to prepare this traffic impact study in support of the proposed community on a site municipally known as 350 Wellington Road 7, located on the south side of Wellington Road 7, midblock between David Street West and Wellington Road 18 in the Township of Centre Wellington County of Wellington. The proposed Site Plan is shown in **Appendix A**. This chapter summarizes the conclusions and recommendations from the study.

The proposed community is anticipated to consist of 273 townhouse units.

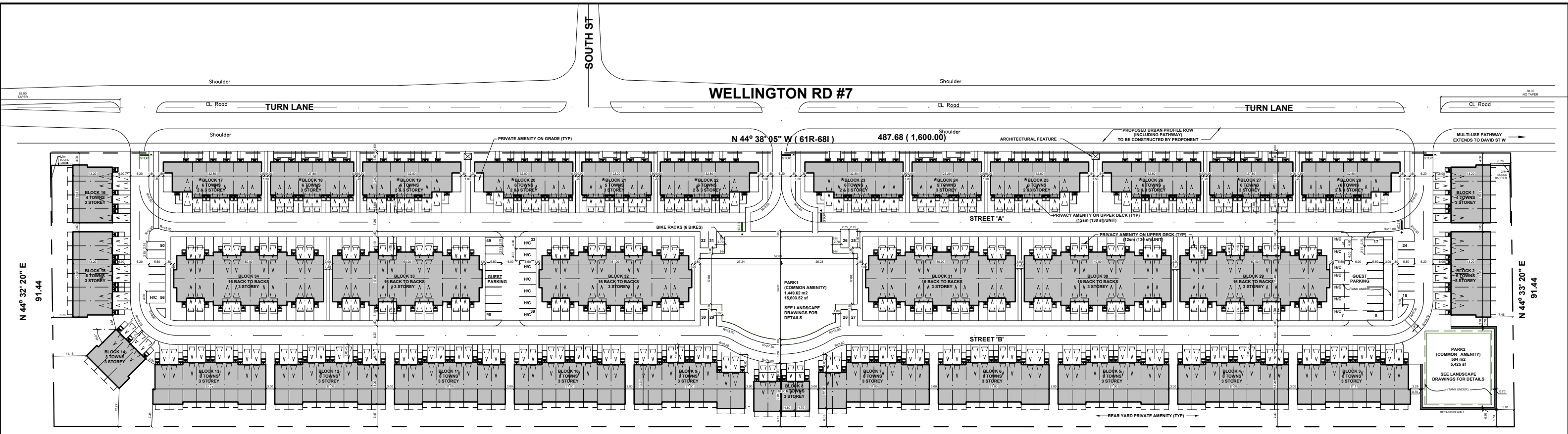
1. The proposed community is expected to generate a 110 AM and 140 PM peak hour trips.
2. Detailed intersection counts were conducted at the study intersection on Thursday August 4<sup>th</sup>, 2022.
3. An intersection operation analysis was completed at the study area intersections, using the existing (2022) and background (2027 & 2032) traffic volumes. This enabled a review of existing and future traffic deficiencies that would be present without the influence of the proposed community. The following improvements are recommended to coincide with the increase in posted speed limit to 60 km/h on Wellington Road 7:

### **Background (2027) Traffic Volumes**

- **Wellington Road 7 / Middlebrook Road / David Street West**
  - Widen Wellington Road 7 to provide a northbound left turn lane with a 15 metre storage length, 50 metre parallel length and 65 metre taper length.
  - Widen Wellington Road 7 to provide a southbound left turn lane with a 25 metre storage length, 50 metre parallel length and 80 metre taper length.
- 4. An estimate of the amount of traffic that would be generated by the Subject Site was prepared and assigned to the study area street and intersections.
- 5. An intersection operation analysis was completed under total (2027 & 2032) traffic volumes with the proposed community operational at the study area intersections. The following improvements are recommended prior to occupancy of the proposed development:
  - **Wellington Road 7 / North Access**
    - Widen Wellington Road 7 to provide a northbound left turn lane with a 15 metre storage length, 15 metre parallel length and 65 metre taper length.
  - **Wellington Road 7 / Centre Access**
    - Widen Wellington Road 7 to provide a northbound left turn lane with a 15 metre storage length, 50 metre parallel length and 80 metre taper length.
  - **Wellington Road 7 / South Access**
    - Widen road to accommodate a northbound left turn lane with a 15 metre storage length, 50 metre parallel length and 80 metre taper length.
  - **Wellington Road 7 / South Street**
    - Widen road to accommodate a southbound left turn lane with a 15 metre storage length, 15 metre parallel length and 65 metre taper length.

- **Wellington Road 7 / Middlebrook Road / David Street West**
    - Advance northbound and southbound left turn lane construction to coincide with above-noted road improvements.
6. The proposed North Access, Centre Access and South Access will operate efficiently as full-movement accesses, with one-way stop control for eastbound movements. A single ingress and egress lane at the North Access, Centre Access and South Access will provide the necessary capacity to service the proposed community.
  7. It is recommended the Client install a Level 2 Type C pedestrian crossing at the north leg of the Wellington Road 7 / Middlebrook Road / David Street West intersection.
  8. It is recommended the County maintain the posted 50km/h speed limit within the study area (between Middlebrook Road / David Street West and Wellington Road 18). The following traffic calming measures are recommended to support the posted 50km/h speed limit:
    - Construct a raised median island on Wellington Road 7, north of the subject site to provide a visual cue that will link the two adjacent low-speed sections on Wellington Road 7 (to be completed by the Client);
    - Provide enhanced street tree plantings on both sides of Wellington Road 7, between Middlebrook Road / David Street West and the bridge over the Grand River (to be completed by the Client); and
    - Extend the existing sidewalk from the bridge over the Grand River to Middlebrook Road, to activate the boulevard of Wellington Road 7 and also provide additional pedestrian access to the Elora Gorge Trail (to be completed by the Township).
  9. The proposed parking supply meets the minimum requirements in the Township's Zoning By-law 2009-045.
  10. In summary the proposed community will not cause any operational issues and will not add significant delay or congestion to the local roadway network.

## Appendix A – Site Plan



**Version 3.4**  
**Concept Site Plan**  
**350 Wellington Rd #7 Elora ON.**

Client: ELORA 7 OP INC.  
 Date: 04/03/23  
 Project number: 3287      Scale: 1 : 1250

PROPOSED HIGHWAY COMMERCIAL ZONE (C2)			
CATEGORY	ZONING REGULATION	PROPOSED	COMPLIANCE
MINIMUM LOT AREA	700.0 m <sup>2</sup> (7,535 ft <sup>2</sup> )	44,588.50m <sup>2</sup> (11.02Ac)	YES
MINIMUM LOT FRONTAGE	20 m (65.6 ft)	487.68m (1,600 ft)	YES
MINIMUM FRONT YARD	3 m (9.8 ft) FOR A BUILDING CONTAINING DWELLING UNITS ADJACENT TO THE STREET LINE, THE BUILDING FACE SHALL BE STEEPED BACK 2m FOR EACH STOREY ABOVE THE THIRD STOREY	3.0m (9.8 ft) 3 STOREY	YES
MINIMUM LANDSCAPE BUFFER ABUTTING STREET LINE	3 m (9.8 ft)	3.0m WITH EXCEPTION OF WALKWAYS TO LIVE / WORK UNITS	YES
RESIDENTIAL USES ON GROUND FLOOR	NOT PERMITTED WITHIN 9m OF A STREET LINE. SHALL NOT OCCUPY MORE THAN 50% OF TOTAL GROUND FLOOR AREA OF A BUILDING WITHIN 30m OF A STREET LINE.	LIVE / WORK UNITS FRONTING ONTO WELLINGTON ROAD 7 CONTAIN LIVING AREA, WORKSPACE, WASHROOM AND GARAGE USES. TOWNHOUSE UNITS FLANKING WELLINGTON ROAD 7 (4.0m)	NO
MINIMUM REAR YARD	7.5m (24.6 ft)	5.11 m (16.8 ft)	NO
MINIMUM SIDE YARD	3 m (9.8 ft)	6.76 m (22.1 ft)	YES
MINIMUM LANDSCAPED AREA	20%	28% (12,547.53 m <sup>2</sup> ) INCLUDES 1,953.62m <sup>2</sup> OF COMMON PARK AREA (PARK 1+2)	YES
MAXIMUM BUILDING HEIGHT	18 m BUT NO GREATER THAN 5 STOREY FOR A BUILDING CONTAINING DWELLING UNITS.	3 STOREYS 10.9 m	YES
MINIMUM BUILDING HEIGHT	7.5 m AND 2 STOREYS	7.5 m AND 2 STOREYS	YES
BUFFER STRIP	A BUFFER STRIP IS REQUIRED ALONG ANY INTERIOR SIDE LOT LINE AND REAR LOT LINE WHICH ABUTS LAND ZONED FOR RESIDENTIAL OR INSTRUCTIONAL PURPOSES. (N/A)	OK	N/A
PARKING	CLUSTER TOWNHOUSE USE 1.0 / UNIT PLUS 0.5 / UNIT FOR FIRST 20 UNITS AND 0.25 / UNIT FOR EACH ADDITIONAL UNIT. 50% OF ADDITIONAL PARKING TO BE EXCLUSIVE VISITOR PARKING	GARAGE 273 DRIVEWAY 273 VISITORS 56	NO - FOR TOWNHOUSES YES - FOR VISITORS
BARRIER FREE PARKING	PARKING SPACES REQUIRED 301 - 400 B / F SPACES . 15	15 SPACES (25% OF VISITOR SPACES)	YES
GROSS FLOOR AREA	N/A	41,520 m <sup>2</sup> ± 446,928 sf ±	N/A
COVERAGE	N/A	17,791.96 m <sup>2</sup> ± 191,510.90 sf ±      40%±	N/A
DENSITY	N/A	61.2 UPH 24.8 UPA	N/A

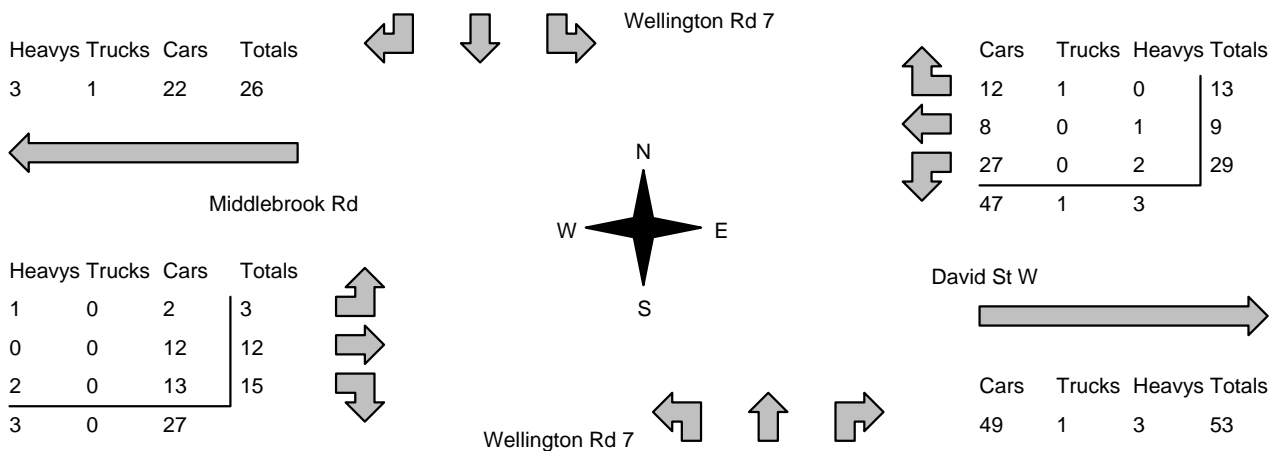
Unit Count	
15' CONVENTIONAL	107 (172.1m <sup>2</sup> AVERAGE)
15' LIVE / WORK CONVENTIONAL	62 (146.0m <sup>2</sup> AVERAGE)
22' LIVE / WORK CONVENTIONAL	8 (146.0m <sup>2</sup> AVERAGE)
20' BACK TO BACKS	96 (134.8m <sup>2</sup> AVERAGE)
<b>TOTAL</b>	<b>273 (152.3m<sup>2</sup> AVERAGE OVERALL)</b>

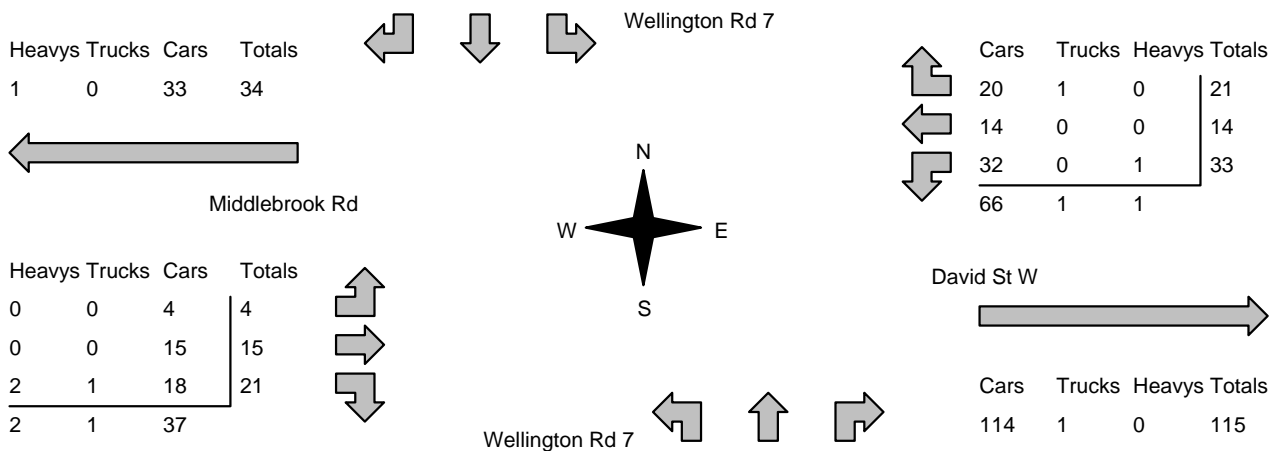
Note:  
 \*Asterik indicates a block of live/work units.

WE MERCHANDISE SPACE INC.  
 FORREST GROUP INC.

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## Appendix B – Traffic Count Data

<b>Morning Peak Diagram</b>		<b>Specified Period</b> <b>From:</b> 7:00:00 <b>To:</b> 9:00:00	<b>One Hour Peak</b> <b>From:</b> 8:00:00 <b>To:</b> 9:00:00																												
<b>Municipality:</b> Centre Wellington <b>Site #:</b> 2214500001 <b>Intersection:</b> Wellington Rd 7 & Middlebrook Rd <b>TFR File #:</b> 1 <b>Count date:</b> 4-Aug-22		<b>Weather conditions:</b>  <b>Person counted:</b> <b>Person prepared:</b> <b>Person checked:</b>																													
<b>** Non-Signalized Intersection **</b>		<b>Major Road:</b> Wellington Rd 7 runs N/S																													
North Leg Total: 423 North Entering: 230 North Peds: 0 Peds Cross: ☒	<table style="width:100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>0</td><td>26</td><td>0</td><td>26</td></tr> <tr><td>Trucks</td><td>1</td><td>1</td><td>0</td><td>2</td></tr> <tr><td>Cars</td><td>8</td><td>178</td><td>16</td><td>202</td></tr> <tr><td>Totals</td><td>9</td><td>205</td><td>16</td><td></td></tr> </table>	Heavys	0	26	0	26	Trucks	1	1	0	2	Cars	8	178	16	202	Totals	9	205	16		<table style="width:100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>22</td></tr> <tr><td>Trucks</td><td>12</td></tr> <tr><td>Cars</td><td>159</td></tr> <tr><td>Totals</td><td>193</td></tr> </table>	Heavys	22	Trucks	12	Cars	159	Totals	193	East Leg Total: 104 East Entering: 51 East Peds: 0 Peds Cross: ☒
Heavys	0	26	0	26																											
Trucks	1	1	0	2																											
Cars	8	178	16	202																											
Totals	9	205	16																												
Heavys	22																														
Trucks	12																														
Cars	159																														
Totals	193																														
 <p style="text-align: center;">Wellington Rd 7</p> <p style="text-align: center;">Middlebrook Rd</p> <p style="text-align: center;">David St W</p> <p style="text-align: center;">Wellington Rd 7</p>																															
Peds Cross: ☒ West Peds: 0 West Entering: 30 West Leg Total: 56	<table style="width:100%; border-collapse: collapse;"> <tr><td>Cars</td><td>218</td></tr> <tr><td>Trucks</td><td>1</td></tr> <tr><td>Heavys</td><td>30</td></tr> <tr><td>Totals</td><td>249</td></tr> </table>	Cars	218	Trucks	1	Heavys	30	Totals	249	<table style="width:100%; border-collapse: collapse;"> <tr><td>Cars</td><td>6</td><td>145</td><td>21</td><td>172</td></tr> <tr><td>Trucks</td><td>0</td><td>11</td><td>1</td><td>12</td></tr> <tr><td>Heavys</td><td>2</td><td>21</td><td>3</td><td>26</td></tr> <tr><td>Totals</td><td>8</td><td>177</td><td>25</td><td></td></tr> </table>	Cars	6	145	21	172	Trucks	0	11	1	12	Heavys	2	21	3	26	Totals	8	177	25		Peds Cross: ☒ South Peds: 0 South Entering: 210 South Leg Total: 459
Cars	218																														
Trucks	1																														
Heavys	30																														
Totals	249																														
Cars	6	145	21	172																											
Trucks	0	11	1	12																											
Heavys	2	21	3	26																											
Totals	8	177	25																												
<b>Comments</b>																															

<b>Afternoon Peak Diagram</b>		<b>Specified Period</b> <b>From:</b> 16:00:00 <b>To:</b> 19:00:00	<b>One Hour Peak</b> <b>From:</b> 16:00:00 <b>To:</b> 17:00:00																												
<b>Municipality:</b> Centre Wellington <b>Site #:</b> 2214500001 <b>Intersection:</b> Wellington Rd 7 & Middlebrook Rd <b>TFR File #:</b> 1 <b>Count date:</b> 4-Aug-22		<b>Weather conditions:</b>  <b>Person counted:</b> <b>Person prepared:</b> <b>Person checked:</b>																													
<b>** Non-Signalized Intersection **</b>		<b>Major Road:</b> Wellington Rd 7 runs N/S																													
North Leg Total: 610 North Entering: 280 North Peds: 0 Peds Cross: ☒	<table style="width:100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>0</td><td>8</td><td>0</td><td style="border-left: 1px solid black;">8</td></tr> <tr><td>Trucks</td><td>0</td><td>7</td><td>0</td><td style="border-left: 1px solid black;">7</td></tr> <tr><td>Cars</td><td>7</td><td>238</td><td>20</td><td style="border-left: 1px solid black; border-bottom: 1px solid black;">265</td></tr> <tr><td>Totals</td><td>7</td><td>253</td><td>20</td><td style="border-left: 1px solid black;"></td></tr> </table>	Heavys	0	8	0	8	Trucks	0	7	0	7	Cars	7	238	20	265	Totals	7	253	20		<table style="width:100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>14</td></tr> <tr><td>Trucks</td><td>3</td></tr> <tr><td>Cars</td><td style="border-bottom: 1px solid black;">313</td></tr> <tr><td>Totals</td><td>330</td></tr> </table>	Heavys	14	Trucks	3	Cars	313	Totals	330	East Leg Total: 183 East Entering: 68 East Peds: 0 Peds Cross: ☒
Heavys	0	8	0	8																											
Trucks	0	7	0	7																											
Cars	7	238	20	265																											
Totals	7	253	20																												
Heavys	14																														
Trucks	3																														
Cars	313																														
Totals	330																														
																															
<table style="width:100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>Trucks</td><td>Cars</td><td style="border-left: 1px solid black;">Totals</td></tr> <tr><td>1</td><td>0</td><td>33</td><td style="border-left: 1px solid black;">34</td></tr> </table>	Heavys	Trucks	Cars	Totals	1	0	33	34		<table style="width:100%; border-collapse: collapse;"> <tr><td>Cars</td><td>Trucks</td><td>Heavys</td><td style="border-left: 1px solid black;">Totals</td></tr> <tr><td>20</td><td>1</td><td>0</td><td style="border-left: 1px solid black;">21</td></tr> <tr><td>14</td><td>0</td><td>0</td><td style="border-left: 1px solid black;">14</td></tr> <tr><td>32</td><td>0</td><td>1</td><td style="border-left: 1px solid black; border-bottom: 1px solid black;">33</td></tr> <tr><td>66</td><td>1</td><td>1</td><td style="border-left: 1px solid black;"></td></tr> </table>	Cars	Trucks	Heavys	Totals	20	1	0	21	14	0	0	14	32	0	1	33	66	1	1		
Heavys	Trucks	Cars	Totals																												
1	0	33	34																												
Cars	Trucks	Heavys	Totals																												
20	1	0	21																												
14	0	0	14																												
32	0	1	33																												
66	1	1																													
<table style="width:100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>Trucks</td><td>Cars</td><td style="border-left: 1px solid black;">Totals</td></tr> <tr><td>0</td><td>0</td><td>4</td><td style="border-left: 1px solid black;">4</td></tr> <tr><td>0</td><td>0</td><td>15</td><td style="border-left: 1px solid black;">15</td></tr> <tr><td>2</td><td>1</td><td>18</td><td style="border-left: 1px solid black; border-bottom: 1px solid black;">21</td></tr> <tr><td>2</td><td>1</td><td>37</td><td style="border-left: 1px solid black;"></td></tr> </table>	Heavys	Trucks	Cars	Totals	0	0	4	4	0	0	15	15	2	1	18	21	2	1	37				<table style="width:100%; border-collapse: collapse;"> <tr><td>Cars</td><td>Trucks</td><td>Heavys</td><td style="border-left: 1px solid black;">Totals</td></tr> <tr><td>114</td><td>1</td><td>0</td><td style="border-left: 1px solid black;">115</td></tr> </table>	Cars	Trucks	Heavys	Totals	114	1	0	115
Heavys	Trucks	Cars	Totals																												
0	0	4	4																												
0	0	15	15																												
2	1	18	21																												
2	1	37																													
Cars	Trucks	Heavys	Totals																												
114	1	0	115																												
Peds Cross: ☒ West Peds: 0 West Entering: 40 West Leg Total: 74	<table style="width:100%; border-collapse: collapse;"> <tr><td>Cars</td><td>288</td></tr> <tr><td>Trucks</td><td>8</td></tr> <tr><td>Heavys</td><td style="border-bottom: 1px solid black;">11</td></tr> <tr><td>Totals</td><td>307</td></tr> </table>	Cars	288	Trucks	8	Heavys	11	Totals	307	<table style="width:100%; border-collapse: collapse;"> <tr><td>Cars</td><td>12</td><td>289</td><td>79</td><td style="border-left: 1px solid black;">380</td></tr> <tr><td>Trucks</td><td>0</td><td>2</td><td>1</td><td style="border-left: 1px solid black;">3</td></tr> <tr><td>Heavys</td><td>1</td><td>14</td><td>0</td><td style="border-left: 1px solid black; border-bottom: 1px solid black;">15</td></tr> <tr><td>Totals</td><td>13</td><td>305</td><td>80</td><td style="border-left: 1px solid black;"></td></tr> </table>	Cars	12	289	79	380	Trucks	0	2	1	3	Heavys	1	14	0	15	Totals	13	305	80		Peds Cross: ☒ South Peds: 0 South Entering: 398 South Leg Total: 705
Cars	288																														
Trucks	8																														
Heavys	11																														
Totals	307																														
Cars	12	289	79	380																											
Trucks	0	2	1	3																											
Heavys	1	14	0	15																											
Totals	13	305	80																												
<b>Comments</b>																															



# Total Count Diagram

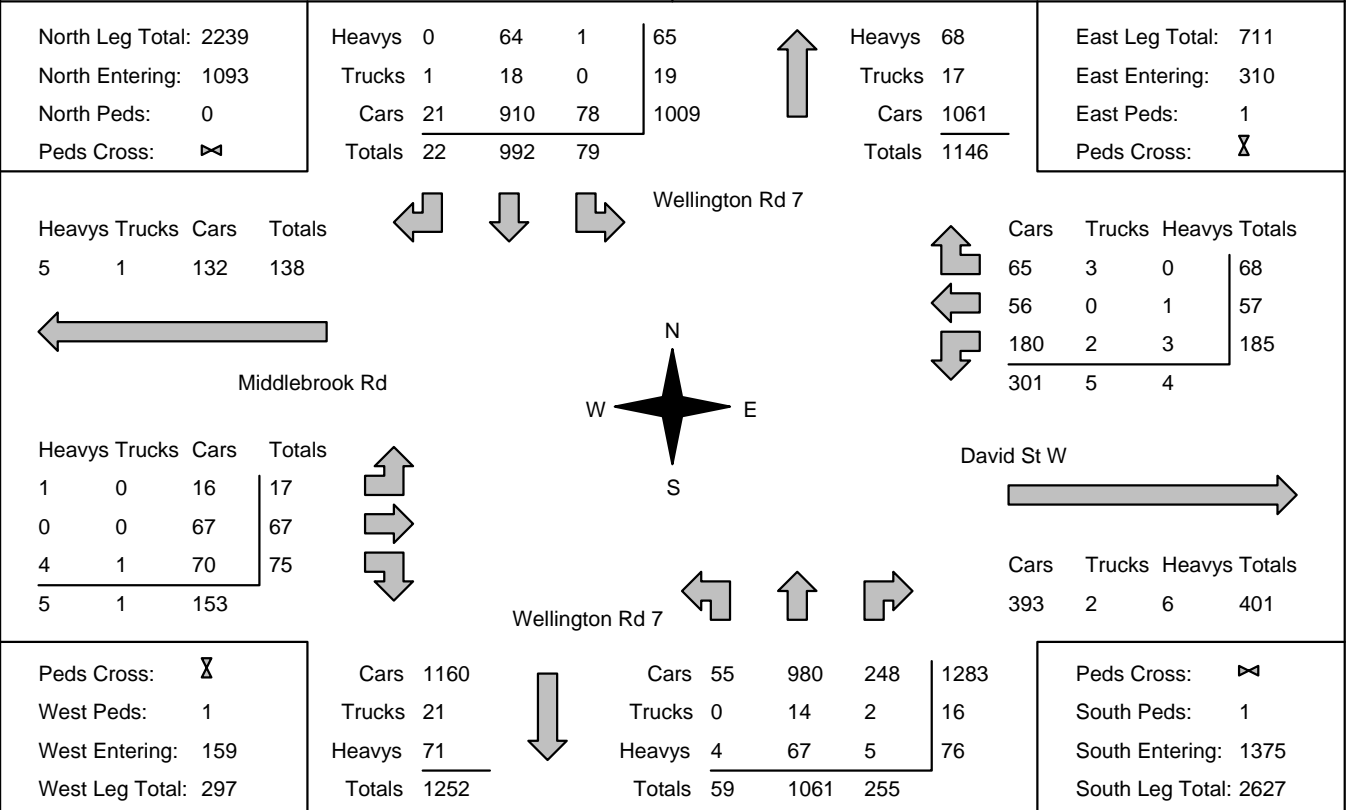
**Municipality:** Centre Wellington  
**Site #:** 2214500001  
**Intersection:** Wellington Rd 7 & Middlebrook Rd  
**TFR File #:** 1  
**Count date:** 4-Aug-22

**Weather conditions:**

**Person counted:**  
**Person prepared:**  
**Person checked:**

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Wellington Rd 7 runs N/S



## Comments

# Traffic Count Summary

Intersection: Wellington Rd 7 & Middlebrook Rd    Count Date: 4-Aug-22    Municipality: Centre Wellington

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	9	177	2	188	0	337	8:00:00	10	117	22	149	0
9:00:00	16	205	9	230	0	440	9:00:00	8	177	25	210	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	20	253	7	280	0	678	17:00:00	13	305	80	398	0
18:00:00	16	190	2	208	0	563	18:00:00	17	262	76	355	1
19:00:00	18	167	2	187	0	450	19:00:00	11	200	52	263	0
<b>Totals:</b>	79	992	22	1093	0	2468	<b>S Totals:</b>	59	1061	255	1375	1
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	56	14	3	73	0	93	8:00:00	3	6	11	20	1
9:00:00	29	9	13	51	0	81	9:00:00	3	12	15	30	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	33	14	21	68	0	108	17:00:00	4	15	21	40	0
18:00:00	40	12	18	70	1	109	18:00:00	4	17	18	39	0
19:00:00	27	8	13	48	0	78	19:00:00	3	17	10	30	0
<b>Totals:</b>	185	57	68	310	1	469	<b>W Totals:</b>	17	67	75	159	1
<b>Calculated Values for Traffic Crossing Major Street</b>												
Hours Ending:	7:00	8:00	9:00	16:00			17:00	18:00	19:00	0:00		
Crossing Values:	0	73	44	0			52	62	47	0		



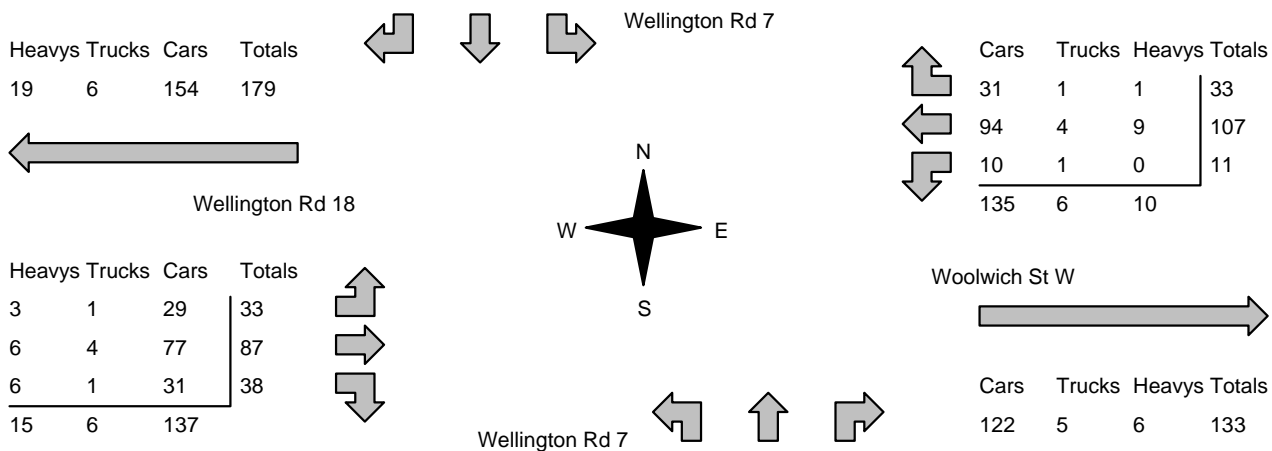
Count Date: 4-Aug-22 Site #: 2214500001

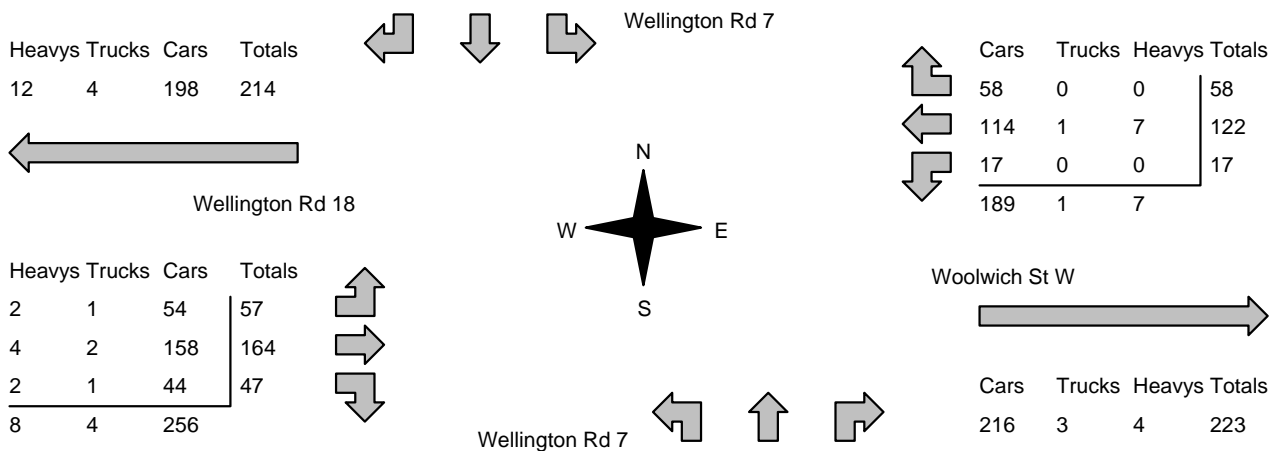
Interval Time	Passenger Cars - North Approach						Trucks - North Approach						Heavys - North Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		North Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	1	1	35	35	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0
7:30:00	2	1	85	50	0	0	0	0	0	0	0	0	1	1	7	4	0	0	0	0
7:45:00	3	1	127	42	1	1	0	0	0	0	0	0	1	0	11	4	0	0	0	0
8:00:00	8	5	163	36	2	1	0	0	0	0	0	0	1	0	14	3	0	0	0	0
8:15:00	12	4	202	39	3	1	0	0	0	0	0	0	1	0	22	8	0	0	0	0
8:30:00	17	5	249	47	3	0	0	0	1	1	0	0	1	0	32	10	0	0	0	0
8:45:00	20	3	294	45	10	7	0	0	1	0	1	1	1	0	36	4	0	0	0	0
9:00:00	24	4	341	47	10	0	0	0	1	0	1	0	1	0	40	4	0	0	0	0
9:15:00	24	0	341	0	10	0	0	0	1	0	1	0	1	0	40	0	0	0	0	0
16:00:00	24	0	341	0	10	0	0	0	1	0	1	0	1	0	40	0	0	0	0	0
16:15:00	30	6	406	65	12	2	0	0	4	3	1	0	1	0	41	1	0	0	0	0
16:30:00	35	5	461	55	14	2	0	0	6	2	1	0	1	0	43	2	0	0	0	0
16:45:00	37	2	519	58	14	0	0	0	7	1	1	0	1	0	48	5	0	0	0	0
17:00:00	44	7	579	60	17	3	0	0	8	1	1	0	1	0	48	0	0	0	0	0
17:15:00	45	1	631	52	18	1	0	0	9	1	1	0	1	0	50	2	0	0	0	0
17:30:00	50	5	669	38	18	0	0	0	12	3	1	0	1	0	53	3	0	0	0	0
17:45:00	56	6	709	40	18	0	0	0	14	2	1	0	1	0	54	1	0	0	0	0
18:00:00	60	4	754	45	19	1	0	0	15	1	1	0	1	0	56	2	0	0	0	0
18:15:00	63	3	801	47	19	0	0	0	16	1	1	0	1	0	59	3	0	0	0	0
18:30:00	67	4	837	36	20	1	0	0	17	1	1	0	1	0	62	3	0	0	0	0
18:45:00	72	5	870	33	21	1	0	0	17	0	1	0	1	0	62	0	0	0	0	0
19:00:00	78	6	910	40	21	0	0	0	18	1	1	0	1	0	64	2	0	0	0	0
19:15:00	78	0	910	0	21	0	0	0	18	0	1	0	1	0	64	0	0	0	0	0
19:15:15	78	0	910	0	21	0	0	0	18	0	1	0	1	0	64	0	0	0	0	0







<b>Morning Peak Diagram</b>		<b>Specified Period</b> <b>From:</b> 7:00:00 <b>To:</b> 9:00:00	<b>One Hour Peak</b> <b>From:</b> 7:45:00 <b>To:</b> 8:45:00																																								
<b>Municipality:</b> Centre Wellington <b>Site #:</b> 2214500002 <b>Intersection:</b> Wellington Rd 7 & Wellington Rd 1 <b>TFR File #:</b> 1 <b>Count date:</b> 4-Aug-22		<b>Weather conditions:</b>  <b>Person counted:</b> <b>Person prepared:</b> <b>Person checked:</b>																																									
<b>** Signalized Intersection **</b>		<b>Major Road:</b> Wellington Rd 7 runs N/S																																									
North Leg Total: 417 North Entering: 226 North Peds: 0 Peds Cross: ☒	<table style="width:100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>5</td><td>20</td><td>0</td><td style="border-left: 1px solid black;">25</td></tr> <tr><td>Trucks</td><td>0</td><td>3</td><td>0</td><td style="border-left: 1px solid black;">3</td></tr> <tr><td>Cars</td><td>30</td><td>138</td><td>30</td><td style="border-left: 1px solid black;">198</td></tr> <tr><td>Totals</td><td>35</td><td>161</td><td>30</td><td style="border-left: 1px solid black;"></td></tr> </table>	Heavys	5	20	0	25	Trucks	0	3	0	3	Cars	30	138	30	198	Totals	35	161	30		<table style="width:100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>17</td></tr> <tr><td>Trucks</td><td>7</td></tr> <tr><td>Cars</td><td>167</td></tr> <tr><td>Totals</td><td>191</td></tr> </table>	Heavys	17	Trucks	7	Cars	167	Totals	191	East Leg Total: 284 East Entering: 151 East Peds: 0 Peds Cross: ☒												
Heavys	5	20	0	25																																							
Trucks	0	3	0	3																																							
Cars	30	138	30	198																																							
Totals	35	161	30																																								
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Cars	167																																										
Totals	191																																										
																																											
Heavys Trucks Cars Totals 19 6 154 179	<table style="width:100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>3</td><td>1</td><td>29</td><td style="border-left: 1px solid black;">33</td></tr> <tr><td>Trucks</td><td>6</td><td>4</td><td>77</td><td style="border-left: 1px solid black;">87</td></tr> <tr><td>Cars</td><td>6</td><td>1</td><td>31</td><td style="border-left: 1px solid black;">38</td></tr> <tr><td>Totals</td><td>15</td><td>6</td><td>137</td><td style="border-left: 1px solid black;"></td></tr> </table>	Heavys	3	1	29	33	Trucks	6	4	77	87	Cars	6	1	31	38	Totals	15	6	137		<table style="width:100%; border-collapse: collapse;"> <tr><td>Cars</td><td>31</td><td>1</td><td>1</td><td style="border-left: 1px solid black;">33</td></tr> <tr><td>Trucks</td><td>94</td><td>4</td><td>9</td><td style="border-left: 1px solid black;">107</td></tr> <tr><td>Heavys</td><td>10</td><td>1</td><td>0</td><td style="border-left: 1px solid black;">11</td></tr> <tr><td>Totals</td><td>135</td><td>6</td><td>10</td><td style="border-left: 1px solid black;"></td></tr> </table>	Cars	31	1	1	33	Trucks	94	4	9	107	Heavys	10	1	0	11	Totals	135	6	10		Woolwich St W Cars Trucks Heavys Totals 122 5 6 133
Heavys	3	1	29	33																																							
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Totals	135	6	10																																								
Peds Cross: ☒ West Peds: 0 West Entering: 158 West Leg Total: 337	<table style="width:100%; border-collapse: collapse;"> <tr><td>Cars</td><td>179</td></tr> <tr><td>Trucks</td><td>5</td></tr> <tr><td>Heavys</td><td>26</td></tr> <tr><td>Totals</td><td>210</td></tr> </table>	Cars	179	Trucks	5	Heavys	26	Totals	210	<table style="width:100%; border-collapse: collapse;"> <tr><td>Cars</td><td>30</td><td>107</td><td>15</td><td style="border-left: 1px solid black;">152</td></tr> <tr><td>Trucks</td><td>2</td><td>5</td><td>1</td><td style="border-left: 1px solid black;">8</td></tr> <tr><td>Heavys</td><td>5</td><td>13</td><td>0</td><td style="border-left: 1px solid black;">18</td></tr> <tr><td>Totals</td><td>37</td><td>125</td><td>16</td><td style="border-left: 1px solid black;"></td></tr> </table>	Cars	30	107	15	152	Trucks	2	5	1	8	Heavys	5	13	0	18	Totals	37	125	16		Peds Cross: ☒ South Peds: 0 South Entering: 178 South Leg Total: 388												
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<b>Comments</b>																																											

<b>Afternoon Peak Diagram</b>		<b>Specified Period</b> <b>From:</b> 16:00:00 <b>To:</b> 19:00:00	<b>One Hour Peak</b> <b>From:</b> 16:00:00 <b>To:</b> 17:00:00																																																								
<b>Municipality:</b> Centre Wellington <b>Site #:</b> 2214500002 <b>Intersection:</b> Wellington Rd 7 & Wellington Rd 1 <b>TFR File #:</b> 1 <b>Count date:</b> 4-Aug-22		<b>Weather conditions:</b>  <b>Person counted:</b> <b>Person prepared:</b> <b>Person checked:</b>																																																									
<b>** Signalized Intersection **</b>		<b>Major Road:</b> Wellington Rd 7 runs N/S																																																									
North Leg Total: 676 North Entering: 290 North Peds: 0 Peds Cross: $\nabla$	<table style="border-collapse: collapse;"> <tr><td>Heavys</td><td>1</td><td>10</td><td>0</td><td style="border-left: 1px solid black;">11</td></tr> <tr><td>Trucks</td><td>2</td><td>4</td><td>1</td><td style="border-left: 1px solid black;">7</td></tr> <tr><td>Cars</td><td>41</td><td>191</td><td>40</td><td style="border-left: 1px solid black; border-bottom: 1px solid black;">272</td></tr> <tr><td>Totals</td><td>44</td><td>205</td><td>41</td><td style="border-left: 1px solid black;"></td></tr> </table>	Heavys	1	10	0	11	Trucks	2	4	1	7	Cars	41	191	40	272	Totals	44	205	41		<table style="border-collapse: collapse;"> <tr><td>Heavys</td><td>13</td></tr> <tr><td>Trucks</td><td>7</td></tr> <tr><td>Cars</td><td style="border-bottom: 1px solid black;">366</td></tr> <tr><td>Totals</td><td>386</td></tr> </table>	Heavys	13	Trucks	7	Cars	366	Totals	386	East Leg Total: 420 East Entering: 197 East Peds: 0 Peds Cross: $\nabla$																												
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Heavys	Trucks	Cars	Totals																																																								
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216	3	4	223																																																								
Peds Cross: $\nabla$ West Peds: 0 West Entering: 268 West Leg Total: 482	<table style="border-collapse: collapse;"> <tr><td>Cars</td><td>252</td></tr> <tr><td>Trucks</td><td>5</td></tr> <tr><td>Heavys</td><td style="border-bottom: 1px solid black;">12</td></tr> <tr><td>Totals</td><td>269</td></tr> </table>	Cars	252	Trucks	5	Heavys	12	Totals	269	<table style="border-collapse: collapse;"> <tr><td>Cars</td><td>43</td><td>254</td><td>18</td><td style="border-left: 1px solid black;">315</td></tr> <tr><td>Trucks</td><td>1</td><td>6</td><td>0</td><td style="border-left: 1px solid black;">7</td></tr> <tr><td>Heavys</td><td>4</td><td>11</td><td>0</td><td style="border-left: 1px solid black; border-bottom: 1px solid black;">15</td></tr> <tr><td>Totals</td><td>48</td><td>271</td><td>18</td><td style="border-left: 1px solid black;"></td></tr> </table>	Cars	43	254	18	315	Trucks	1	6	0	7	Heavys	4	11	0	15	Totals	48	271	18		Peds Cross: $\nabla$ South Peds: 0 South Entering: 337 South Leg Total: 606																												
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<b>Comments</b>																																																											



# Total Count Diagram

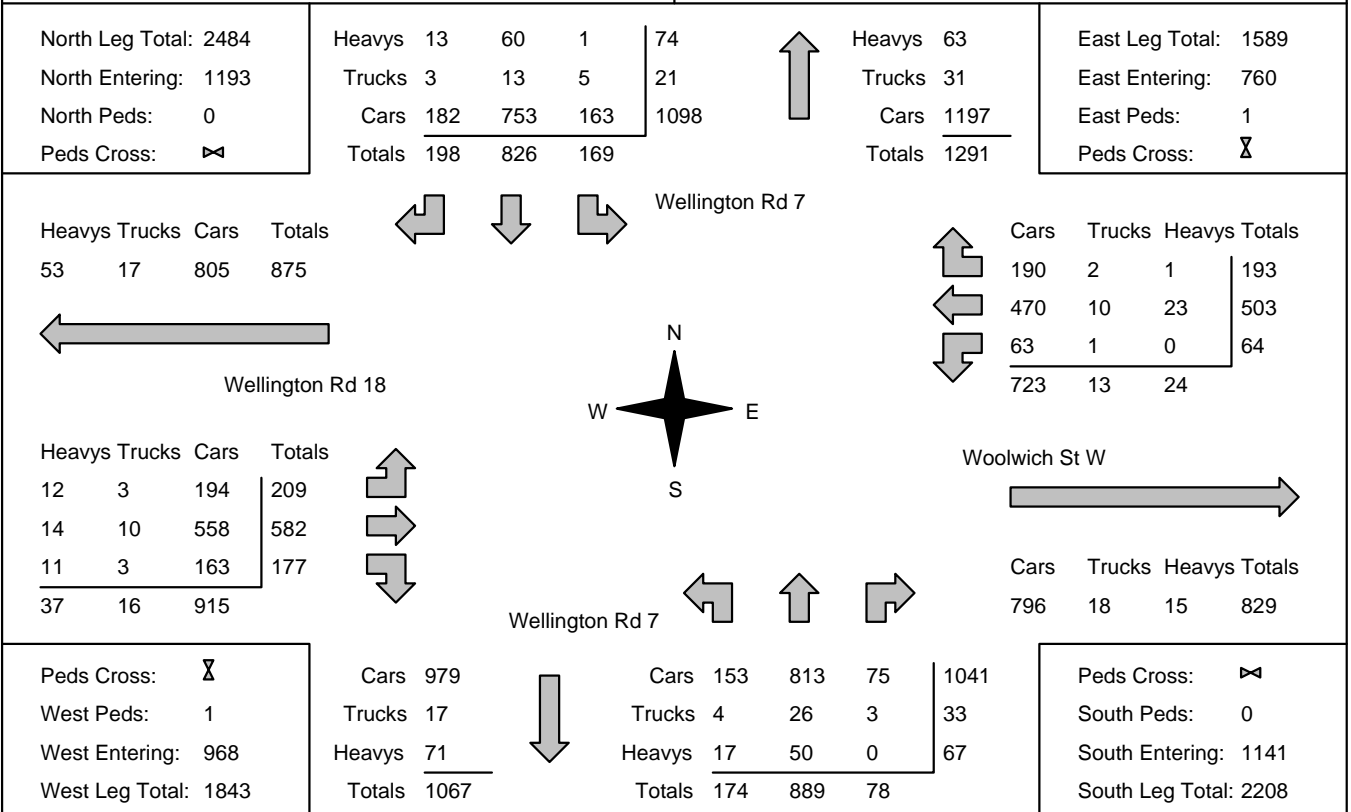
**Municipality:** Centre Wellington  
**Site #:** 2214500002  
**Intersection:** Wellington Rd 7 & Wellington Rd 1  
**TFR File #:** 1  
**Count date:** 4-Aug-22

**Weather conditions:**

**Person counted:**  
**Person prepared:**  
**Person checked:**

**\*\* Signalized Intersection \*\***

**Major Road:** Wellington Rd 7 runs N/S



## Comments

# Traffic Count Summary

Intersection: Wellington Rd 7 & Wellington Rd      Count Date: 4-Aug-22      Municipality: Centre Wellington

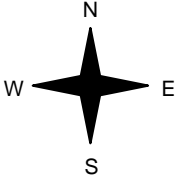
North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	29	143	39	211	0	335	8:00:00	21	95	8	124	0
9:00:00	27	174	28	229	0	421	9:00:00	41	134	17	192	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	41	205	44	290	0	627	17:00:00	48	271	18	337	0
18:00:00	45	161	56	262	0	539	18:00:00	40	220	17	277	0
19:00:00	27	143	31	201	0	412	19:00:00	24	169	18	211	0
<b>Totals:</b>	<b>169</b>	<b>826</b>	<b>198</b>	<b>1193</b>	<b>0</b>	<b>2334</b>	<b>S Totals:</b>	<b>174</b>	<b>889</b>	<b>78</b>	<b>1141</b>	<b>0</b>
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	10	115	27	152	1	275	8:00:00	29	64	30	123	1
9:00:00	10	92	34	136	0	287	9:00:00	25	89	37	151	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	17	122	58	197	0	465	17:00:00	57	164	47	268	0
18:00:00	13	101	42	156	0	435	18:00:00	67	178	34	279	0
19:00:00	14	73	32	119	0	266	19:00:00	31	87	29	147	0
<b>Totals:</b>	<b>64</b>	<b>503</b>	<b>193</b>	<b>760</b>	<b>1</b>	<b>1728</b>	<b>W Totals:</b>	<b>209</b>	<b>582</b>	<b>177</b>	<b>968</b>	<b>1</b>
<b>Calculated Values for Traffic Crossing Major Street</b>												
Hours Ending:	7:00	8:00	9:00	16:00		17:00	18:00	19:00	0:00			
Crossing Values:	0	154	127	0		238	258	132	0			

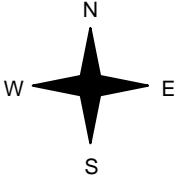








<b>Morning Peak Diagram</b>		<b>Specified Period</b> <b>From:</b> 7:00:00 <b>To:</b> 9:00:00	<b>One Hour Peak</b> <b>From:</b> 8:00:00 <b>To:</b> 9:00:00																																																																																				
<b>Municipality:</b> Centre Wellington <b>Site #:</b> 2214500003 <b>Intersection:</b> Wellington Rd 7 & South St <b>TFR File #:</b> 1 <b>Count date:</b> 4-Aug-22		<b>Weather conditions:</b>  <b>Person counted:</b> <b>Person prepared:</b> <b>Person checked:</b>																																																																																					
<b>** Non-Signalized Intersection **</b>		<b>Major Road:</b> Wellington Rd 7 runs N/S																																																																																					
North Leg Total: 409 North Entering: 222 North Peds: 0 Peds Cross: ☒	<table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: right;">Heavys</td> <td style="text-align: center;">27</td> <td style="text-align: center;">0</td> <td style="border-left: 1px solid black; text-align: center;">27</td> <td style="text-align: center;">↑</td> <td style="text-align: left;">Heavys</td> <td style="text-align: center;">22</td> </tr> <tr> <td style="text-align: right;">Trucks</td> <td style="text-align: center;">3</td> <td style="text-align: center;">0</td> <td style="border-left: 1px solid black; text-align: center;">3</td> <td></td> <td style="text-align: left;">Trucks</td> <td style="text-align: center;">7</td> </tr> <tr> <td style="text-align: right;">Cars</td> <td style="text-align: center;">189</td> <td style="text-align: center;">3</td> <td style="border-left: 1px solid black; text-align: center;">192</td> <td></td> <td style="text-align: left;">Cars</td> <td style="text-align: center;">158</td> </tr> <tr> <td style="text-align: right;">Totals</td> <td style="text-align: center;">219</td> <td style="text-align: center;">3</td> <td style="border-left: 1px solid black;"></td> <td></td> <td style="text-align: left;">Totals</td> <td style="text-align: center;">187</td> </tr> </table> <p style="text-align: center;">Wellington Rd 7</p>  <p style="text-align: center;">Wellington Rd 7</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: right;">Cars</td> <td style="text-align: center;">2</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="border-left: 1px solid black; text-align: center;">2</td> <td style="text-align: center;">↑</td> </tr> <tr> <td style="text-align: right;">Trucks</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="border-left: 1px solid black; text-align: center;">0</td> <td></td> </tr> <tr> <td style="text-align: right;">Heavys</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="border-left: 1px solid black; text-align: center;">0</td> <td></td> </tr> <tr> <td style="text-align: right;">Totals</td> <td style="text-align: center;">2</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="border-left: 1px solid black;"></td> <td></td> </tr> </table> <p style="text-align: center;">South St</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: right;">Cars</td> <td style="text-align: center;">3</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="border-left: 1px solid black; text-align: center;">3</td> <td style="text-align: center;">→</td> </tr> <tr> <td style="text-align: right;">Trucks</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="border-left: 1px solid black; text-align: center;">0</td> <td></td> </tr> <tr> <td style="text-align: right;">Heavys</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="border-left: 1px solid black; text-align: center;">0</td> <td></td> </tr> <tr> <td style="text-align: right;">Totals</td> <td style="text-align: center;">3</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="border-left: 1px solid black;"></td> <td></td> </tr> </table>		Heavys	27	0	27	↑	Heavys	22	Trucks	3	0	3		Trucks	7	Cars	189	3	192		Cars	158	Totals	219	3			Totals	187	Cars	2	0	0	2	↑	Trucks	0	0	0	0		Heavys	0	0	0	0		Totals	2	0	0			Cars	3	0	0	3	→	Trucks	0	0	0	0		Heavys	0	0	0	0		Totals	3	0	0			<table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: right;">East Leg Total:</td> <td style="text-align: center;">5</td> </tr> <tr> <td style="text-align: right;">East Entering:</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: right;">East Peds:</td> <td style="text-align: center;">0</td> </tr> <tr> <td style="text-align: right;">Peds Cross:</td> <td style="text-align: center;">☒</td> </tr> </table>	East Leg Total:	5	East Entering:	2	East Peds:	0	Peds Cross:	☒
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Totals	219		Totals	185	0																																																																																		
Peds Cross:	☒																																																																																						
South Peds:	0																																																																																						
South Entering:	185																																																																																						
South Leg Total:	404																																																																																						
<b>Comments</b>																																																																																							

<b>Afternoon Peak Diagram</b>		<b>Specified Period</b> <b>From:</b> 16:00:00 <b>To:</b> 19:00:00	<b>One Hour Peak</b> <b>From:</b> 16:00:00 <b>To:</b> 17:00:00																																																																																																																																
<b>Municipality:</b> Centre Wellington <b>Site #:</b> 2214500003 <b>Intersection:</b> Wellington Rd 7 & South St <b>TFR File #:</b> 1 <b>Count date:</b> 4-Aug-22		<b>Weather conditions:</b>  <b>Person counted:</b> <b>Person prepared:</b> <b>Person checked:</b>																																																																																																																																	
<b>** Non-Signalized Intersection **</b>		<b>Major Road:</b> Wellington Rd 7 runs N/S																																																																																																																																	
North Leg Total: 616 North Entering: 280 North Peds: 0 Peds Cross: ☒	<table style="margin: auto;"> <tr> <td style="text-align: right;">Heavys</td><td style="text-align: center;">10</td><td style="text-align: center;">0</td><td style="border-left: 1px solid black; text-align: center;">10</td><td rowspan="4" style="text-align: center; vertical-align: middle;">↑</td> </tr> <tr> <td style="text-align: right;">Trucks</td><td style="text-align: center;">5</td><td style="text-align: center;">0</td><td style="border-left: 1px solid black; text-align: center;">5</td> </tr> <tr> <td style="text-align: right;">Cars</td><td style="text-align: center;">259</td><td style="text-align: center;">6</td><td style="border-left: 1px solid black; text-align: center;">265</td> </tr> <tr> <td style="text-align: right;">Totals</td><td style="text-align: center;">274</td><td style="text-align: center;">6</td><td style="border-left: 1px solid black;"></td> </tr> </table> <p style="text-align: center;">Wellington Rd 7</p>  <p style="text-align: center;">Wellington Rd 7</p> <table style="margin: auto;"> <tr> <td style="text-align: right;">Cars</td><td style="text-align: center;">261</td><td style="text-align: center;">4</td><td style="border-left: 1px solid black; 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# Total Count Diagram

**Municipality:** Centre Wellington  
**Site #:** 2214500003  
**Intersection:** Wellington Rd 7 & South St  
**TFR File #:** 1  
**Count date:** 4-Aug-22

**Weather conditions:**

**Person counted:**  
**Person prepared:**  
**Person checked:**

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Wellington Rd 7 runs N/S

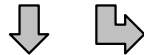
North Leg Total: 2244  
 North Entering: 1093  
 North Peds: 0  
 Peds Cross:

Heavys	69	0	69
Trucks	19	0	19
Cars	986	19	1005
Totals	1074	19	

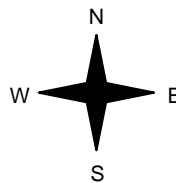


Heavys	66
Trucks	26
Cars	1059
Totals	1151

East Leg Total: 50  
 East Entering: 23  
 East Peds: 0  
 Peds Cross:



Wellington Rd 7



Cars	Trucks	Heavys	Totals
19	0	0	19

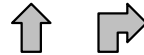


Cars	Trucks	Heavys	Totals
4	0	0	4
23	0	0	

South St



Wellington Rd 7



Cars	990
Trucks	19
Heavys	69
Totals	1078



Cars	1040	8	1048
Trucks	26	0	26
Heavys	66	0	66
Totals	1132	8	

Cars	Trucks	Heavys	Totals
27	0	0	27

Peds Cross:   
 South Peds: 0  
 South Entering: 1140  
 South Leg Total: 2218

## Comments

# Traffic Count Summary

Intersection: Wellington Rd 7 & South St      Count Date: 4-Aug-22      Municipality: Centre Wellington

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	3	185	0	188	0	312	8:00:00	0	124	0	124	0
9:00:00	3	219	0	222	0	407	9:00:00	0	185	0	185	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	6	274	0	280	0	613	17:00:00	0	329	4	333	0
18:00:00	5	209	0	214	0	496	18:00:00	0	281	1	282	0
19:00:00	2	187	0	189	0	405	19:00:00	0	213	3	216	0
<b>Totals:</b>	19	1074	0	1093	0	2233	<b>S Totals:</b>	0	1132	8	1140	0
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	0	0	0	0	0	0	8:00:00	0	0	0	0	0
9:00:00	0	0	2	2	0	2	9:00:00	0	0	0	0	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	2	0	7	9	0	9	17:00:00	0	0	0	0	0
18:00:00	2	0	5	7	0	7	18:00:00	0	0	0	0	0
19:00:00	0	0	5	5	0	5	19:00:00	0	0	0	0	0
<b>Totals:</b>	4	0	19	23	0	23	<b>W Totals:</b>	0	0	0	0	0
<b>Calculated Values for Traffic Crossing Major Street</b>												
Hours Ending:	7:00	8:00	9:00	16:00			17:00	18:00	19:00	0:00		
Crossing Values:	0	0	0	0			2	2	0	0		





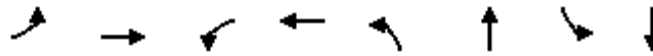




## **Appendix C – Synchro Analysis Output – Existing Traffic Volumes**

350 Wellington Road 7  
 1: Wellington Road 7 & Wellington Road 18

Queues  
 Existing (2022) AM Peak Hour

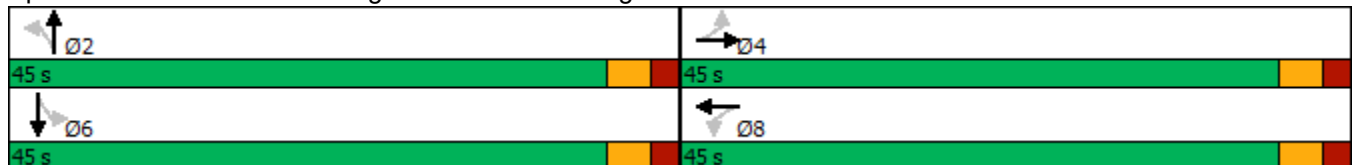


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕		↕
Traffic Volume (vph)	33	87	11	107	37	125	30	161
Future Volume (vph)	33	87	11	107	37	125	30	161
Lane Group Flow (vph)	0	165	0	156	0	186	0	235
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.0		5.0		5.0		5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.58		0.51		0.19		0.22
Control Delay		28.2		25.5		5.2		5.2
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		28.2		25.5		5.2		5.2
Queue Length 50th (m)		15.4		14.5		6.8		8.6
Queue Length 95th (m)		32.0		30.0		17.3		21.0
Internal Link Dist (m)		549.0		565.6		505.0		454.0
Turn Bay Length (m)								
Base Capacity (vph)		960		1053		995		1049
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.17		0.15		0.19		0.22

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 62.3  
 Natural Cycle: 80  
 Control Type: Semi Act-Uncoord

















Splits and Phases: 1: Wellington Road 7 & Wellington Road 18























350 Wellington Road 7  
1: Wellington Road 7 & Wellington Road 18

HCM Signalized Intersection Capacity Analysis  
Existing (2022) AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	87	38	11	107	33	37	125	16	30	161	35
Future Volume (vph)	33	87	38	11	107	33	37	125	16	30	161	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			0.97			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		1611			1663			1625			1648	
Flt Permitted		0.91			0.98			0.92			0.95	
Satd. Flow (perm)		1482			1628			1504			1583	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	34	91	40	11	111	34	39	130	17	31	168	36
RTOR Reduction (vph)	0	19	0	0	16	0	0	2	0	0	4	0
Lane Group Flow (vph)	0	146	0	0	140	0	0	184	0	0	231	0
Heavy Vehicles (%)	12%	11%	18%	9%	12%	6%	19%	14%	6%	0%	14%	14%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		11.1			11.1			41.2			41.2	
Effective Green, g (s)		11.1			11.1			41.2			41.2	
Actuated g/C Ratio		0.18			0.18			0.66			0.66	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		264			290			994			1046	
v/s Ratio Prot												
v/s Ratio Perm		c0.10			0.09			0.12			c0.15	
v/c Ratio		0.55			0.48			0.18			0.22	
Uniform Delay, d1		23.3			23.0			4.1			4.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.5			1.3			0.4			0.5	
Delay (s)		25.8			24.3			4.5			4.7	
Level of Service		C			C			A			A	
Approach Delay (s)		25.8			24.3			4.5			4.7	
Approach LOS		C			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			13.5				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.29									
Actuated Cycle Length (s)			62.3				Sum of lost time (s)		10.0			
Intersection Capacity Utilization			40.9%				ICU Level of Service		A			
Analysis Period (min)			15									
c Critical Lane Group												

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	12	15	29	9	13	8	177	25	16	205	9
Future Volume (Veh/h)	3	12	15	29	9	13	8	177	25	16	205	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	3	13	16	31	10	14	9	188	27	17	218	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	482	490	223	494	482	202	228			215		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	482	490	223	494	482	202	228			215		
tC, single (s)	7.4	6.5	6.3	7.2	6.6	6.3	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.8	4.0	3.4	3.6	4.1	3.4	2.4			2.2		
p0 queue free %	99	97	98	93	98	98	99			99		
cM capacity (veh/h)	426	472	790	451	462	824	1216			1367		
Direction, Lane #												
	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	32	55	9	215	17	228						
Volume Left	3	31	9	0	17	0						
Volume Right	16	14	0	27	0	10						
cSH	584	512	1216	1700	1367	1700						
Volume to Capacity	0.05	0.11	0.01	0.13	0.01	0.13						
Queue Length 95th (m)	1.4	2.9	0.2	0.0	0.3	0.0						
Control Delay (s)	11.5	12.9	8.0	0.0	7.7	0.0						
Lane LOS	B	B	A		A							
Approach Delay (s)	11.5	12.9	0.3		0.5							
Approach LOS	B	B										
Intersection Summary												
Average Delay			2.3									
Intersection Capacity Utilization			29.5%		ICU Level of Service					A		
Analysis Period (min)			15									

350 Wellington Road 7  
 1: Wellington Road 7 & Wellington Road 18

Queues  
 Existing (2022) PM Peak Hour

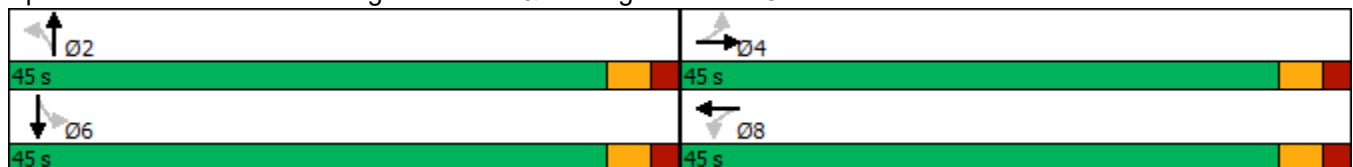


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕		↕
Traffic Volume (vph)	57	164	17	122	48	271	41	205
Future Volume (vph)	57	164	17	122	48	271	41	205
Lane Group Flow (vph)	0	279	0	205	0	351	0	303
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.0		5.0		5.0		5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.72		0.48		0.35		0.31
Control Delay		32.4		21.7		8.7		8.0
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		32.4		21.7		8.7		8.0
Queue Length 50th (m)		31.2		19.1		19.6		15.7
Queue Length 95th (m)		54.9		36.4		44.3		36.9
Internal Link Dist (m)		549.0		565.6		505.0		454.0
Turn Bay Length (m)								
Base Capacity (vph)		952		1031		994		982
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.29		0.20		0.35		0.31

Intersection Summary

















Cycle Length: 90  
 Actuated Cycle Length: 66.3  
 Natural Cycle: 80  
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Wellington Road 7 & Wellington Road 18





















350 Wellington Road 7  
1: Wellington Road 7 & Wellington Road 18

HCM Signalized Intersection Capacity Analysis  
Existing (2022) PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	164	47	17	122	58	48	271	18	41	205	44
Future Volume (vph)	57	164	47	17	122	58	48	271	18	41	205	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.96			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		1755			1741			1763			1739	
Flt Permitted		0.88			0.96			0.92			0.92	
Satd. Flow (perm)		1562			1684			1639			1612	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	59	171	49	18	127	60	50	282	19	43	214	46
RTOR Reduction (vph)	0	11	0	0	23	0	0	2	0	0	5	0
Lane Group Flow (vph)	0	268	0	0	182	0	0	349	0	0	298	0
Heavy Vehicles (%)	5%	4%	6%	0%	7%	0%	10%	6%	0%	2%	7%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		16.1			16.1			40.2			40.2	
Effective Green, g (s)		16.1			16.1			40.2			40.2	
Actuated g/C Ratio		0.24			0.24			0.61			0.61	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		379			408			993			977	
v/s Ratio Prot												
v/s Ratio Perm		c0.17			0.11			c0.21			0.18	
v/c Ratio		0.71			0.45			0.35			0.30	
Uniform Delay, d1		22.9			21.3			6.5			6.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		5.9			0.8			1.0			0.8	
Delay (s)		28.8			22.1			7.5			7.1	
Level of Service		C			C			A			A	
Approach Delay (s)		28.8			22.1			7.5			7.1	
Approach LOS		C			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			15.3				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.45									
Actuated Cycle Length (s)			66.3				Sum of lost time (s)		10.0			
Intersection Capacity Utilization			60.1%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

350 Wellington Road 7  
2: Middlebrook Rd/David St W & Wellington Road 7

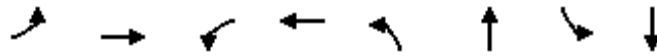
HCM Unsignalized Intersection Capacity Analysis  
Existing (2022) PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	15	21	33	14	21	13	305	80	20	253	7
Future Volume (Veh/h)	4	15	21	33	14	21	13	305	80	20	253	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	16	22	35	15	22	14	321	84	21	266	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	690	744	270	729	706	363	273			405		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	690	744	270	729	706	363	273			405		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	99	95	97	89	96	97	99			98		
cM capacity (veh/h)	331	335	741	308	352	675	1256			1165		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	42	72	14	405	21	273						
Volume Left	4	35	14	0	21	0						
Volume Right	22	22	0	84	0	7						
cSH	469	382	1256	1700	1165	1700						
Volume to Capacity	0.09	0.19	0.01	0.24	0.02	0.16						
Queue Length 95th (m)	2.3	5.5	0.3	0.0	0.4	0.0						
Control Delay (s)	13.4	16.6	7.9	0.0	8.1	0.0						
Lane LOS	B	C	A		A							
Approach Delay (s)	13.4	16.6	0.3		0.6							
Approach LOS	B	C										
Intersection Summary												
Average Delay			2.5									
Intersection Capacity Utilization			38.1%		ICU Level of Service					A		
Analysis Period (min)			15									

## **Appendix D – Synchro Analysis Output – Background Traffic Volumes**

350 Wellington Road 7  
 1: Wellington Road 7 & Wellington Road 18

Queues  
 Background (2027) AM Peak Hour

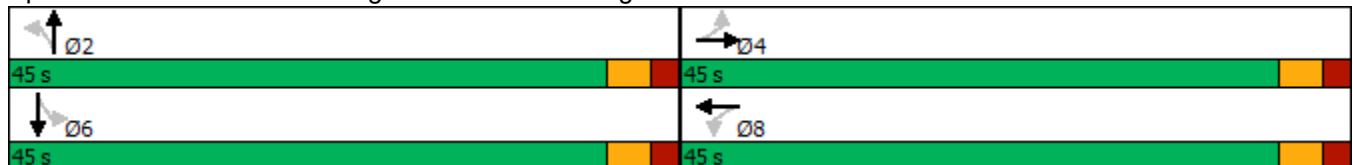


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕		↕
Traffic Volume (vph)	41	108	14	133	46	156	37	201
Future Volume (vph)	41	108	14	133	46	156	37	201
Lane Group Flow (vph)	0	205	0	197	0	232	0	294
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.0		5.0		5.0		5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.65		0.56		0.25		0.29
Control Delay		30.5		26.5		6.4		6.6
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		30.5		26.5		6.4		6.6
Queue Length 50th (m)		20.4		19.5		10.0		12.9
Queue Length 95th (m)		39.9		37.4		24.7		30.8
Internal Link Dist (m)		549.0		565.6		505.0		454.0
Turn Bay Length (m)								
Base Capacity (vph)		923		1038		940		999
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.22		0.19		0.25		0.29

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 63.2  
 Natural Cycle: 80  
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Wellington Road 7 & Wellington Road 18



350 Wellington Road 7  
1: Wellington Road 7 & Wellington Road 18

HCM Signalized Intersection Capacity Analysis  
Background (2027) AM Peak Hour





















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	41	108	47	14	133	41	46	156	20	37	201	44
Future Volume (vph)	41	108	47	14	133	41	46	156	20	37	201	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			0.97			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		1612			1663			1625			1648	
Flt Permitted		0.88			0.97			0.90			0.94	
Satd. Flow (perm)		1439			1623			1476			1565	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	43	112	49	15	139	43	48	162	21	39	209	46
RTOR Reduction (vph)	0	18	0	0	16	0	0	3	0	0	5	0
Lane Group Flow (vph)	0	187	0	0	181	0	0	229	0	0	289	0
Heavy Vehicles (%)	12%	11%	18%	9%	12%	6%	19%	14%	6%	0%	14%	14%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.0			13.0			40.1			40.1	
Effective Green, g (s)		13.0			13.0			40.1			40.1	
Actuated g/C Ratio		0.21			0.21			0.64			0.64	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		296			334			937			994	
v/s Ratio Prot												
v/s Ratio Perm		c0.13			0.11			0.16			c0.18	
v/c Ratio		0.63			0.54			0.24			0.29	
Uniform Delay, d1		22.9			22.4			5.0			5.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		4.3			1.8			0.6			0.7	
Delay (s)		27.2			24.2			5.6			5.9	
Level of Service		C			C			A			A	
Approach Delay (s)		27.2			24.2			5.6			5.9	
Approach LOS		C			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			14.4					HCM 2000 Level of Service			B	
HCM 2000 Volume to Capacity ratio			0.37									
Actuated Cycle Length (s)			63.1					Sum of lost time (s)		10.0		
Intersection Capacity Utilization			48.7%					ICU Level of Service		A		
Analysis Period (min)			15									
c Critical Lane Group												



350 Wellington Road 7  
 2: Middlebrook Rd/David St W & Wellington Road 7

HCM Unsignalized Intersection Capacity Analysis  
 Background (2027) AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	15	19	36	11	16	10	221	31	20	255	11
Future Volume (Veh/h)	4	15	19	36	11	16	10	221	31	20	255	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	4	16	20	38	12	17	11	235	33	21	271	12
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	599	609	277	614	598	252	283			268		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	599	609	277	614	598	252	283			268		
tC, single (s)	7.4	6.5	6.3	7.2	6.6	6.3	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.8	4.0	3.4	3.6	4.1	3.4	2.4			2.2		
p0 queue free %	99	96	97	90	97	98	99			98		
cM capacity (veh/h)	348	402	736	367	393	773	1158			1307		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	40	67	11	268	21	283						
Volume Left	4	38	11	0	21	0						
Volume Right	20	17	0	33	0	12						
cSH	510	429	1158	1700	1307	1700						
Volume to Capacity	0.08	0.16	0.01	0.16	0.02	0.17						
Queue Length 95th (m)	2.0	4.4	0.2	0.0	0.4	0.0						
Control Delay (s)	12.7	14.9	8.1	0.0	7.8	0.0						
Lane LOS	B	B	A		A							
Approach Delay (s)	12.7	14.9	0.3		0.5							
Approach LOS	B	B										
Intersection Summary												
Average Delay			2.6									
Intersection Capacity Utilization			33.5%		ICU Level of Service					A		
Analysis Period (min)			15									

350 Wellington Road 7  
 1: Wellington Road 7 & Wellington Road 18

Queues  
 Background (2027) PM Peak Hour

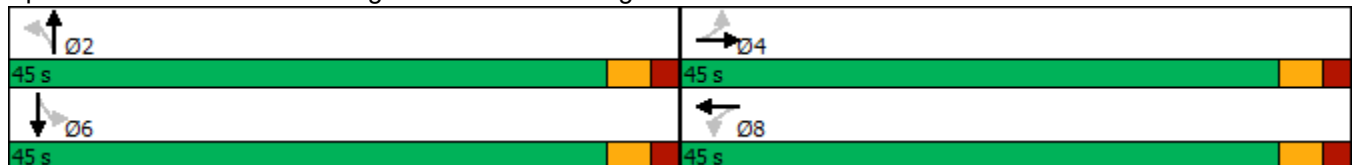


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕		↕
Traffic Volume (vph)	71	204	21	152	60	338	51	255
Future Volume (vph)	71	204	21	152	60	338	51	255
Lane Group Flow (vph)	0	348	0	255	0	438	0	376
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.0		5.0		5.0		5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.79		0.51		0.48		0.41
Control Delay		35.7		21.8		12.3		11.2
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		35.7		21.8		12.3		11.2
Queue Length 50th (m)		42.1		25.5		31.7		25.1
Queue Length 95th (m)		70.7		45.2		71.4		58.1
Internal Link Dist (m)		549.0		565.6		505.0		454.0
Turn Bay Length (m)								
Base Capacity (vph)		868		969		918		907
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.40		0.26		0.48		0.41

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 70.4  
 Natural Cycle: 80  
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Wellington Road 7 & Wellington Road 18





















350 Wellington Road 7  
1: Wellington Road 7 & Wellington Road 18

HCM Signalized Intersection Capacity Analysis  
Background (2027) PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	71	204	59	21	152	72	60	338	22	51	255	55
Future Volume (vph)	71	204	59	21	152	72	60	338	22	51	255	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.96			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		1755			1741			1763			1739	
Flt Permitted		0.85			0.96			0.90			0.90	
Satd. Flow (perm)		1507			1673			1604			1576	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	74	212	61	22	158	75	62	352	23	53	266	57
RTOR Reduction (vph)	0	11	0	0	21	0	0	2	0	0	6	0
Lane Group Flow (vph)	0	337	0	0	234	0	0	436	0	0	370	0
Heavy Vehicles (%)	5%	4%	6%	0%	7%	0%	10%	6%	0%	2%	7%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		20.1			20.1			40.3			40.3	
Effective Green, g (s)		20.1			20.1			40.3			40.3	
Actuated g/C Ratio		0.29			0.29			0.57			0.57	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		430			477			918			902	
v/s Ratio Prot												
v/s Ratio Perm		c0.22			0.14			c0.27			0.24	
v/c Ratio		0.78			0.49			0.48			0.41	
Uniform Delay, d1		23.2			20.9			8.8			8.4	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		9.1			0.8			1.8			1.4	
Delay (s)		32.2			21.7			10.6			9.8	
Level of Service		C			C			B			A	
Approach Delay (s)		32.2			21.7			10.6			9.8	
Approach LOS		C			C			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			17.7					HCM 2000 Level of Service			B	
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			70.4					Sum of lost time (s)		10.0		
Intersection Capacity Utilization			73.0%					ICU Level of Service			D	
Analysis Period (min)			15									
c Critical Lane Group												

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	19	26	41	17	26	16	380	100	25	315	9
Future Volume (Veh/h)	5	19	26	41	17	26	16	380	100	25	315	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	20	27	43	18	27	17	400	105	26	332	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	858	928	336	908	880	452	341			505		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	858	928	336	908	880	452	341			505		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	98	92	96	81	94	96	99			98		
cM capacity (veh/h)	246	260	679	224	277	601	1185			1070		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	52	88	17	505	26	341						
Volume Left	5	43	17	0	26	0						
Volume Right	27	27	0	105	0	9						
cSH	379	292	1185	1700	1070	1700						
Volume to Capacity	0.14	0.30	0.01	0.30	0.02	0.20						
Queue Length 95th (m)	3.8	9.9	0.3	0.0	0.6	0.0						
Control Delay (s)	16.0	22.6	8.1	0.0	8.4	0.0						
Lane LOS	C	C	A		A							
Approach Delay (s)	16.0	22.6	0.3		0.6							
Approach LOS	C	C										
Intersection Summary												
Average Delay			3.1									
Intersection Capacity Utilization			44.2%		ICU Level of Service					A		
Analysis Period (min)			15									

350 Wellington Road 7  
 1: Wellington Road 7 & Wellington Road 18

Queues  
 Background (2032) AM Peak Hour

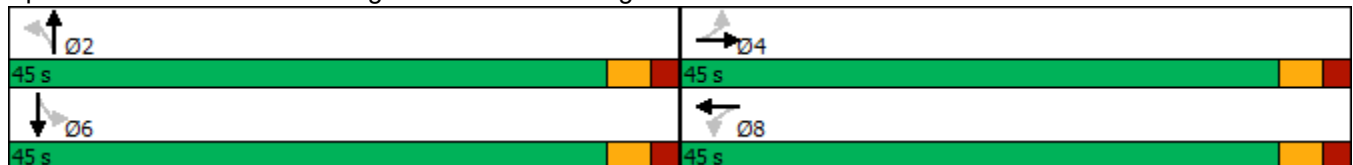


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕		↕
Traffic Volume (vph)	51	135	17	166	57	194	47	250
Future Volume (vph)	51	135	17	166	57	194	47	250
Lane Group Flow (vph)	0	255	0	244	0	287	0	365
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.0		5.0		5.0		5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.73		0.61		0.33		0.39
Control Delay		33.8		27.0		8.4		8.8
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		33.8		27.0		8.4		8.8
Queue Length 50th (m)		27.5		25.5		15.2		19.9
Queue Length 95th (m)		50.4		46.0		36.9		46.8
Internal Link Dist (m)		549.0		565.6		505.0		454.0
Turn Bay Length (m)								
Base Capacity (vph)		856		995		880		945
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.30		0.25		0.33		0.39

Intersection Summary

















Cycle Length: 90  
 Actuated Cycle Length: 65.9  
 Natural Cycle: 80  
 Control Type: Semi Act-Uncoord



















Splits and Phases: 1: Wellington Road 7 & Wellington Road 18



350 Wellington Road 7  
1: Wellington Road 7 & Wellington Road 18

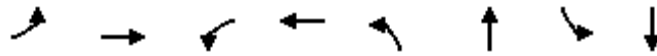
HCM Signalized Intersection Capacity Analysis  
Background (2032) AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	135	59	17	166	51	57	194	25	47	250	54
Future Volume (vph)	51	135	59	17	166	51	57	194	25	47	250	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			0.97			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		1612			1663			1625			1648	
Flt Permitted		0.85			0.97			0.88			0.93	
Satd. Flow (perm)		1391			1619			1439			1544	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	53	141	61	18	173	53	59	202	26	49	260	56
RTOR Reduction (vph)	0	18	0	0	15	0	0	3	0	0	5	0
Lane Group Flow (vph)	0	237	0	0	229	0	0	284	0	0	360	0
Heavy Vehicles (%)	12%	11%	18%	9%	12%	6%	19%	14%	6%	0%	14%	14%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		15.7			15.7			40.2			40.2	
Effective Green, g (s)		15.7			15.7			40.2			40.2	
Actuated g/C Ratio		0.24			0.24			0.61			0.61	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		331			385			877			941	
v/s Ratio Prot												
v/s Ratio Perm		c0.17			0.14			0.20			c0.23	
v/c Ratio		0.72			0.59			0.32			0.38	
Uniform Delay, d1		23.1			22.3			6.2			6.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		7.2			2.5			1.0			1.2	
Delay (s)		30.3			24.7			7.2			7.7	
Level of Service		C			C			A			A	
Approach Delay (s)		30.3			24.7			7.2			7.7	
Approach LOS		C			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			16.2				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			65.9				Sum of lost time (s)		10.0			
Intersection Capacity Utilization			58.6%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	19	23	45	14	20	12	275	39	25	318	14
Future Volume (Veh/h)	5	19	23	45	14	20	12	275	39	25	318	14
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	5	20	24	48	15	21	13	293	41	27	338	15
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	747	760	346	766	746	314	353			334		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	747	760	346	766	746	314	353			334		
tC, single (s)	7.4	6.5	6.3	7.2	6.6	6.3	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.8	4.0	3.4	3.6	4.1	3.4	2.4			2.2		
p0 queue free %	98	94	96	83	95	97	99			98		
cM capacity (veh/h)	267	327	673	281	320	713	1089			1237		
Direction, Lane #												
	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	49	84	13	334	27	353						
Volume Left	5	48	13	0	27	0						
Volume Right	24	21	0	41	0	15						
cSH	424	340	1089	1700	1237	1700						
Volume to Capacity	0.12	0.25	0.01	0.20	0.02	0.21						
Queue Length 95th (m)	3.1	7.6	0.3	0.0	0.5	0.0						
Control Delay (s)	14.6	19.0	8.3	0.0	8.0	0.0						
Lane LOS	B	C	A		A							
Approach Delay (s)	14.6	19.0	0.3		0.6							
Approach LOS	B	C										
Intersection Summary												
Average Delay			3.1									
Intersection Capacity Utilization			38.6%		ICU Level of Service					A		
Analysis Period (min)			15									

350 Wellington Road 7  
1: Wellington Road 7 & Wellington Road 18

Queues  
Background (2032) PM Peak Hour

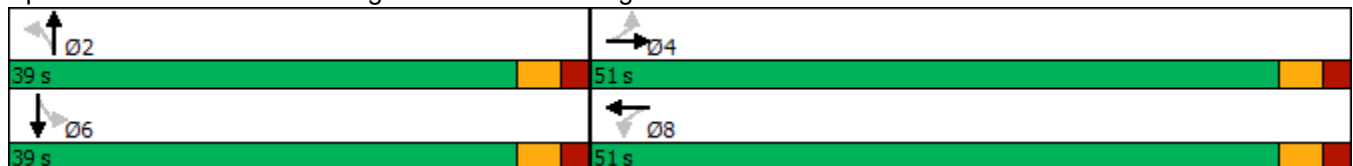


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕		↕
Traffic Volume (vph)	89	255	26	189	75	421	64	318
Future Volume (vph)	89	255	26	189	75	421	64	318
Lane Group Flow (vph)	0	435	0	318	0	546	0	469
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Total Split (s)	51.0	51.0	51.0	51.0	39.0	39.0	39.0	39.0
Total Split (%)	56.7%	56.7%	56.7%	56.7%	43.3%	43.3%	43.3%	43.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.0		5.0		5.0		5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.84		0.53		0.69		0.60
Control Delay		34.2		18.7		20.7		17.5
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		34.2		18.7		20.7		17.5
Queue Length 50th (m)		49.8		29.2		50.2		39.7
Queue Length 95th (m)		82.7		49.8		#128.8		92.7
Internal Link Dist (m)		549.0		565.6		505.0		454.0
Turn Bay Length (m)								
Base Capacity (vph)		1013		1146		795		782
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.43		0.28		0.69		0.60

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 68  
 Natural Cycle: 80  
 Control Type: Semi Act-Uncoord  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Wellington Road 7 & Wellington Road 18
























350 Wellington Road 7  
1: Wellington Road 7 & Wellington Road 18

HCM Signalized Intersection Capacity Analysis  
Background (2032) PM Peak Hour



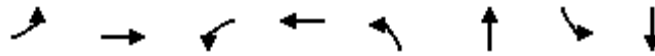
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	89	255	73	26	189	90	75	421	28	64	318	68
Future Volume (vph)	89	255	73	26	189	90	75	421	28	64	318	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.96			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		1755			1741			1763			1739	
Flt Permitted		0.83			0.95			0.88			0.88	
Satd. Flow (perm)		1474			1661			1570			1537	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	93	266	76	27	197	94	78	439	29	67	331	71
RTOR Reduction (vph)	0	11	0	0	22	0	0	2	0	0	5	0
Lane Group Flow (vph)	0	424	0	0	296	0	0	544	0	0	464	0
Heavy Vehicles (%)	5%	4%	6%	0%	7%	0%	10%	6%	0%	2%	7%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		23.5			23.5			34.4			34.4	
Effective Green, g (s)		23.5			23.5			34.4			34.4	
Actuated g/C Ratio		0.35			0.35			0.51			0.51	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		510			574			795			778	
v/s Ratio Prot												
v/s Ratio Perm		c0.29			0.18			c0.35			0.30	
v/c Ratio		0.83			0.52			0.68			0.60	
Uniform Delay, d1		20.4			17.7			12.6			11.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		11.0			0.8			4.7			3.3	
Delay (s)		31.4			18.5			17.4			15.2	
Level of Service		C			B			B			B	
Approach Delay (s)		31.4			18.5			17.4			15.2	
Approach LOS		C			B			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			20.5					HCM 2000 Level of Service			C	
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			67.9					Sum of lost time (s)		10.0		
Intersection Capacity Utilization			89.2%					ICU Level of Service			E	
Analysis Period (min)			15									
c Critical Lane Group												

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	23	33	51	22	33	20	474	124	31	393	11
Future Volume (Veh/h)	6	23	33	51	22	33	20	474	124	31	393	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	6	24	35	54	23	35	21	499	131	33	414	12
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1074	1158	420	1134	1098	564	426			630		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1074	1158	420	1134	1098	564	426			630		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	96	87	94	63	89	93	98			97		
cM capacity (veh/h)	163	187	608	146	203	519	1102			962		
Direction, Lane #												
	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	65	112	21	630	33	426						
Volume Left	6	54	21	0	33	0						
Volume Right	35	35	0	131	0	12						
cSH	292	204	1102	1700	962	1700						
Volume to Capacity	0.22	0.55	0.02	0.37	0.03	0.25						
Queue Length 95th (m)	6.7	23.4	0.5	0.0	0.9	0.0						
Control Delay (s)	20.8	42.4	8.3	0.0	8.9	0.0						
Lane LOS	C	E	A		A							
Approach Delay (s)	20.8	42.4	0.3		0.6							
Approach LOS	C	E										
Intersection Summary												
Average Delay			5.1									
Intersection Capacity Utilization			51.8%		ICU Level of Service					A		
Analysis Period (min)			15									

## **Appendix E – Synchro Analysis Output – Total Traffic Volumes**

350 Wellington Road 7  
 1: Wellington Road 7 & Wellington Road 18

Queues  
 Total (2027) AM Peak Hour

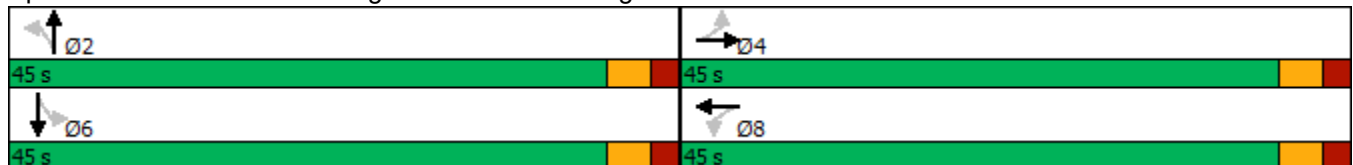


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕		↕
Traffic Volume (vph)	41	108	16	133	56	161	37	203
Future Volume (vph)	41	108	16	133	56	161	37	203
Lane Group Flow (vph)	0	208	0	199	0	255	0	296
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.0		5.0		5.0		5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.66		0.57		0.28		0.30
Control Delay		30.5		26.6		6.7		6.7
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		30.5		26.6		6.7		6.7
Queue Length 50th (m)		20.7		19.7		11.3		13.2
Queue Length 95th (m)		40.3		37.6		27.7		31.3
Internal Link Dist (m)		549.0		565.6		505.0		454.0
Turn Bay Length (m)								
Base Capacity (vph)		920		1032		920		994
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.23		0.19		0.28		0.30

Intersection Summary

















Cycle Length: 90  
 Actuated Cycle Length: 63.3  
 Natural Cycle: 80  
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Wellington Road 7 & Wellington Road 18





















350 Wellington Road 7  
1: Wellington Road 7 & Wellington Road 18

HCM Signalized Intersection Capacity Analysis  
Total (2027) AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	108	50	16	133	41	56	161	28	37	203	44
Future Volume (vph)	41	108	50	16	133	41	56	161	28	37	203	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			0.97			0.98			0.98	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		1609			1663			1619			1648	
Flt Permitted		0.88			0.97			0.88			0.94	
Satd. Flow (perm)		1438			1617			1446			1561	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	43	112	52	17	139	43	58	168	29	39	211	46
RTOR Reduction (vph)	0	19	0	0	16	0	0	3	0	0	5	0
Lane Group Flow (vph)	0	189	0	0	183	0	0	252	0	0	291	0
Heavy Vehicles (%)	12%	11%	18%	9%	12%	6%	19%	14%	6%	0%	14%	14%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.1			13.1			40.1			40.1	
Effective Green, g (s)		13.1			13.1			40.1			40.1	
Actuated g/C Ratio		0.21			0.21			0.63			0.63	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		298			335			917			990	
v/s Ratio Prot												
v/s Ratio Perm		c0.13			0.11			0.17			c0.19	
v/c Ratio		0.63			0.55			0.27			0.29	
Uniform Delay, d1		22.9			22.4			5.1			5.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		4.4			1.8			0.7			0.8	
Delay (s)		27.2			24.2			5.9			5.9	
Level of Service		C			C			A			A	
Approach Delay (s)		27.2			24.2			5.9			5.9	
Approach LOS		C			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			14.3					HCM 2000 Level of Service			B	
HCM 2000 Volume to Capacity ratio			0.38									
Actuated Cycle Length (s)			63.2					Sum of lost time (s)		10.0		
Intersection Capacity Utilization			51.0%					ICU Level of Service		A		
Analysis Period (min)			15									
c Critical Lane Group												












350 Wellington Road 7  
 2: Middlebrook Rd/David St W & Wellington Road 7

HCM Unsignalized Intersection Capacity Analysis  
 Total (2027) AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	15	19	36	11	18	10	238	31	28	308	11
Future Volume (Veh/h)	4	15	19	36	11	18	10	238	31	28	308	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	4	16	20	38	12	19	11	253	33	30	328	12
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	694	702	334	708	692	270	340			286		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	694	702	334	708	692	270	340			286		
tC, single (s)	7.4	6.5	6.3	7.2	6.6	6.3	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.8	4.0	3.4	3.6	4.1	3.4	2.4			2.2		
p0 queue free %	99	95	97	88	97	97	99			98		
cM capacity (veh/h)	295	353	683	314	345	755	1101			1288		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	40	69	11	286	30	340						
Volume Left	4	38	11	0	30	0						
Volume Right	20	19	0	33	0	12						
cSH	454	381	1101	1700	1288	1700						
Volume to Capacity	0.09	0.18	0.01	0.17	0.02	0.20						
Queue Length 95th (m)	2.3	5.2	0.2	0.0	0.6	0.0						
Control Delay (s)	13.7	16.5	8.3	0.0	7.9	0.0						
Lane LOS	B	C	A		A							
Approach Delay (s)	13.7	16.5	0.3		0.6							
Approach LOS	B	C										
Intersection Summary												
Average Delay			2.6									
Intersection Capacity Utilization			40.3%		ICU Level of Service					A		
Analysis Period (min)			15									











350 Wellington Road 7  
3: Wellington Road 7 & North Access

HCM Unsignalized Intersection Capacity Analysis  
Total (2027) AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	15	5	246	281	3
Future Volume (Veh/h)	10	15	5	246	281	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	16	5	267	305	3
<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)						
pX, platoon unblocked						
vC, conflicting volume	584	306	308			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	584	306	308			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	98	100			
cM capacity (veh/h)	476	738	1264			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>		
Volume Total	27	5	267	308		
Volume Left	11	5	0	0		
Volume Right	16	0	0	3		
cSH	603	1264	1700	1700		
Volume to Capacity	0.04	0.00	0.16	0.18		
Queue Length 95th (m)	1.1	0.1	0.0	0.0		
Control Delay (s)	11.3	7.9	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	11.3	0.1		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.6			
Intersection Capacity Utilization			25.0%	ICU Level of Service	A	
Analysis Period (min)			15			

350 Wellington Road 7  
4: Wellington Road 7 & Centre Access











HCM Unsignalized Intersection Capacity Analysis  
Total (2027) AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	21	7	241	290	2
Future Volume (Veh/h)	8	21	7	241	290	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	23	8	262	315	2
<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)						
pX, platoon unblocked						
vC, conflicting volume	594	316	317			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	594	316	317			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	97	99			
cM capacity (veh/h)	468	729	1255			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>		
Volume Total	32	8	262	317		
Volume Left	9	8	0	0		
Volume Right	23	0	0	2		
cSH	630	1255	1700	1700		
Volume to Capacity	0.05	0.01	0.15	0.19		
Queue Length 95th (m)	1.3	0.2	0.0	0.0		
Control Delay (s)	11.0	7.9	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	11.0	0.2		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.7			
Intersection Capacity Utilization			25.4%	ICU Level of Service	A	
Analysis Period (min)			15			



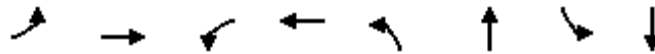
350 Wellington Road 7  
5: Wellington Road 7 & South Access

HCM Unsignalized Intersection Capacity Analysis  
Total (2027) AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	24	8	242	310	1
Future Volume (Veh/h)	6	24	8	242	310	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	26	9	263	337	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)						
pX, platoon unblocked						
vC, conflicting volume	618	338	338			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	618	338	338			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	96	99			
cM capacity (veh/h)	452	709	1232			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>		
Volume Total	33	9	263	338		
Volume Left	7	9	0	0		
Volume Right	26	0	0	1		
cSH	633	1232	1700	1700		
Volume to Capacity	0.05	0.01	0.15	0.20		
Queue Length 95th (m)	1.3	0.2	0.0	0.0		
Control Delay (s)	11.0	7.9	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	11.0	0.3		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.7			
Intersection Capacity Utilization			26.4%	ICU Level of Service	A	
Analysis Period (min)			15			

350 Wellington Road 7  
 1: Wellington Road 7 & Wellington Road 18

Queues  
 Total (2027) PM Peak Hour

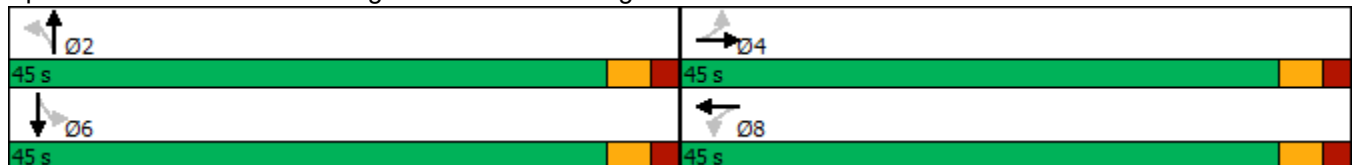


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕		↕
Traffic Volume (vph)	71	204	29	152	66	341	51	260
Future Volume (vph)	71	204	29	152	66	341	51	260
Lane Group Flow (vph)	0	360	0	263	0	452	0	381
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.0		5.0		5.0		5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.80		0.53		0.50		0.42
Control Delay		35.7		22.3		13.1		11.6
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		35.7		22.3		13.1		11.6
Queue Length 50th (m)		43.7		26.9		34.0		26.3
Queue Length 95th (m)		72.8		47.0		76.7		60.6
Internal Link Dist (m)		549.0		565.6		505.0		454.0
Turn Bay Length (m)								
Base Capacity (vph)		862		938		901		898
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.42		0.28		0.50		0.42

Intersection Summary

















Cycle Length: 90  
 Actuated Cycle Length: 71  
 Natural Cycle: 80  
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Wellington Road 7 & Wellington Road 18





















350 Wellington Road 7  
1: Wellington Road 7 & Wellington Road 18

HCM Signalized Intersection Capacity Analysis  
Total (2027) PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	204	70	29	152	72	66	341	27	51	260	55
Future Volume (vph)	71	204	70	29	152	72	66	341	27	51	260	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			0.96			0.99			0.98	
Flt Protected		0.99			0.99			0.99			0.99	
Satd. Flow (prot)		1749			1743			1760			1739	
Flt Permitted		0.85			0.93			0.89			0.90	
Satd. Flow (perm)		1507			1632			1586			1574	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	74	212	73	30	158	75	69	355	28	53	271	57
RTOR Reduction (vph)	0	13	0	0	21	0	0	2	0	0	6	0
Lane Group Flow (vph)	0	347	0	0	242	0	0	450	0	0	375	0
Heavy Vehicles (%)	5%	4%	6%	0%	7%	0%	10%	6%	0%	2%	7%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		20.7			20.7			40.3			40.3	
Effective Green, g (s)		20.7			20.7			40.3			40.3	
Actuated g/C Ratio		0.29			0.29			0.57			0.57	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		439			475			900			893	
v/s Ratio Prot												
v/s Ratio Perm		c0.23			0.15			c0.28			0.24	
v/c Ratio		0.79			0.51			0.50			0.42	
Uniform Delay, d1		23.2			20.9			9.3			8.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		9.4			0.9			2.0			1.5	
Delay (s)		32.6			21.9			11.2			10.2	
Level of Service		C			C			B			B	
Approach Delay (s)		32.6			21.9			11.2			10.2	
Approach LOS		C			C			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			18.2					HCM 2000 Level of Service			B	
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			71.0					Sum of lost time (s)		10.0		
Intersection Capacity Utilization			71.7%					ICU Level of Service			C	
Analysis Period (min)			15									
c	Critical Lane Group											












350 Wellington Road 7  
 2: Middlebrook Rd/David St W & Wellington Road 7

HCM Unsignalized Intersection Capacity Analysis  
 Total (2027) PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	19	26	41	17	34	16	436	100	30	348	9
Future Volume (Veh/h)	5	19	26	41	17	34	16	436	100	30	348	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	20	27	43	18	36	17	459	105	32	366	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	972	1032	370	1012	984	512	375			564		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	972	1032	370	1012	984	512	375			564		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	97	91	96	77	92	94	99			97		
cM capacity (veh/h)	199	224	649	187	239	556	1151			1018		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	52	97	17	564	32	375						
Volume Left	5	43	17	0	32	0						
Volume Right	27	36	0	105	0	9						
cSH	333	262	1151	1700	1018	1700						
Volume to Capacity	0.16	0.37	0.01	0.33	0.03	0.22						
Queue Length 95th (m)	4.4	13.1	0.4	0.0	0.8	0.0						
Control Delay (s)	17.8	26.6	8.2	0.0	8.7	0.0						
Lane LOS	C	D	A		A							
Approach Delay (s)	17.8	26.6	0.2		0.7							
Approach LOS	C	D										
Intersection Summary												
Average Delay			3.4									
Intersection Capacity Utilization			47.6%		ICU Level of Service					A		
Analysis Period (min)			15									











350 Wellington Road 7  
3: Wellington Road 7 & North Access

HCM Unsignalized Intersection Capacity Analysis  
Total (2027) PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	10	16	427	363	10
Future Volume (Veh/h)	6	10	16	427	363	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	11	17	464	395	11
<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)						
pX, platoon unblocked						
vC, conflicting volume	898	400	406			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	898	400	406			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	98	99			
cM capacity (veh/h)	308	654	1164			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>		
Volume Total	18	17	464	406		
Volume Left	7	17	0	0		
Volume Right	11	0	0	11		
cSH	455	1164	1700	1700		
Volume to Capacity	0.04	0.01	0.27	0.24		
Queue Length 95th (m)	1.0	0.4	0.0	0.0		
Control Delay (s)	13.2	8.1	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	13.2	0.3		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.4			
Intersection Capacity Utilization			32.5%	ICU Level of Service	A	
Analysis Period (min)			15			











350 Wellington Road 7  
4: Wellington Road 7 & Centre Access

HCM Unsignalized Intersection Capacity Analysis  
Total (2027) PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	13	22	434	360	8
Future Volume (Veh/h)	5	13	22	434	360	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	14	24	472	391	9
<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)						
pX, platoon unblocked						
vC, conflicting volume	916	396	400			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	916	396	400			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	98	98			
cM capacity (veh/h)	299	658	1170			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>		
Volume Total	19	24	472	400		
Volume Left	5	24	0	0		
Volume Right	14	0	0	9		
cSH	500	1170	1700	1700		
Volume to Capacity	0.04	0.02	0.28	0.24		
Queue Length 95th (m)	0.9	0.5	0.0	0.0		
Control Delay (s)	12.5	8.1	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	12.5	0.4		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.5			
Intersection Capacity Utilization			32.8%	ICU Level of Service	A	
Analysis Period (min)			15			

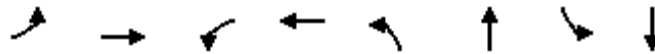
350 Wellington Road 7  
5: Wellington Road 7 & South Access

HCM Unsignalized Intersection Capacity Analysis  
Total (2027) PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	15	26	453	367	6
Future Volume (Veh/h)	3	15	26	453	367	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	16	28	492	399	7
<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)						
pX, platoon unblocked						
vC, conflicting volume	950	402	406			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	950	402	406			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	98			
cM capacity (veh/h)	284	652	1164			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>		
Volume Total	19	28	492	406		
Volume Left	3	28	0	0		
Volume Right	16	0	0	7		
cSH	541	1164	1700	1700		
Volume to Capacity	0.04	0.02	0.29	0.24		
Queue Length 95th (m)	0.9	0.6	0.0	0.0		
Control Delay (s)	11.9	8.2	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	11.9	0.4		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.5			
Intersection Capacity Utilization			33.8%	ICU Level of Service	A	
Analysis Period (min)			15			

350 Wellington Road 7  
 1: Wellington Road 7 & Wellington Road 18

Queues  
 Total (2032) AM Peak Hour

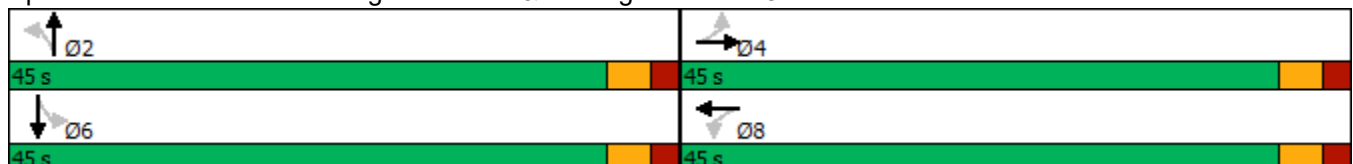


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕		↕
Traffic Volume (vph)	51	135	19	166	67	199	47	252
Future Volume (vph)	51	135	19	166	67	199	47	252
Lane Group Flow (vph)	0	259	0	246	0	311	0	368
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.0		5.0		5.0		5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.74		0.61		0.36		0.39
Control Delay		33.7		27.1		8.9		9.0
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		33.7		27.1		8.9		9.0
Queue Length 50th (m)		27.8		25.7		17.0		20.3
Queue Length 95th (m)		51.2		46.4		41.3		48.0
Internal Link Dist (m)		549.0		565.6		505.0		454.0
Turn Bay Length (m)								
Base Capacity (vph)		855		988		858		939
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.30		0.25		0.36		0.39

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 66.1  
 Natural Cycle: 80  
 Control Type: Semi Act-Uncoord

















Splits and Phases: 1: Wellington Road 7 & Wellington Road 18























350 Wellington Road 7  
1: Wellington Road 7 & Wellington Road 18

HCM Signalized Intersection Capacity Analysis  
Total (2032) AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	135	62	19	166	51	67	199	33	47	252	54
Future Volume (vph)	51	135	62	19	166	51	67	199	33	47	252	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			0.97			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		1609			1663			1620			1649	
Flt Permitted		0.86			0.97			0.86			0.93	
Satd. Flow (perm)		1393			1613			1407			1539	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	53	141	65	20	173	53	70	207	34	49	262	56
RTOR Reduction (vph)	0	18	0	0	15	0	0	4	0	0	5	0
Lane Group Flow (vph)	0	241	0	0	231	0	0	307	0	0	363	0
Heavy Vehicles (%)	12%	11%	18%	9%	12%	6%	19%	14%	6%	0%	14%	14%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		15.9			15.9			40.2			40.2	
Effective Green, g (s)		15.9			15.9			40.2			40.2	
Actuated g/C Ratio		0.24			0.24			0.61			0.61	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		335			387			855			935	
v/s Ratio Prot												
v/s Ratio Perm		c0.17			0.14			0.22			c0.24	
v/c Ratio		0.72			0.60			0.36			0.39	
Uniform Delay, d1		23.0			22.3			6.5			6.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		7.2			2.5			1.2			1.2	
Delay (s)		30.2			24.7			7.7			7.9	
Level of Service		C			C			A			A	
Approach Delay (s)		30.2			24.7			7.7			7.9	
Approach LOS		C			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			16.2				HCM 2000 Level of Service		B			
HCM 2000 Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			66.1				Sum of lost time (s)		10.0			
Intersection Capacity Utilization			60.8%				ICU Level of Service		B			
Analysis Period (min)			15									
c Critical Lane Group												











350 Wellington Road 7  
 2: Middlebrook Rd/David St W & Wellington Road 7

HCM Unsignalized Intersection Capacity Analysis  
 Total (2032) AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	19	23	45	14	22	12	292	39	33	371	14
Future Volume (Veh/h)	5	19	23	45	14	22	12	292	39	33	371	14
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	5	20	24	48	15	23	13	311	41	35	395	15
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	840	850	402	856	838	332	410			352		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	840	850	402	856	838	332	410			352		
tC, single (s)	7.4	6.5	6.3	7.2	6.6	6.3	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.8	4.0	3.4	3.6	4.1	3.4	2.4			2.2		
p0 queue free %	98	93	96	80	95	97	99			97		
cM capacity (veh/h)	227	287	625	240	281	697	1035			1218		
Direction, Lane #												
	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	49	86	13	352	35	410						
Volume Left	5	48	13	0	35	0						
Volume Right	24	23	0	41	0	15						
cSH	377	300	1035	1700	1218	1700						
Volume to Capacity	0.13	0.29	0.01	0.21	0.03	0.24						
Queue Length 95th (m)	3.5	9.2	0.3	0.0	0.7	0.0						
Control Delay (s)	16.0	21.7	8.5	0.0	8.0	0.0						
Lane LOS	C	C	A		A							
Approach Delay (s)	16.0	21.7	0.3		0.6							
Approach LOS	C	C										
Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilization			44.9%		ICU Level of Service					A		
Analysis Period (min)			15									












350 Wellington Road 7  
3: Wellington Road 7 & North Access

HCM Unsignalized Intersection Capacity Analysis  
Total (2032) AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	15	5	303	349	3
Future Volume (Veh/h)	10	15	5	303	349	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	16	5	329	379	3
<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)						
pX, platoon unblocked						
vC, conflicting volume	720	380	382			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	720	380	382			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	98	100			
cM capacity (veh/h)	396	671	1188			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>		
Volume Total	27	5	329	382		
Volume Left	11	5	0	0		
Volume Right	16	0	0	3		
cSH	523	1188	1700	1700		
Volume to Capacity	0.05	0.00	0.19	0.22		
Queue Length 95th (m)	1.3	0.1	0.0	0.0		
Control Delay (s)	12.3	8.0	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	12.3	0.1		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.5			
Intersection Capacity Utilization			28.6%	ICU Level of Service	A	
Analysis Period (min)			15			











350 Wellington Road 7  
4: Wellington Road 7 & Centre Access

HCM Unsignalized Intersection Capacity Analysis  
Total (2032) AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	21	7	297	357	2
Future Volume (Veh/h)	8	21	7	297	357	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	23	8	323	388	2
<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)						
pX, platoon unblocked						
vC, conflicting volume	728	389	390			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	728	389	390			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	97	99			
cM capacity (veh/h)	391	664	1180			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>		
Volume Total	32	8	323	390		
Volume Left	9	8	0	0		
Volume Right	23	0	0	2		
cSH	555	1180	1700	1700		
Volume to Capacity	0.06	0.01	0.19	0.23		
Queue Length 95th (m)	1.5	0.2	0.0	0.0		
Control Delay (s)	11.9	8.1	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	11.9	0.2		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.6			
Intersection Capacity Utilization			28.9%	ICU Level of Service	A	
Analysis Period (min)			15			

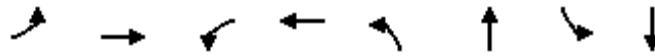
350 Wellington Road 7  
5: Wellington Road 7 & South Access

HCM Unsignalized Intersection Capacity Analysis  
Total (2032) AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	24	8	298	377	1
Future Volume (Veh/h)	6	24	8	298	377	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	26	9	324	410	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)						
pX, platoon unblocked						
vC, conflicting volume	752	410	411			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	752	410	411			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	96	99			
cM capacity (veh/h)	378	646	1159			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>		
Volume Total	33	9	324	411		
Volume Left	7	9	0	0		
Volume Right	26	0	0	1		
cSH	561	1159	1700	1700		
Volume to Capacity	0.06	0.01	0.19	0.24		
Queue Length 95th (m)	1.5	0.2	0.0	0.0		
Control Delay (s)	11.8	8.1	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	11.8	0.2		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.6			
Intersection Capacity Utilization			29.9%	ICU Level of Service	A	
Analysis Period (min)			15			

350 Wellington Road 7  
1: Wellington Road 7 & Wellington Road 18

Queues  
Total (2032) PM Peak Hour

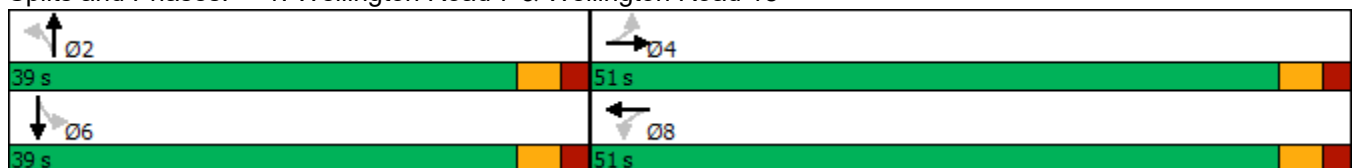


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕		↕
Traffic Volume (vph)	89	255	34	189	81	424	64	323
Future Volume (vph)	89	255	34	189	81	424	64	323
Lane Group Flow (vph)	0	447	0	326	0	560	0	474
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
Total Split (s)	51.0	51.0	51.0	51.0	39.0	39.0	39.0	39.0
Total Split (%)	56.7%	56.7%	56.7%	56.7%	43.3%	43.3%	43.3%	43.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.0		5.0		5.0		5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.84		0.55		0.72		0.61
Control Delay		34.0		19.1		22.3		18.3
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		34.0		19.1		22.3		18.3
Queue Length 50th (m)		51.3		30.4		53.8		41.4
Queue Length 95th (m)		85.0		51.8		#138.0		96.5
Internal Link Dist (m)		549.0		565.6		505.0		454.0
Turn Bay Length (m)								
Base Capacity (vph)		1006		1112		782		775
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.44		0.29		0.72		0.61

Intersection Summary

















Cycle Length: 90  
 Actuated Cycle Length: 68.7  
 Natural Cycle: 80  
 Control Type: Semi Act-Uncoord  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Wellington Road 7 & Wellington Road 18





















350 Wellington Road 7  
1: Wellington Road 7 & Wellington Road 18

HCM Signalized Intersection Capacity Analysis  
Total (2032) PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	255	84	34	189	90	81	424	33	64	323	68
Future Volume (vph)	89	255	84	34	189	90	81	424	33	64	323	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			0.96			0.99			0.98	
Flt Protected		0.99			0.99			0.99			0.99	
Satd. Flow (prot)		1750			1743			1761			1739	
Flt Permitted		0.83			0.93			0.88			0.88	
Satd. Flow (perm)		1476			1628			1559			1537	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	93	266	88	35	197	94	84	442	34	67	336	71
RTOR Reduction (vph)	0	13	0	0	21	0	0	2	0	0	5	0
Lane Group Flow (vph)	0	434	0	0	305	0	0	558	0	0	469	0
Heavy Vehicles (%)	5%	4%	6%	0%	7%	0%	10%	6%	0%	2%	7%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		24.2			24.2			34.4			34.4	
Effective Green, g (s)		24.2			24.2			34.4			34.4	
Actuated g/C Ratio		0.35			0.35			0.50			0.50	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		520			574			781			770	
v/s Ratio Prot												
v/s Ratio Perm		c0.29			0.19			c0.36			0.30	
v/c Ratio		0.83			0.53			0.71			0.61	
Uniform Delay, d1		20.4			17.7			13.3			12.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		11.1			0.9			5.5			3.6	
Delay (s)		31.4			18.6			18.8			15.8	
Level of Service		C			B			B			B	
Approach Delay (s)		31.4			18.6			18.8			15.8	
Approach LOS		C			B			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			21.1					HCM 2000 Level of Service			C	
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			68.6					Sum of lost time (s)		10.0		
Intersection Capacity Utilization			87.6%					ICU Level of Service		E		
Analysis Period (min)			15									
c Critical Lane Group												

350 Wellington Road 7  
 2: Middlebrook Rd/David St W & Wellington Road 7











HCM Unsignalized Intersection Capacity Analysis  
 Total (2032) PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	23	33	51	22	41	20	530	124	36	426	11
Future Volume (Veh/h)	6	23	33	51	22	41	20	530	124	36	426	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	6	24	35	54	23	43	21	558	131	38	448	12
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1184	1261	454	1236	1202	624	460			689		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1184	1261	454	1236	1202	624	460			689		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	95	85	94	55	87	91	98			96		
cM capacity (veh/h)	131	161	582	121	175	480	1070			915		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	65	120	21	689	38	460						
Volume Left	6	54	21	0	38	0						
Volume Right	35	43	0	131	0	12						
cSH	255	180	1070	1700	915	1700						
Volume to Capacity	0.25	0.67	0.02	0.41	0.04	0.27						
Queue Length 95th (m)	7.9	31.5	0.5	0.0	1.0	0.0						
Control Delay (s)	23.9	58.0	8.4	0.0	9.1	0.0						
Lane LOS	C	F	A		A							
Approach Delay (s)	23.9	58.0	0.2		0.7							
Approach LOS	C	F										
Intersection Summary												
Average Delay			6.5									
Intersection Capacity Utilization			55.2%		ICU Level of Service					B		
Analysis Period (min)			15									













350 Wellington Road 7  
3: Wellington Road 7 & North Access

HCM Unsignalized Intersection Capacity Analysis  
Total (2032) PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	10	16	530	449	10
Future Volume (Veh/h)	6	10	16	530	449	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	11	17	576	488	11
<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)						
pX, platoon unblocked						
vC, conflicting volume	1104	494	499			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1104	494	499			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	98	98			
cM capacity (veh/h)	232	580	1075			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>		
Volume Total	18	17	576	499		
Volume Left	7	17	0	0		
Volume Right	11	0	0	11		
cSH	366	1075	1700	1700		
Volume to Capacity	0.05	0.02	0.34	0.29		
Queue Length 95th (m)	1.2	0.4	0.0	0.0		
Control Delay (s)	15.3	8.4	0.0	0.0		
Lane LOS	C	A				
Approach Delay (s)	15.3	0.2		0.0		
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			0.4			
Intersection Capacity Utilization			37.9%	ICU Level of Service	A	
Analysis Period (min)			15			











350 Wellington Road 7  
4: Wellington Road 7 & Centre Access

HCM Unsignalized Intersection Capacity Analysis  
Total (2032) PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	13	22	536	445	8
Future Volume (Veh/h)	5	13	22	536	445	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	14	24	583	484	9
<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)						
pX, platoon unblocked						
vC, conflicting volume	1120	488	493			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1120	488	493			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	98	98			
cM capacity (veh/h)	226	583	1081			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>		
Volume Total	19	24	583	493		
Volume Left	5	24	0	0		
Volume Right	14	0	0	9		
cSH	412	1081	1700	1700		
Volume to Capacity	0.05	0.02	0.34	0.29		
Queue Length 95th (m)	1.2	0.5	0.0	0.0		
Control Delay (s)	14.2	8.4	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	14.2	0.3		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.4			
Intersection Capacity Utilization			38.2%	ICU Level of Service	A	
Analysis Period (min)			15			

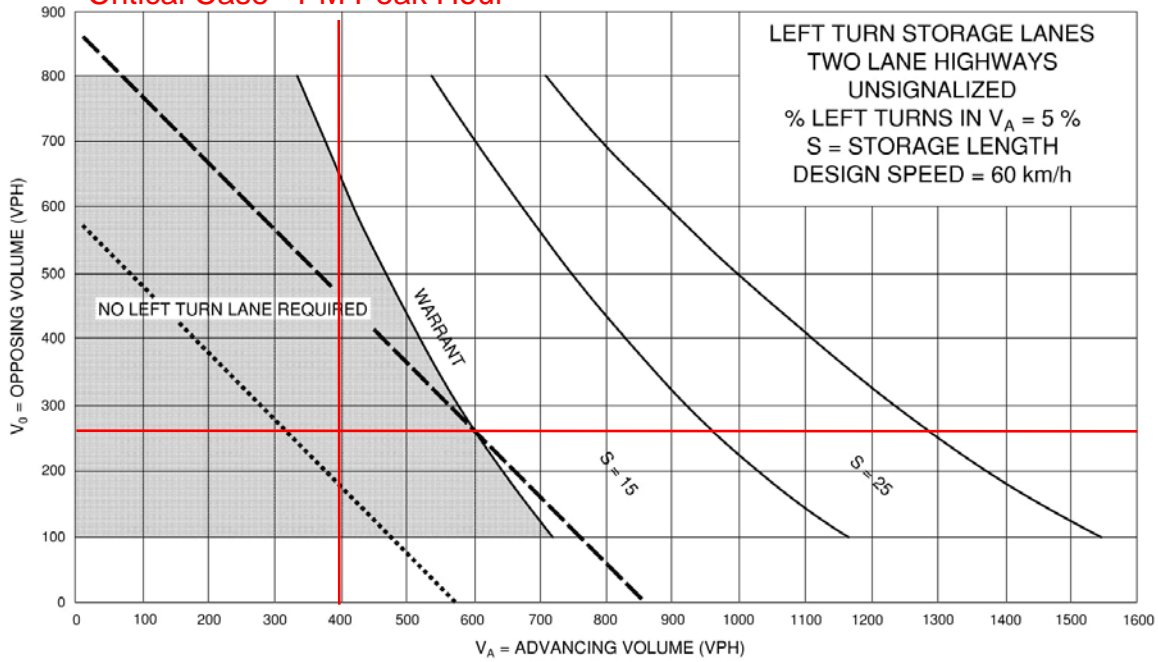
350 Wellington Road 7  
5: Wellington Road 7 & South Access

HCM Unsignalized Intersection Capacity Analysis  
Total (2032) PM Peak Hour

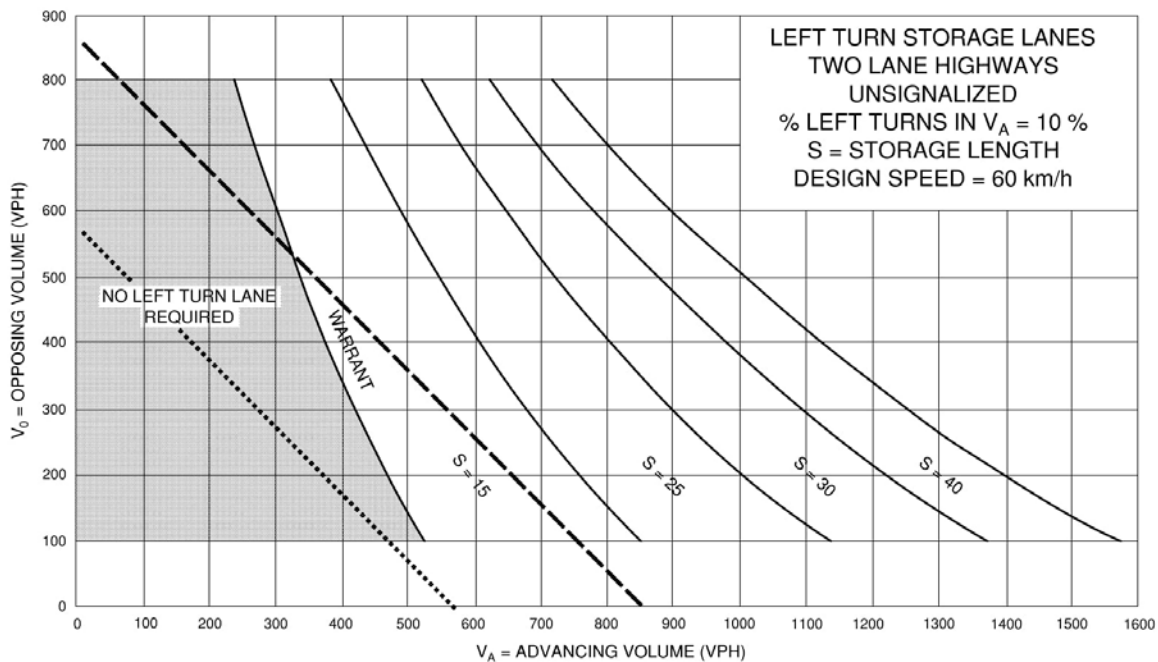
						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	15	26	555	452	6
Future Volume (Veh/h)	3	15	26	555	452	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	16	28	603	491	7
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1154	494	498			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1154	494	498			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	97	97			
cM capacity (veh/h)	214	579	1076			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>		
Volume Total	19	28	603	498		
Volume Left	3	28	0	0		
Volume Right	16	0	0	7		
cSH	456	1076	1700	1700		
Volume to Capacity	0.04	0.03	0.35	0.29		
Queue Length 95th (m)	1.0	0.6	0.0	0.0		
Control Delay (s)	13.2	8.4	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	13.2	0.4		0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			0.4			
Intersection Capacity Utilization			39.2%	ICU Level of Service	A	
Analysis Period (min)			15			

## Appendix F – MTO Left Turn Analysis

**Wellington Road 7 / Middlebrook Road & David Street West**  
**2022 Existing - Northbound Exhibit 9A-6**  
**Critical Case - PM Peak Hour**



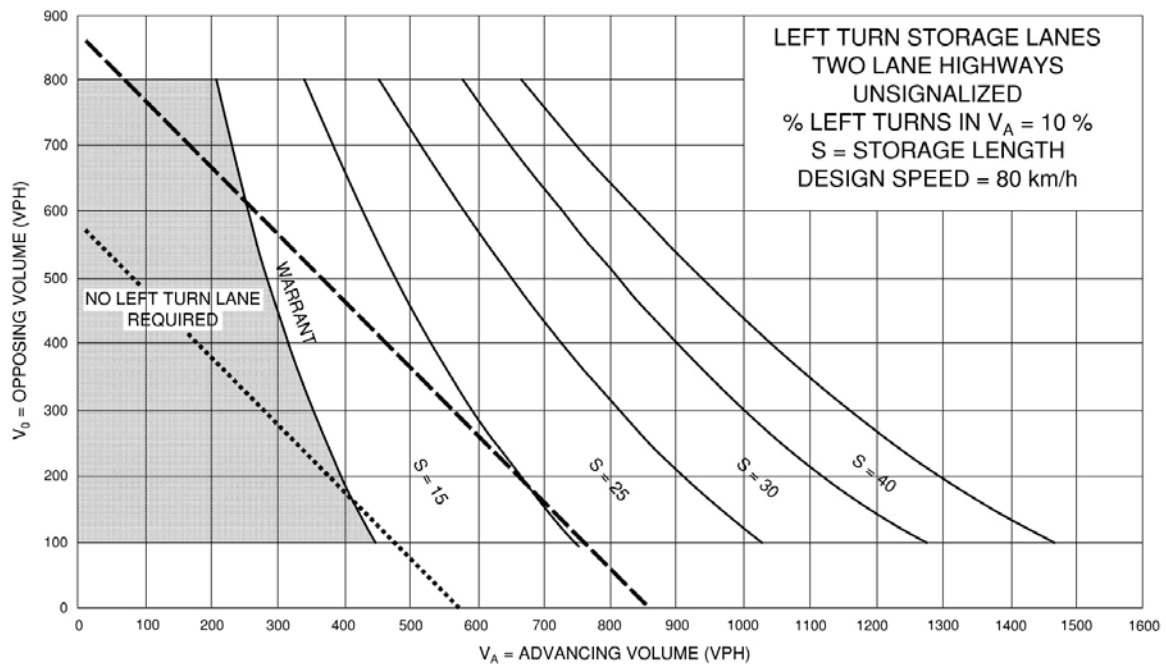
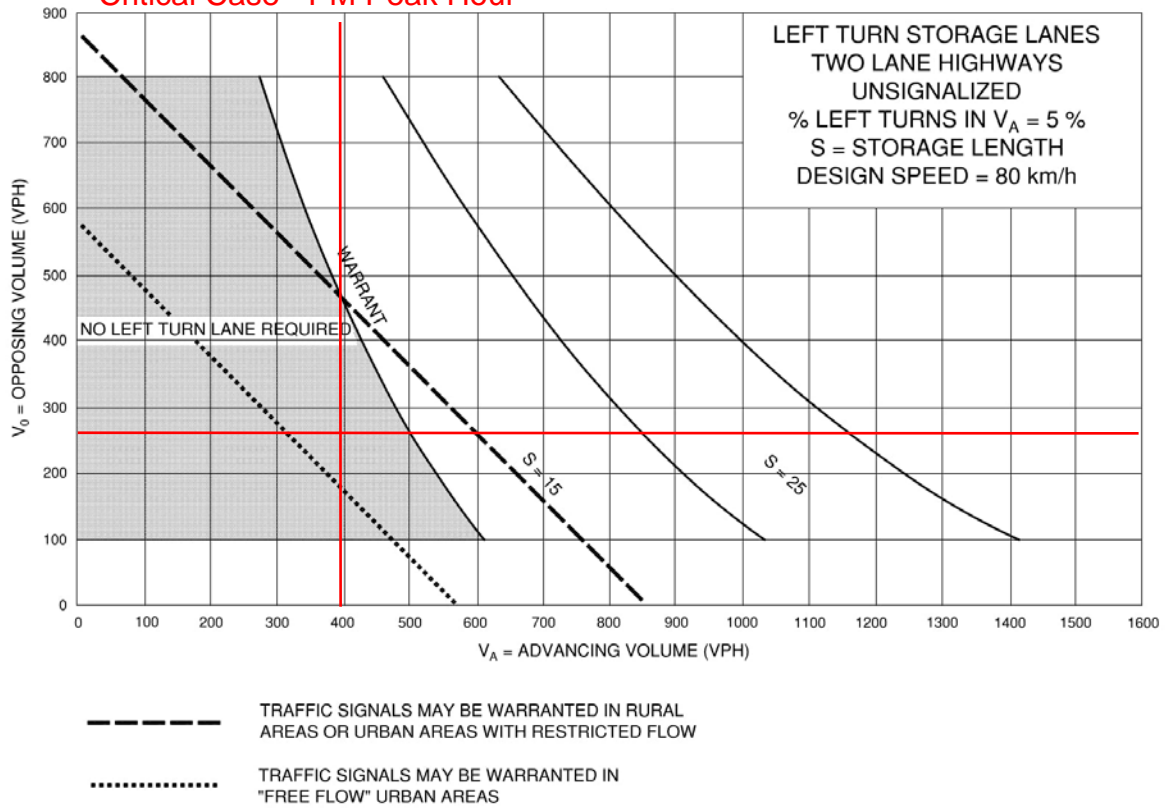
- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW
- ..... TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS



**Wellington Road 7 / Middlebrook Road & David Street West**

**2022 Existing - Northbound Exhibit 9A-14**

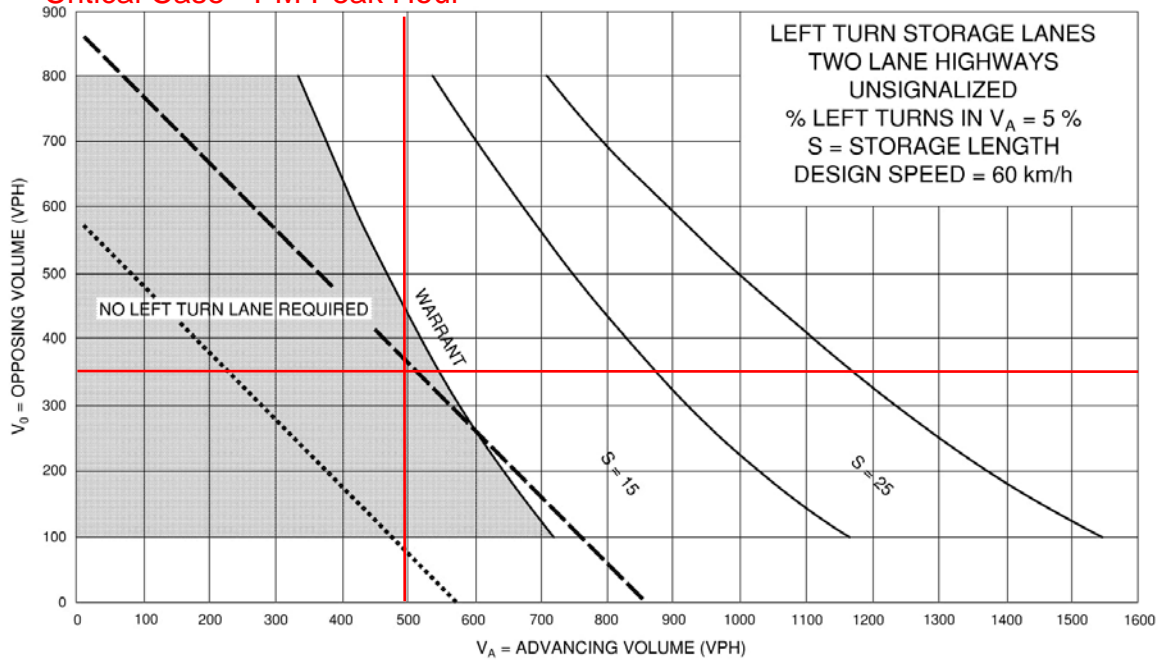
**Critical Case - PM Peak Hour**



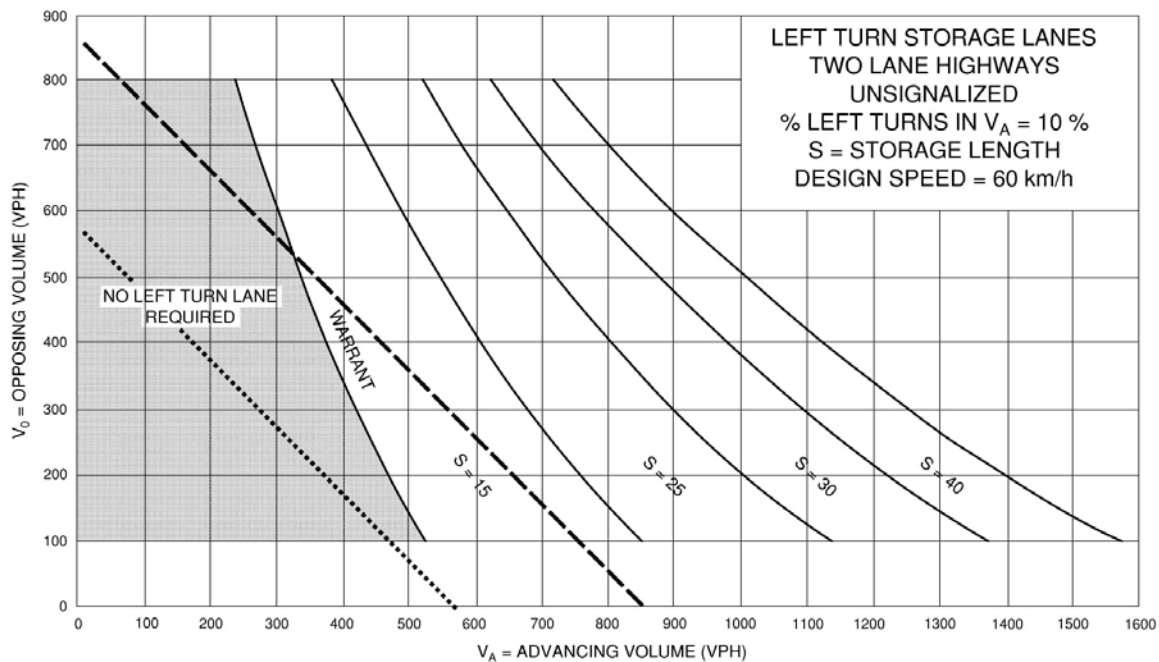
**Wellington Road 7 / Middlebrook Road & David Street West**

**2027 Background - Northbound Exhibit 9A-6**

**Critical Case - PM Peak Hour**



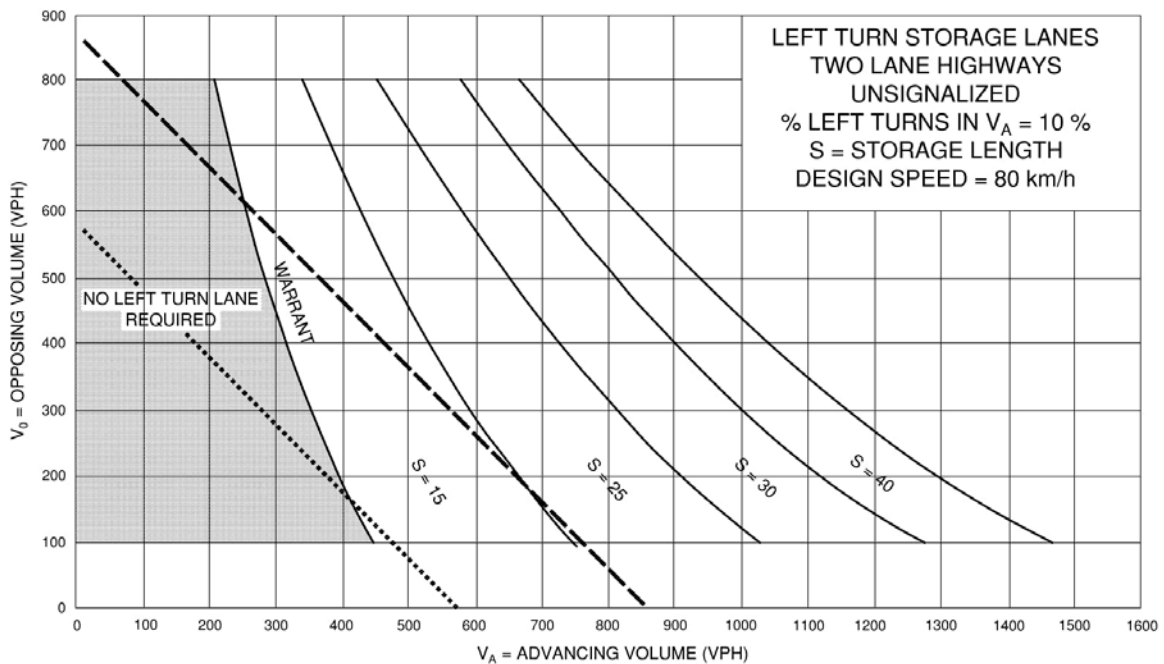
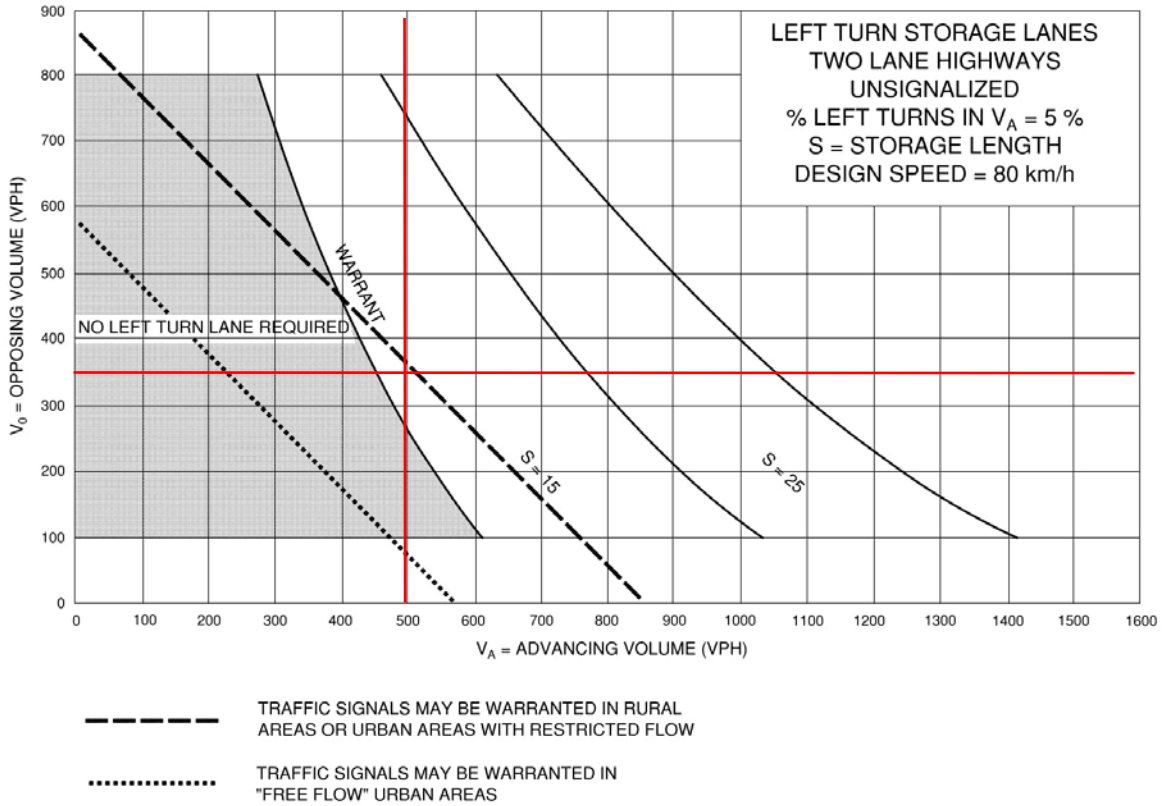
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**Wellington Road 7 / Middlebrook Road & David Street West**

**2027 Background - Northbound Exhibit 9A-14**

**Critical Case - PM Peak Hour**

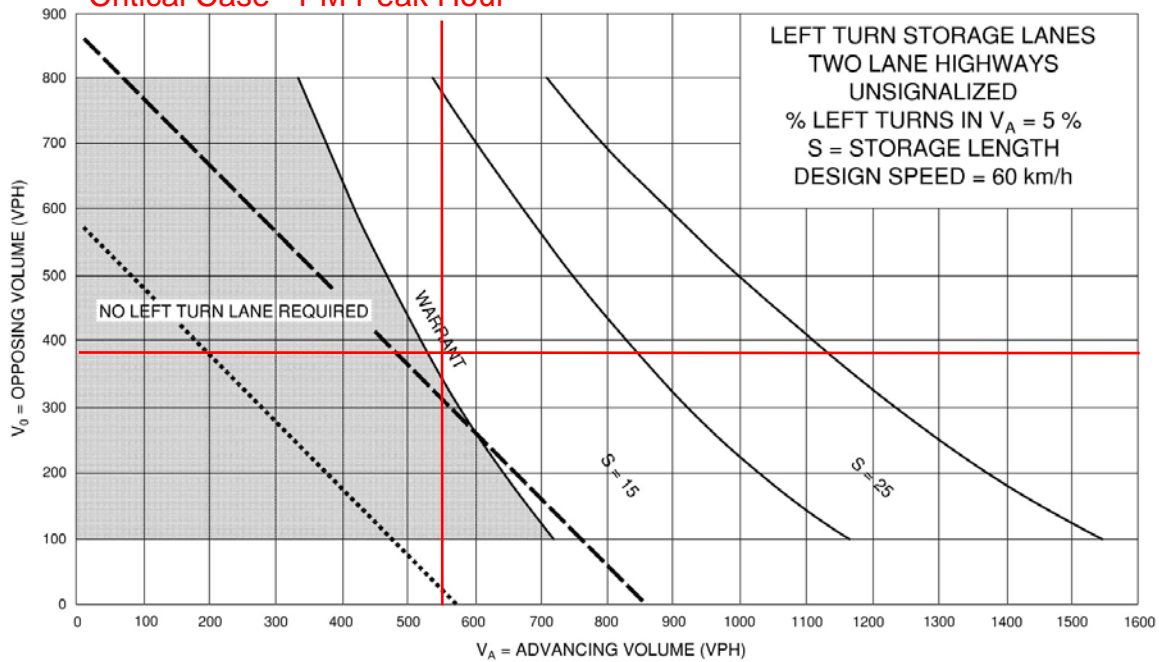




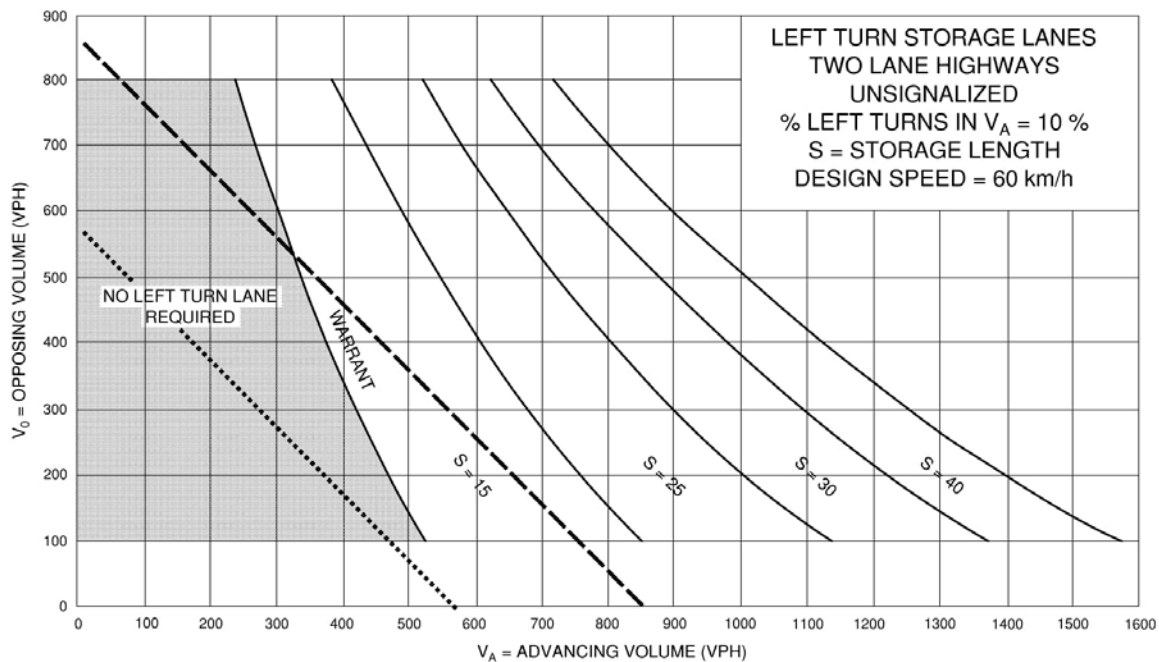
**Wellington Road 7 / Middlebrook Road & David Street West**

2027 Total - Northbound **Exhibit 9A-6**

Critical Case - PM Peak Hour



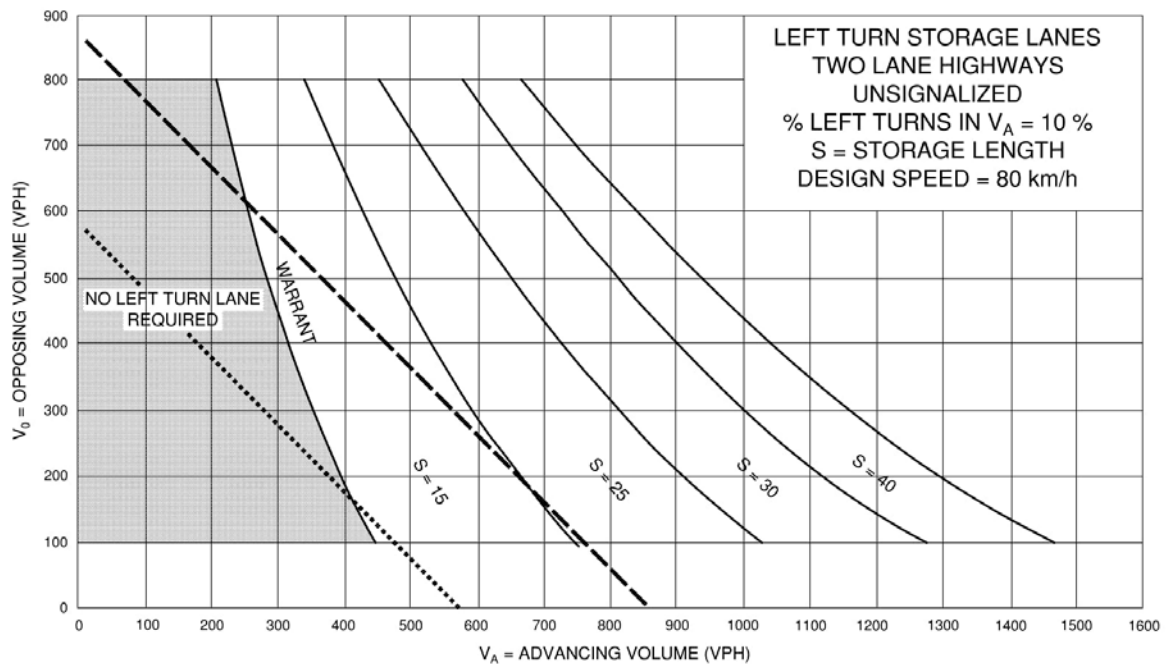
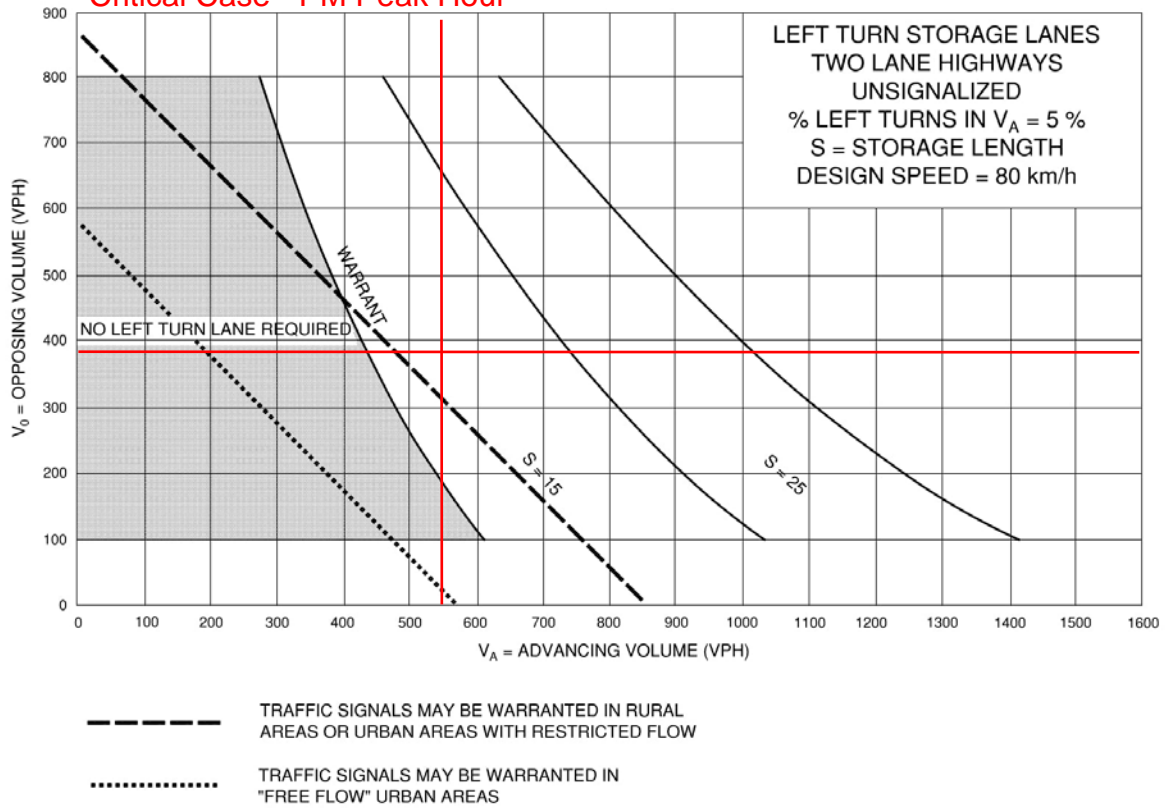
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**Wellington Road 7 / Middlebrook Road & David Street West**

2027 Total - Northbound **Exhibit 9A-14**

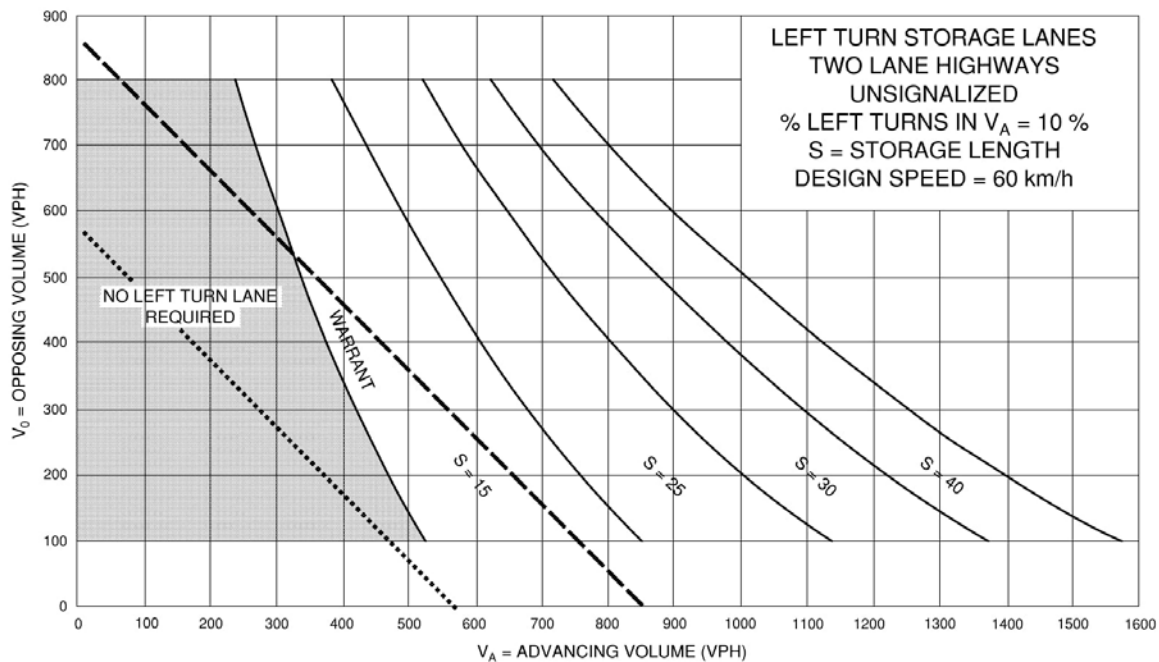
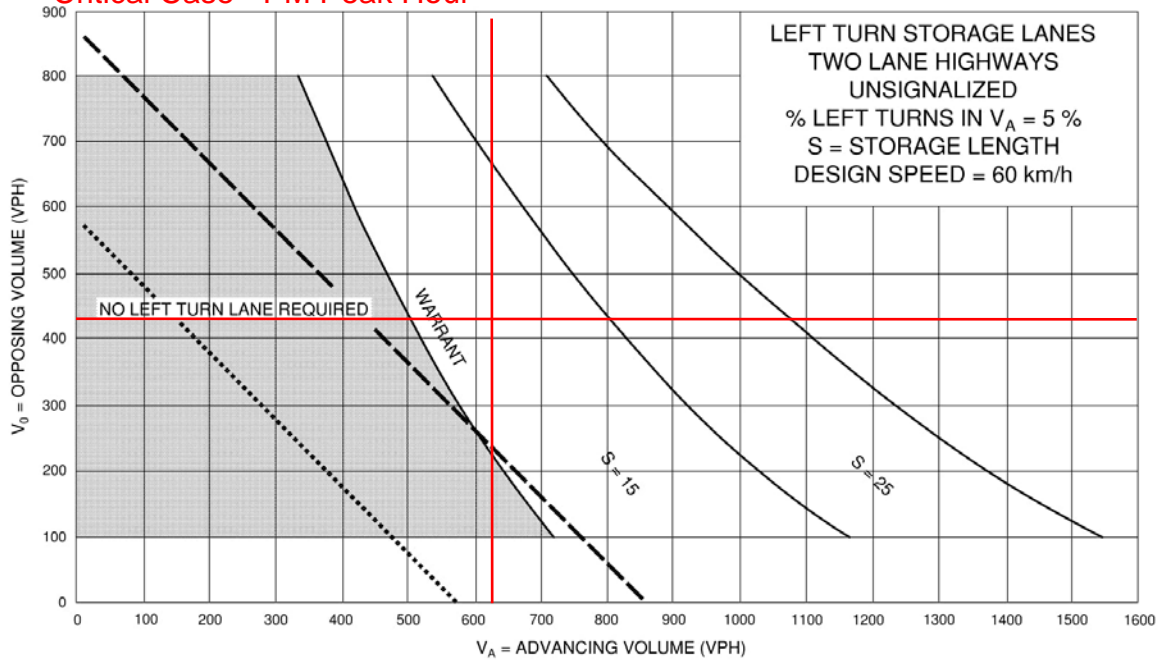
Critical Case - PM Peak Hour



**Wellington Road 7 / Middlebrook Road & David Street West**

2032 Background - Northbound **Exhibit 9A-6**

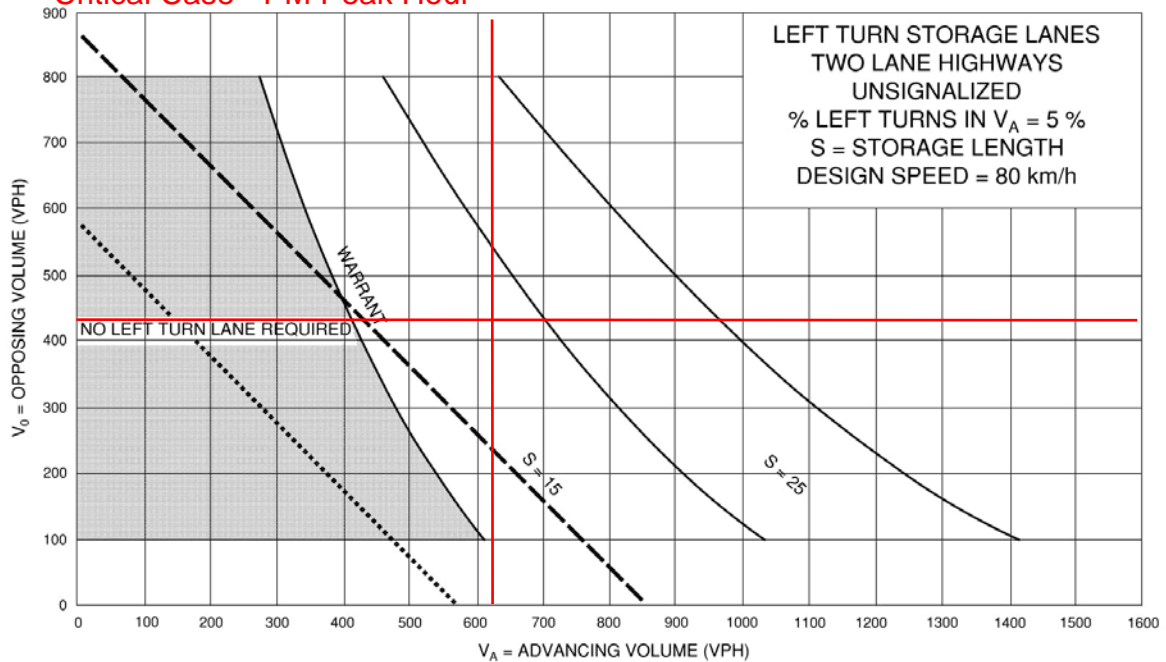
Critical Case - PM Peak Hour



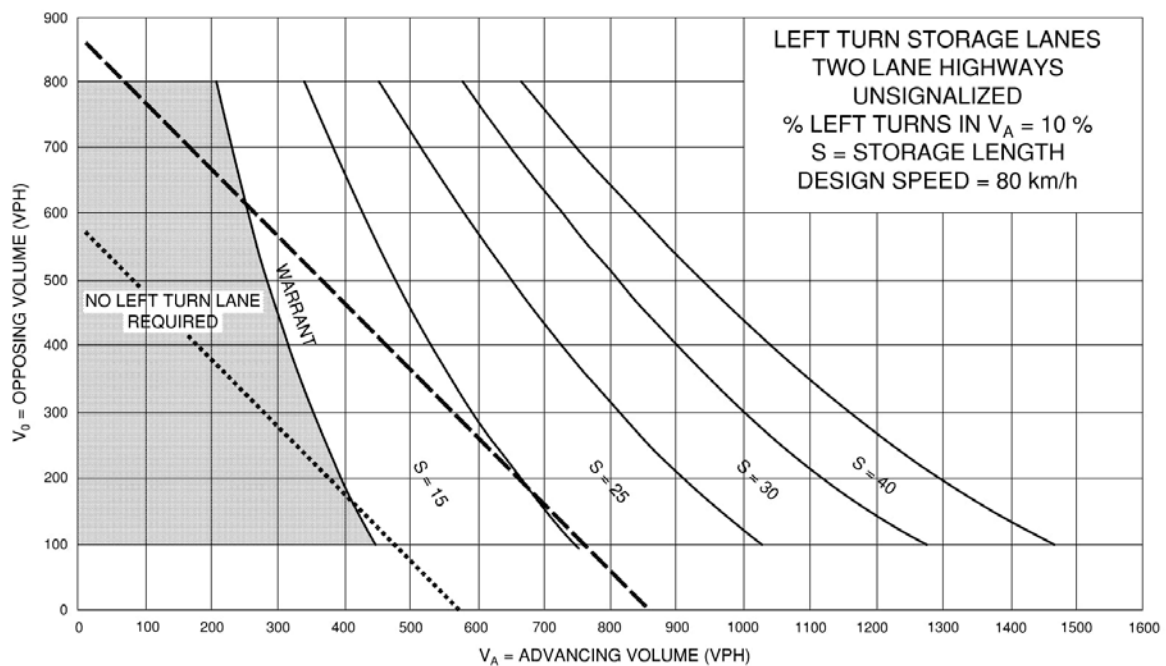
**Wellington Road 7 / Middlebrook Road & David Street West**

2032 Background - Northbound **Exhibit 9A-14**

Critical Case - PM Peak Hour



- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW
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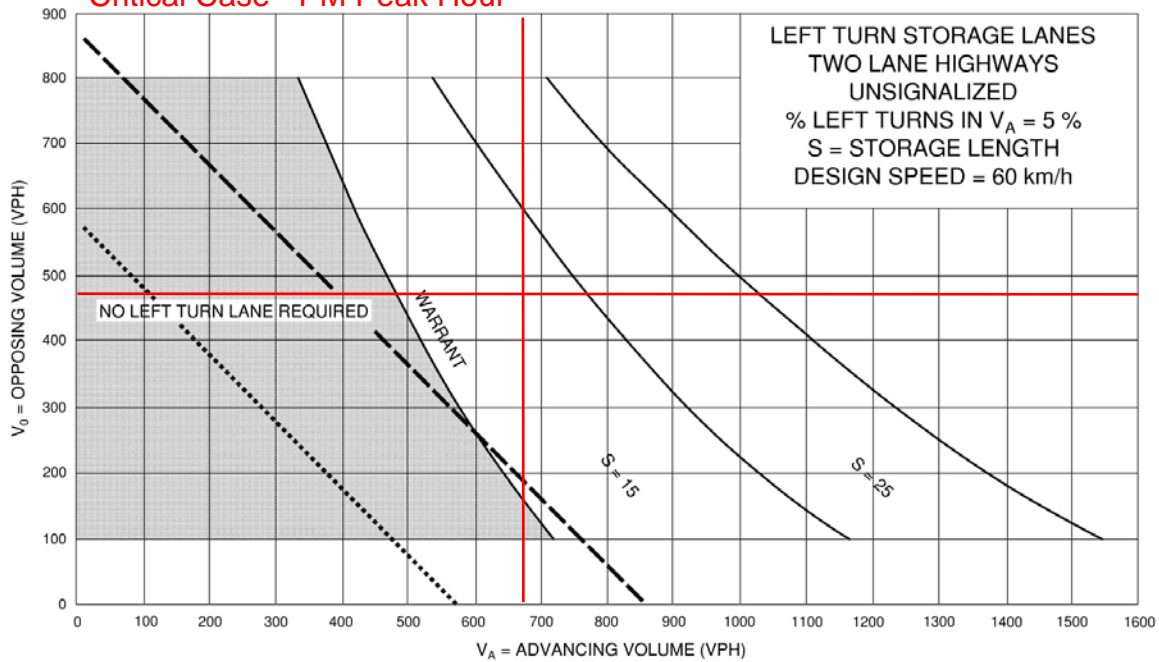


**Wellington Road 7 / Middlebrook Road & David Street West**

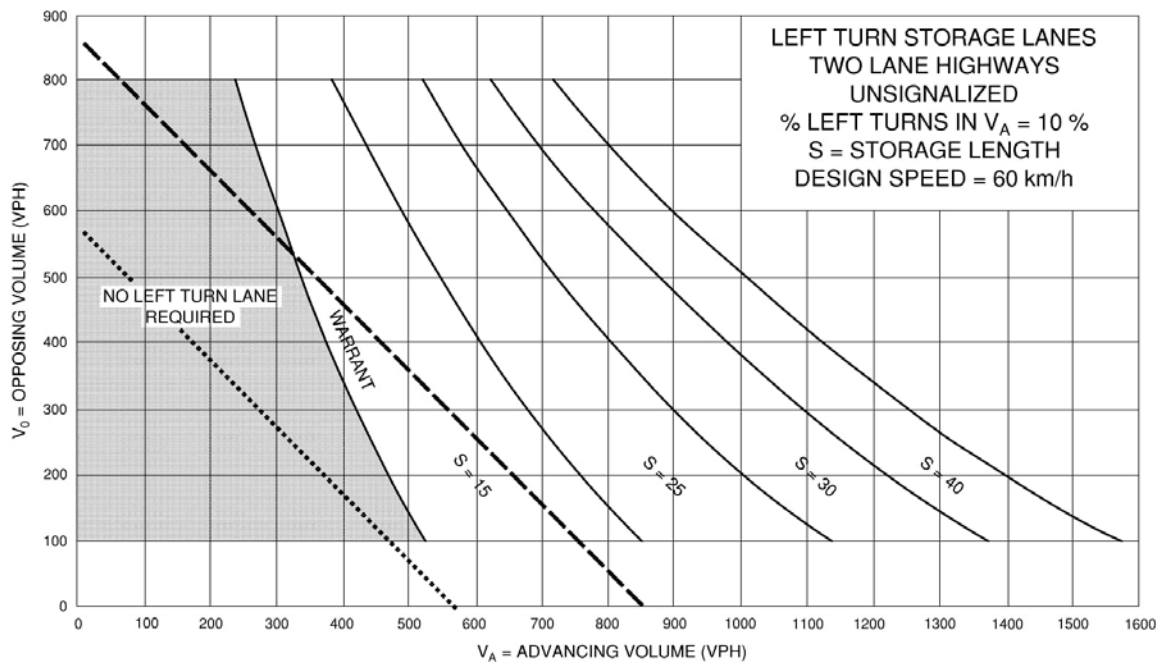
2032 Total - Northbound

**Exhibit 9A-6**

Critical Case - PM Peak Hour



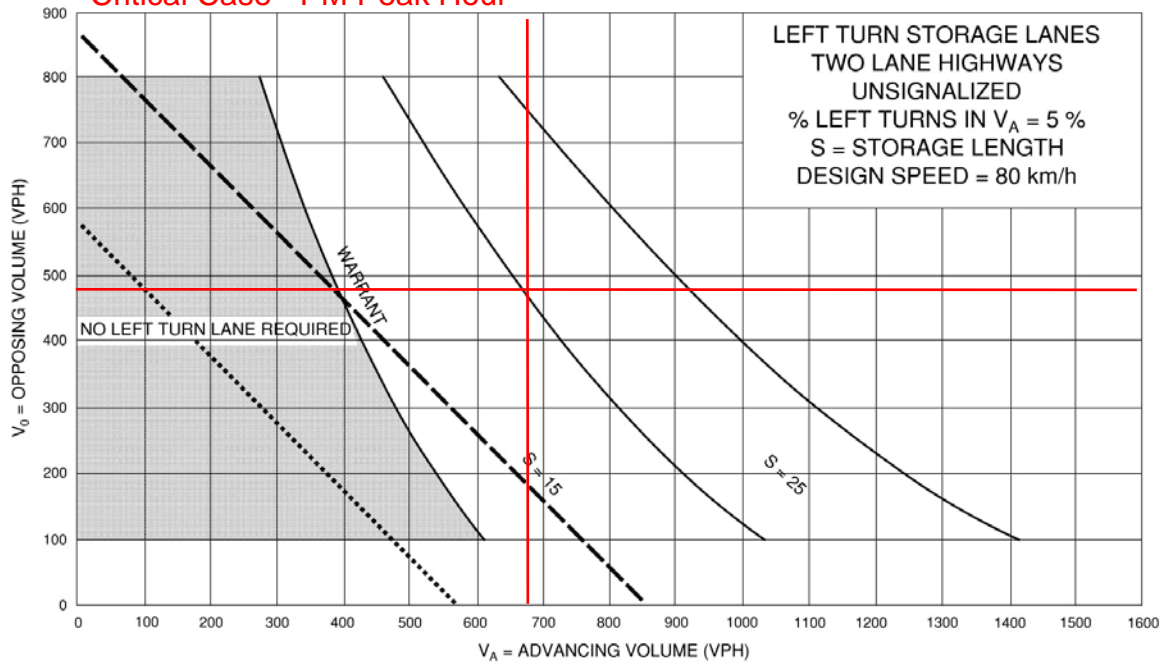
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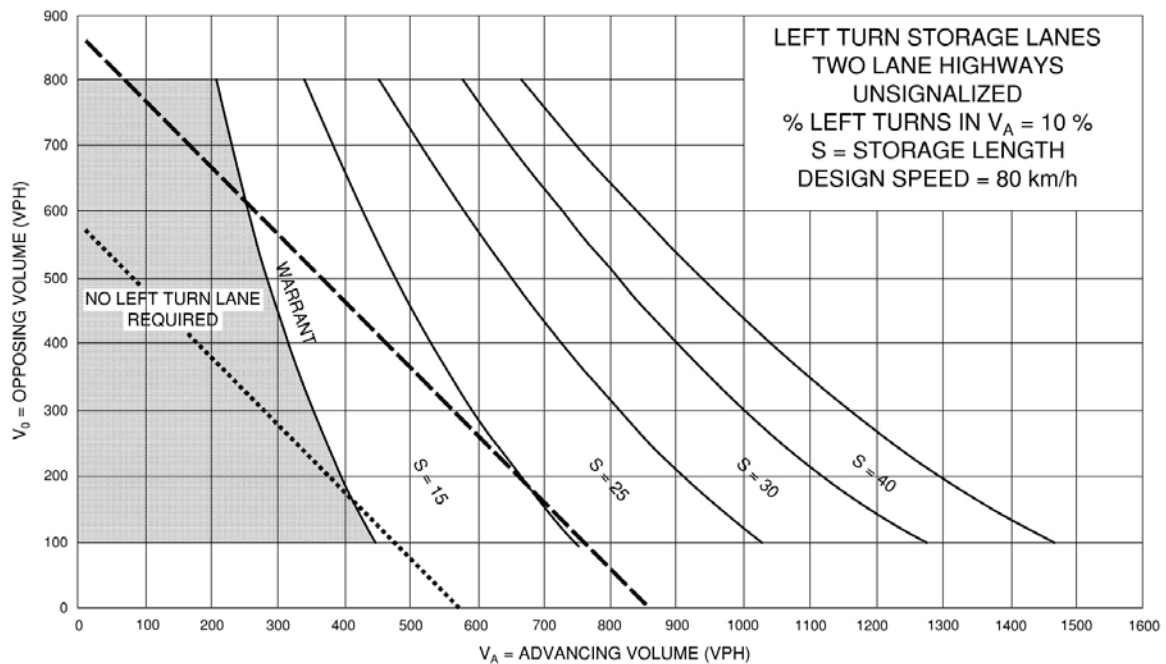
**Wellington Road 7 / Middlebrook Road & David Street West**

2032 Total - Northbound **Exhibit 9A-14**

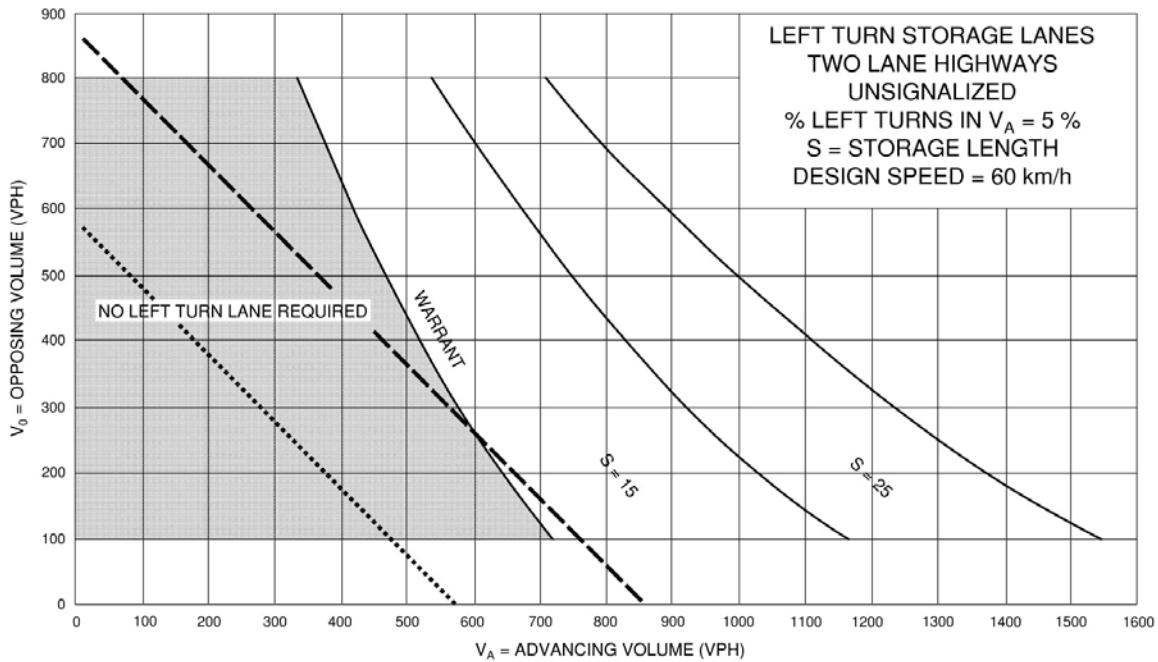
Critical Case - PM Peak Hour



- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW
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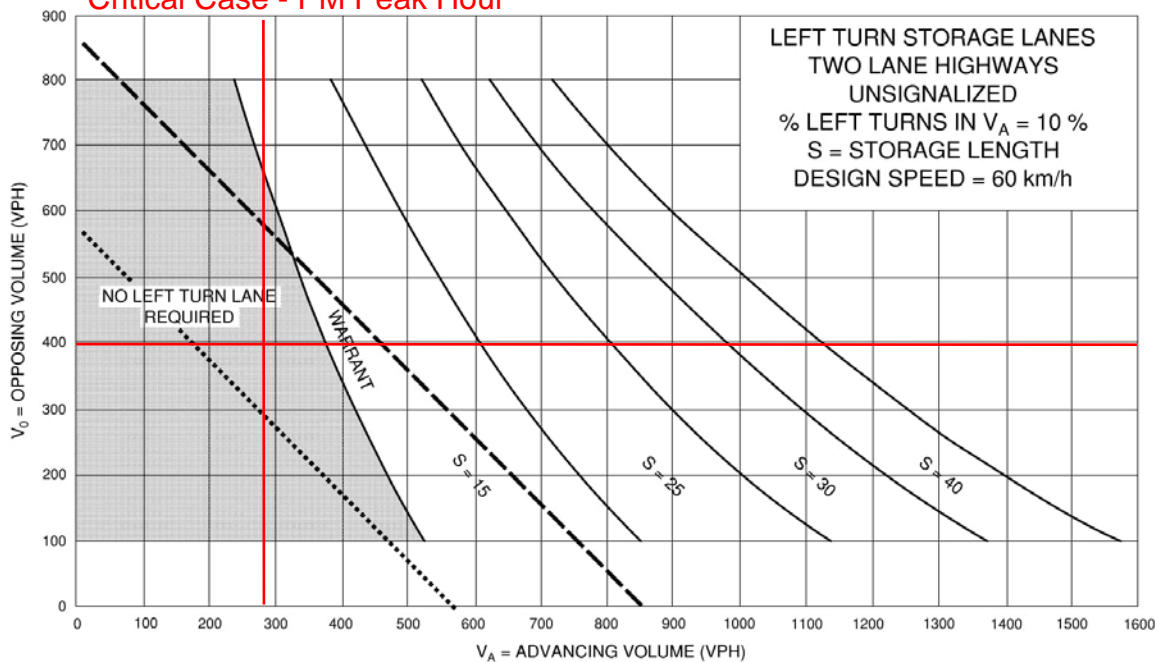
**Exhibit 9A-6**



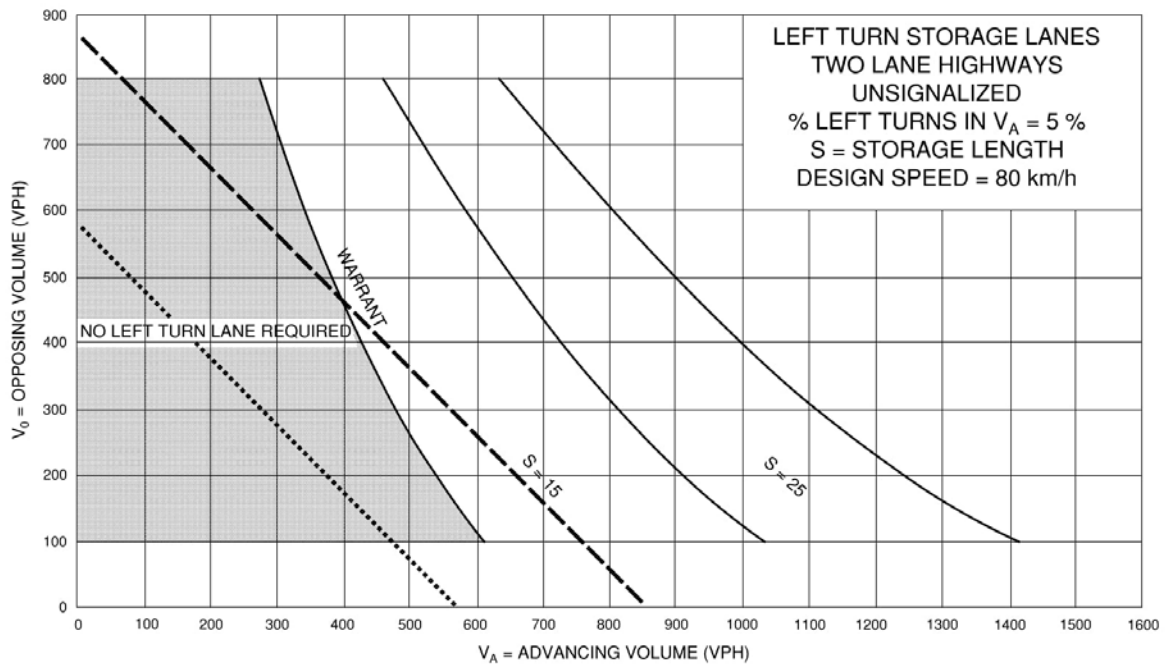
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..... TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

**Wellington Road 7 / Middlebrook Road & David Street West**  
 2022 Existing - Southbound  
 Critical Case - PM Peak Hour



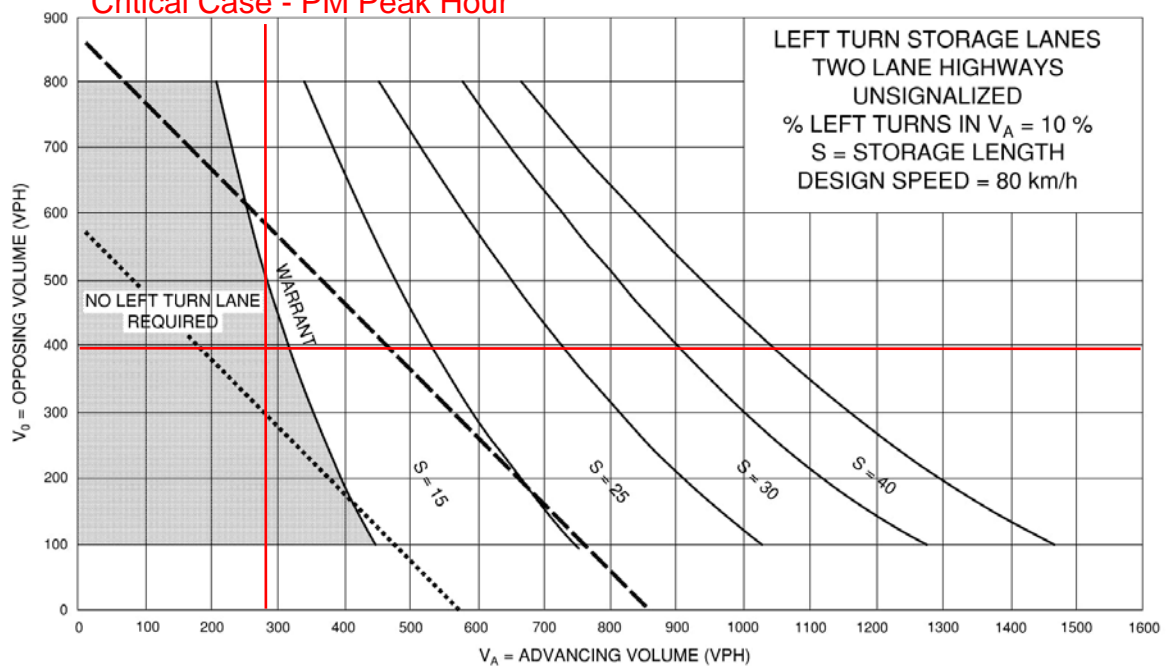
**Exhibit 9A-14**



--- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

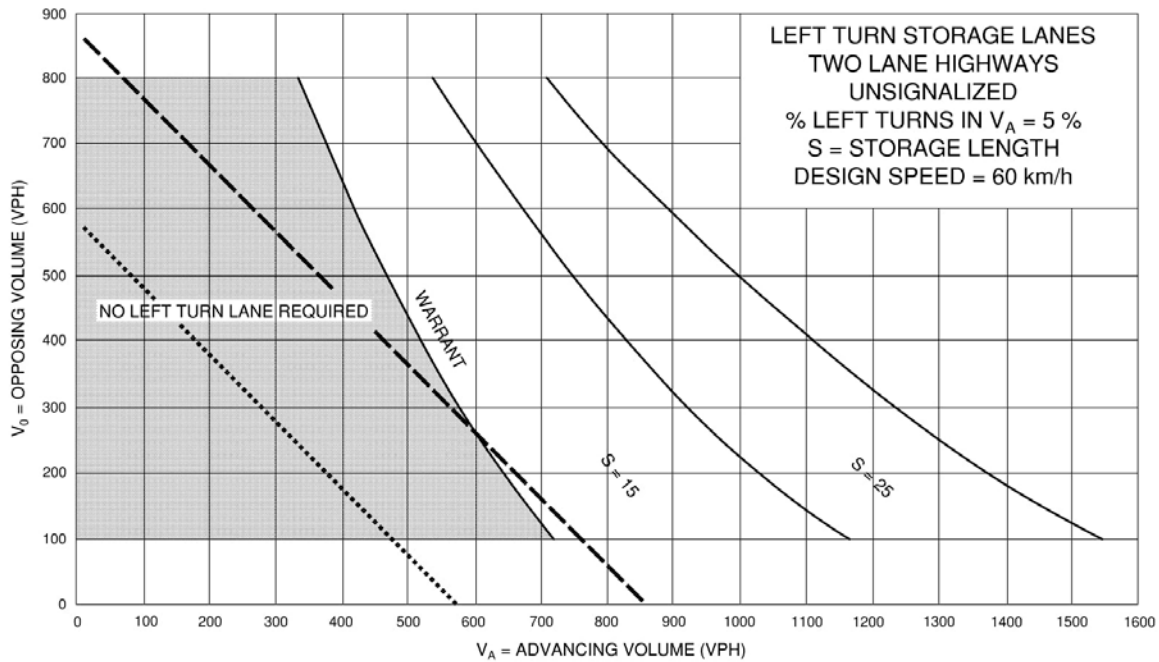
..... TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

**Wellington Road 7 / Middlebrook Road & David Street West**  
 2022 Existing - Southbound  
 Critical Case - PM Peak Hour





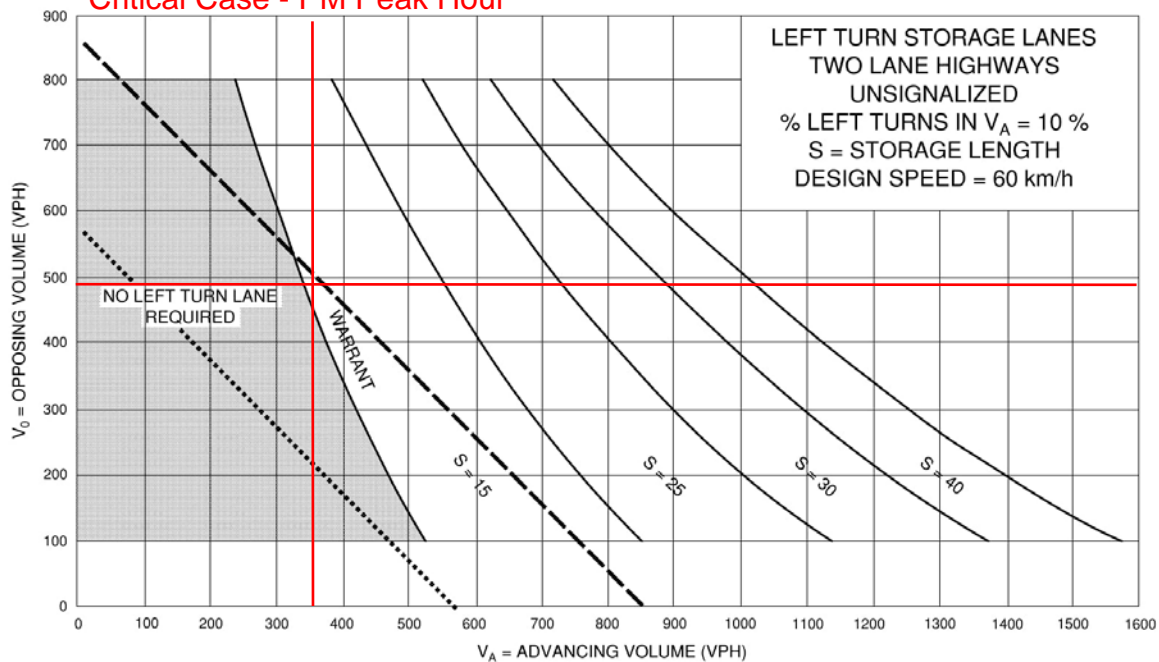
**Exhibit 9A-6**



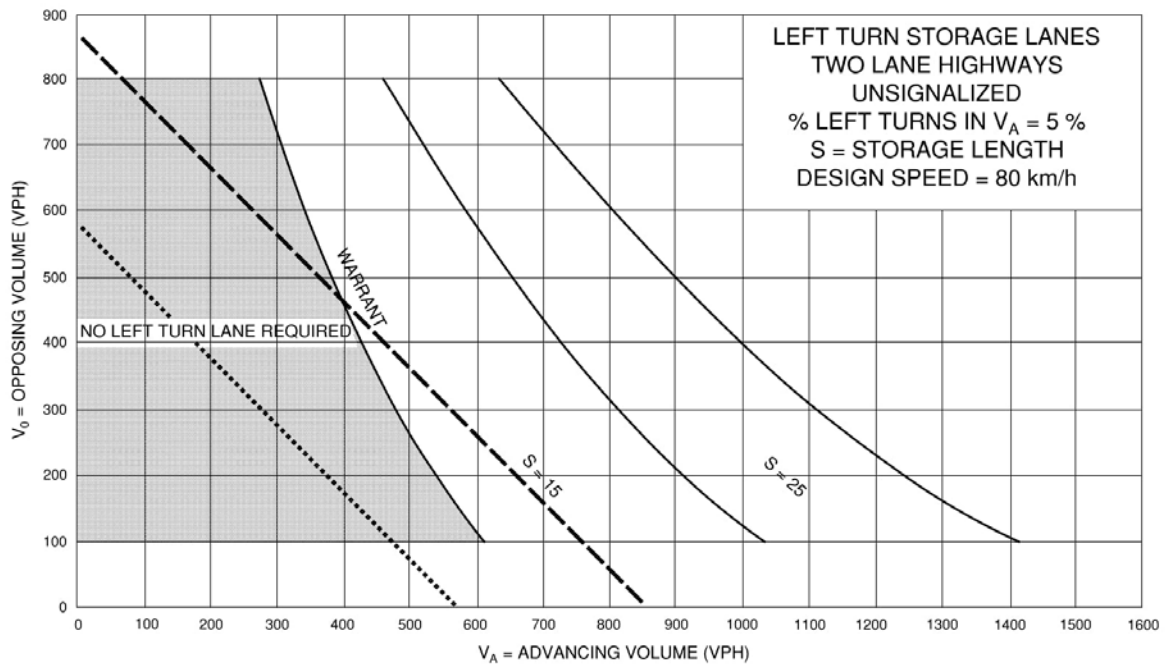
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**Wellington Road 7 / Middlebrook Road & David Street West**  
**2027 Background - Southbound**  
**Critical Case - PM Peak Hour**

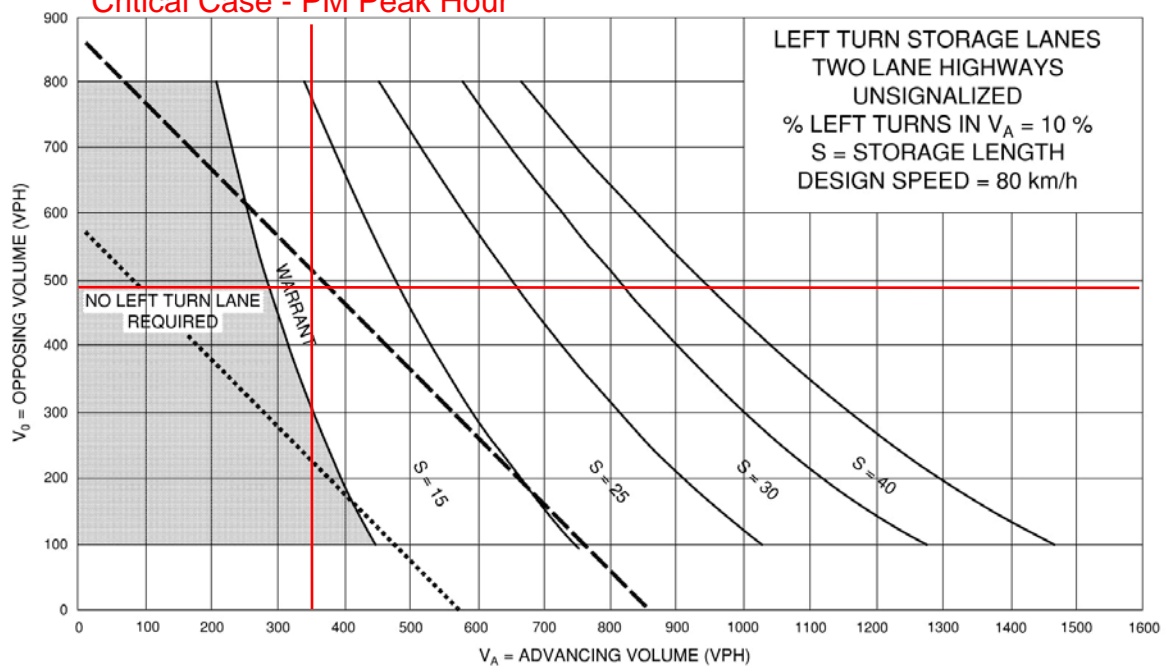


**Exhibit 9A-14**

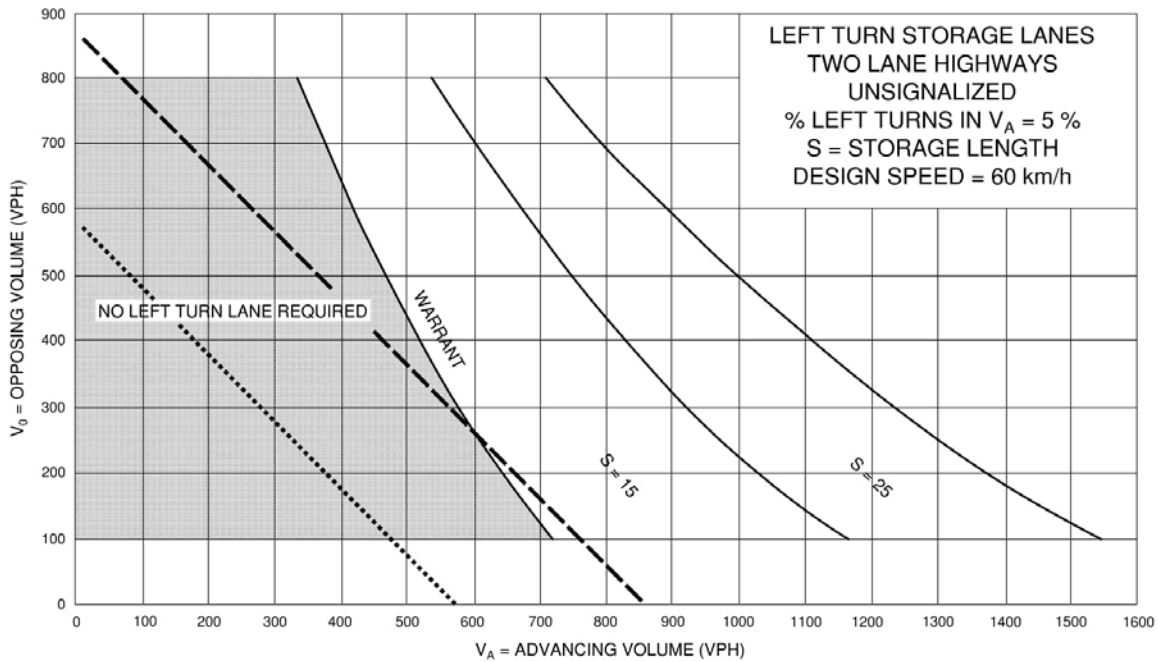


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**Wellington Road 7 / Middlebrook Road & David Street West**  
 2027 Background - Southbound  
 Critical Case - PM Peak Hour



**Exhibit 9A-6**



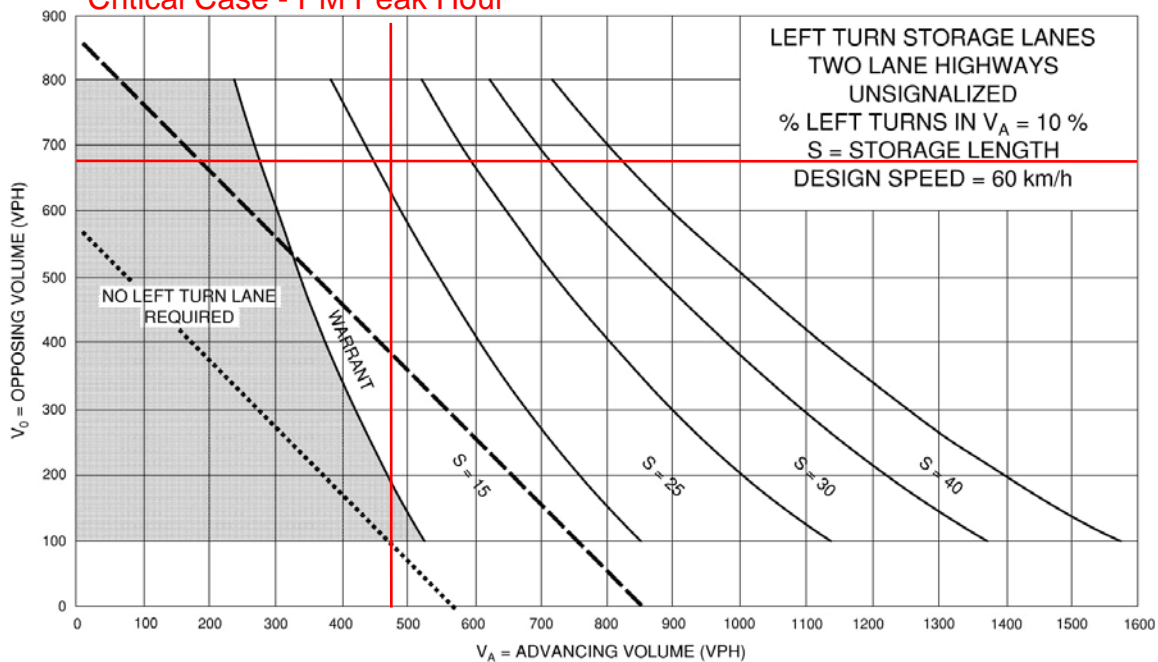
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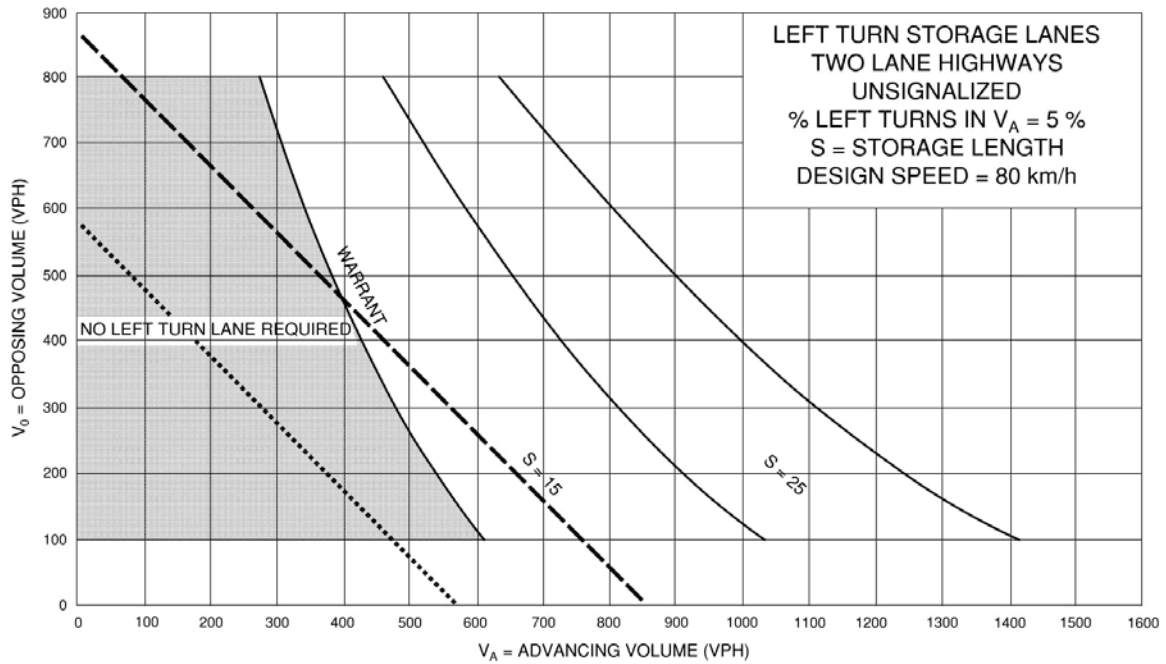
**Wellington Road 7 / Middlebrook Road & David Street West**

2032 Total - Southbound

Critical Case - PM Peak Hour



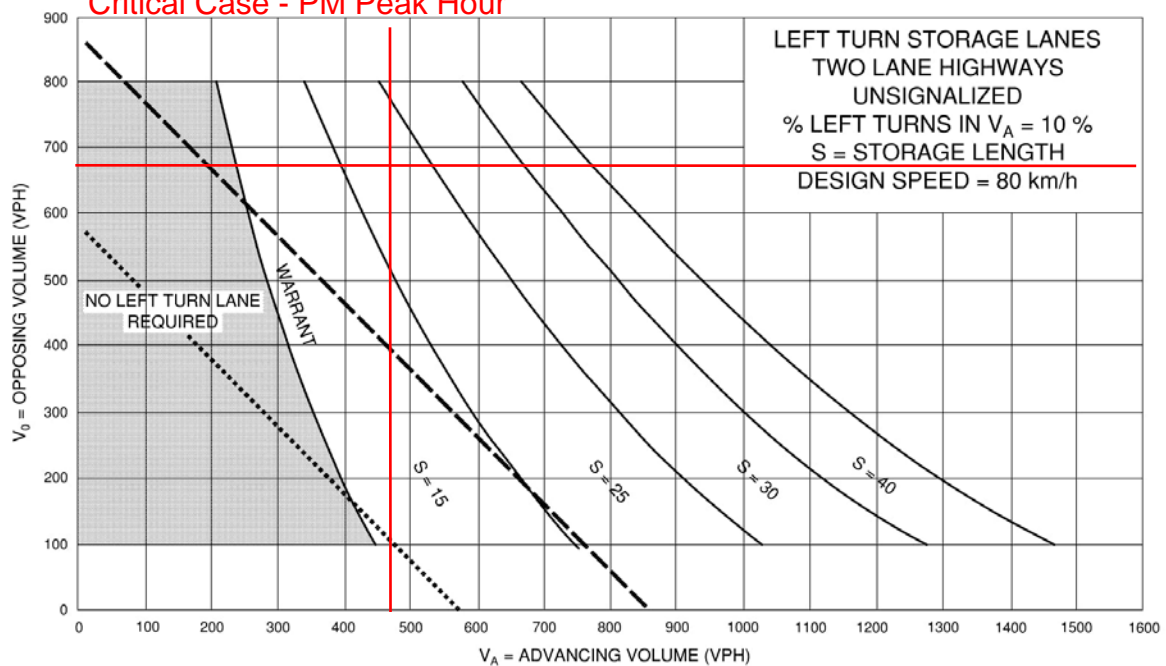
**Exhibit 9A-14**



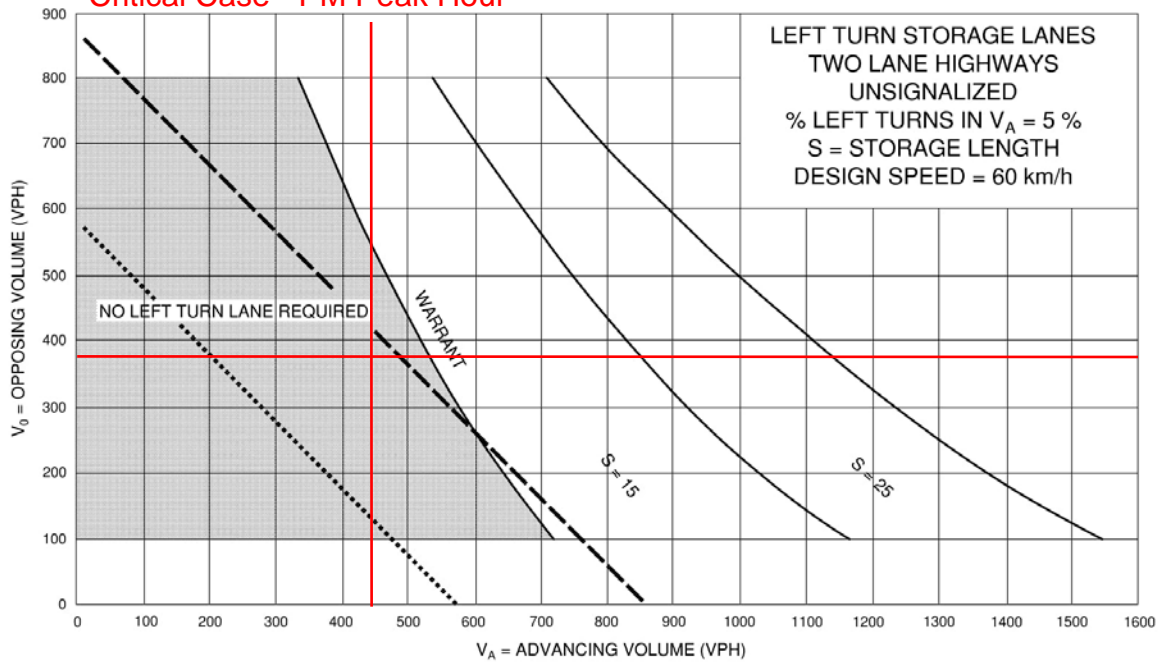
**Wellington Road 7 / Middlebrook Road & David Street West**

2032 Total - Southbound

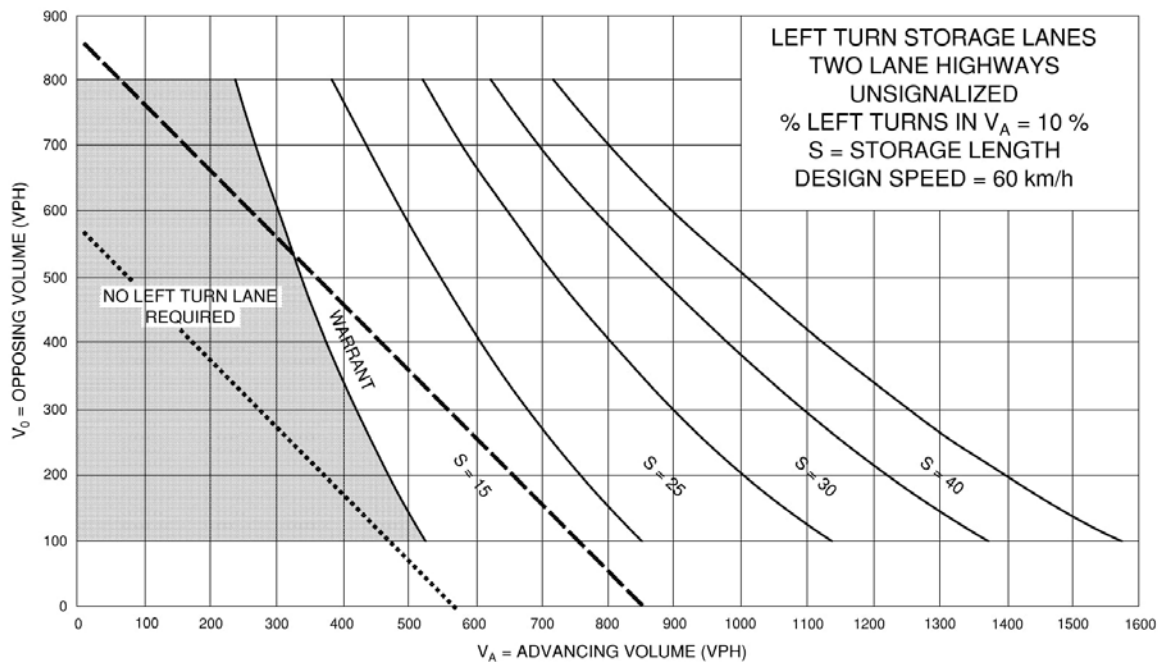
Critical Case - PM Peak Hour



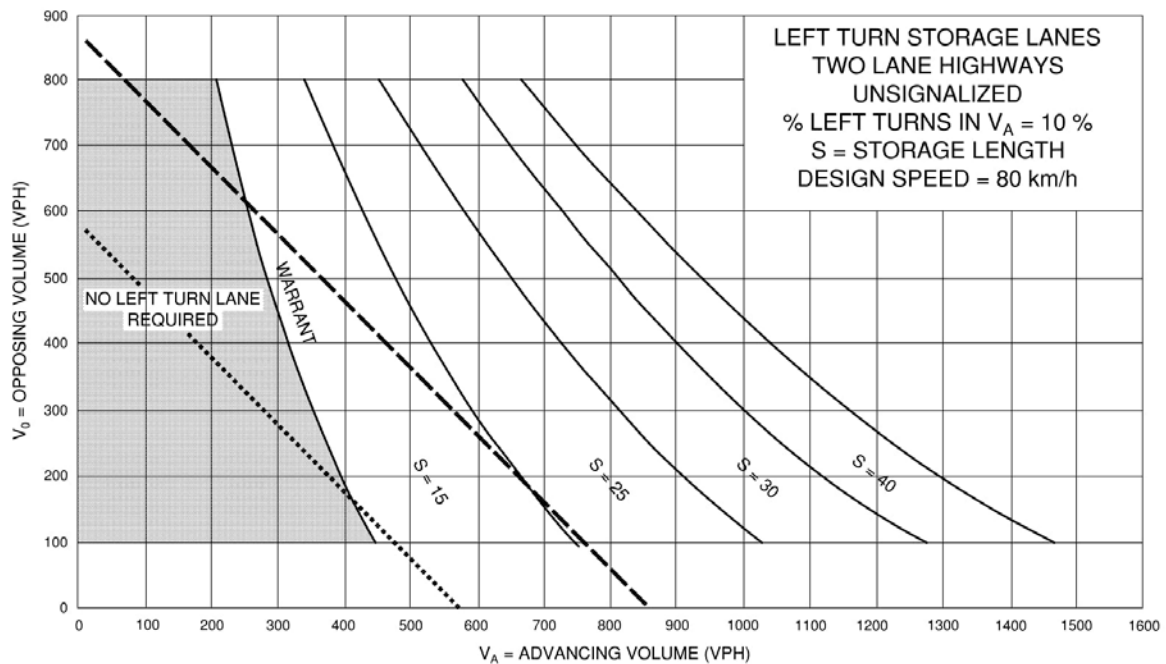
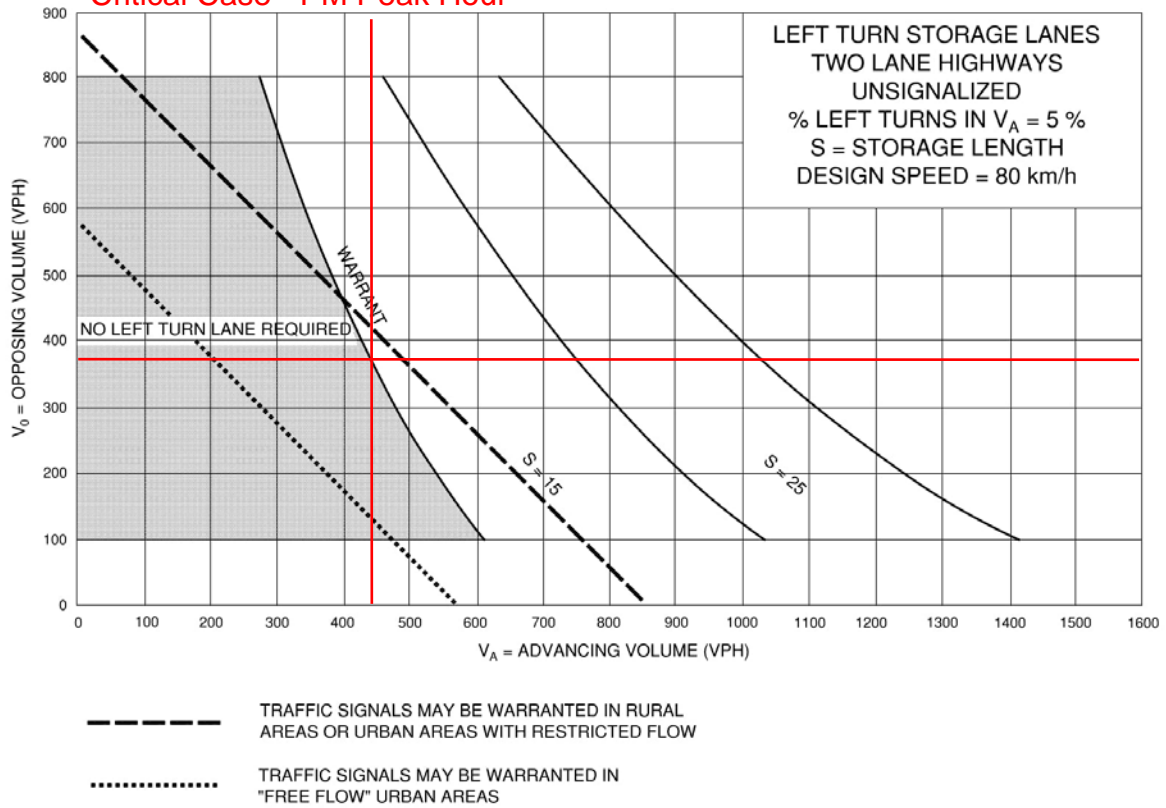
**Wellington Road 7 / North Access**  
**2027 Total - Northbound**      **Exhibit 9A-6**  
**Critical Case - PM Peak Hour**



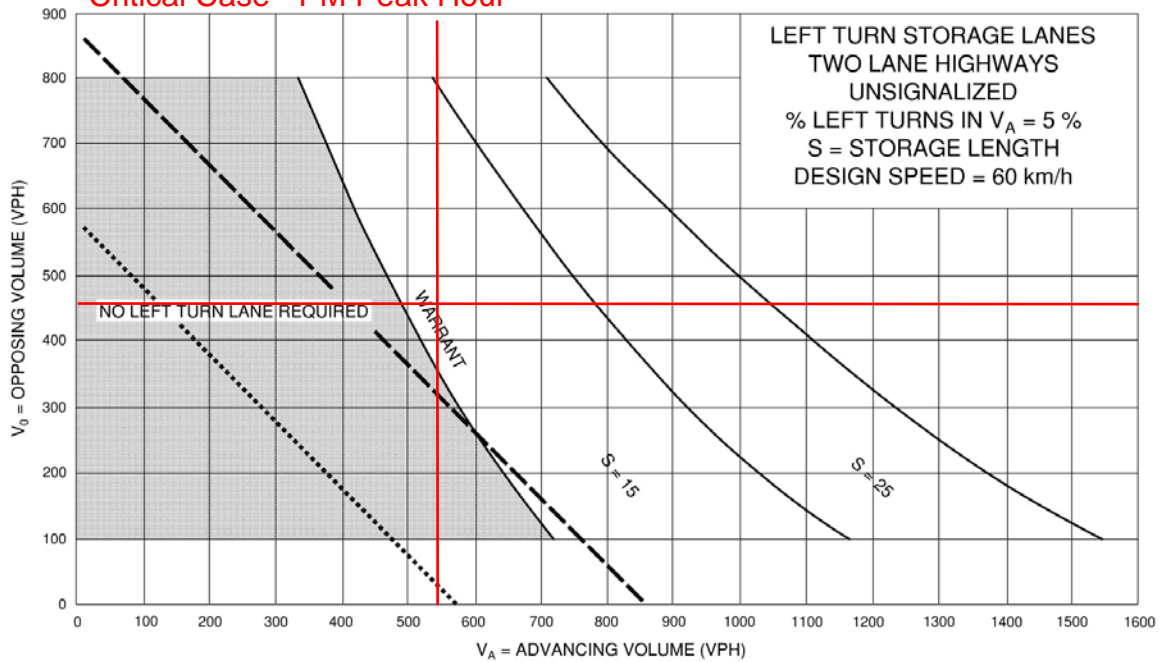
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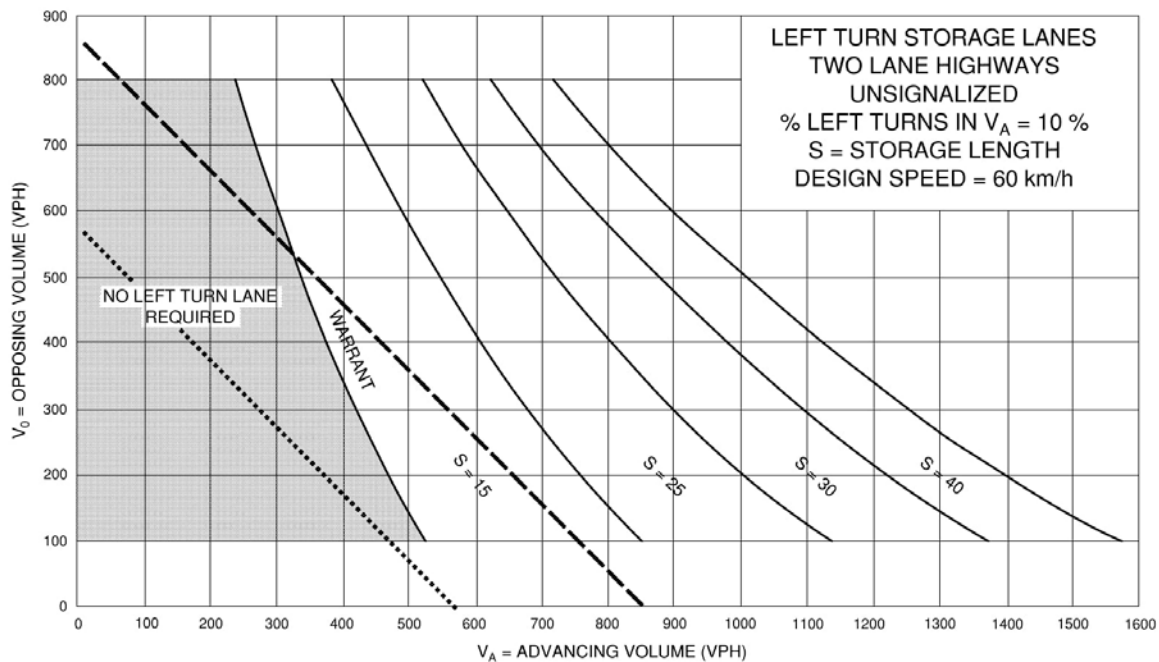
**Wellington Road 7 / North Access**  
**2027 Total - Northbound**      **Exhibit 9A-14**  
**Critical Case - PM Peak Hour**



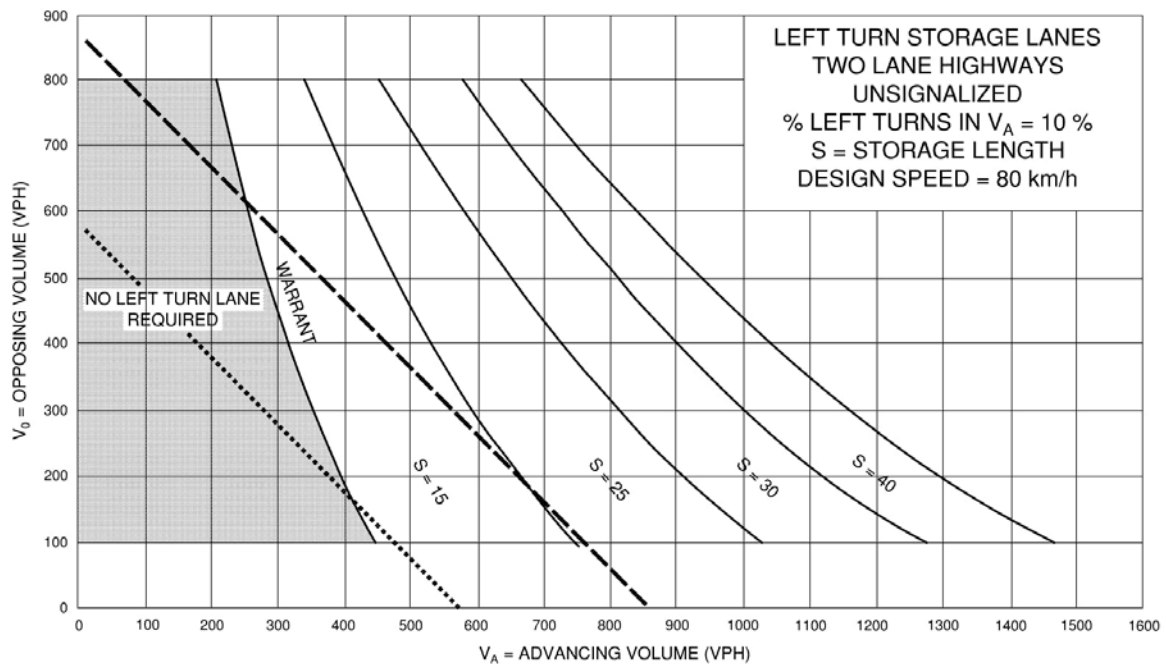
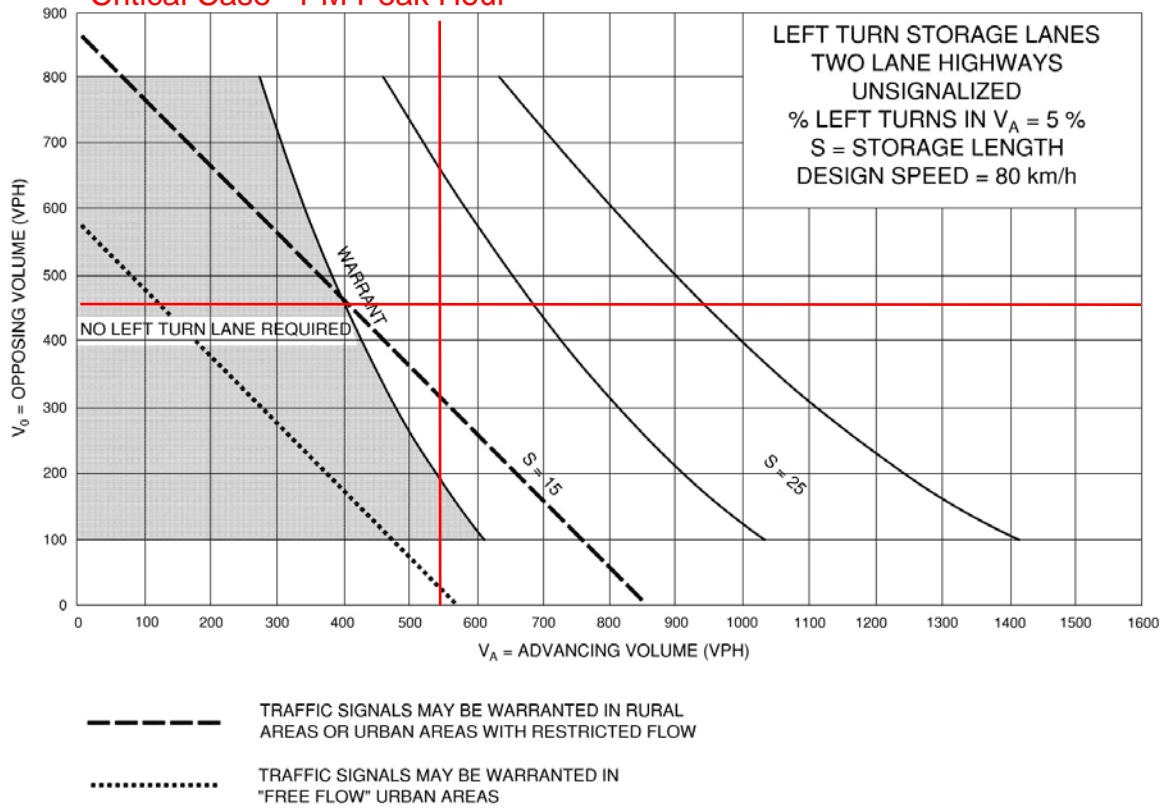
**Wellington Road 7 / North Access**  
**2032 Total - Northbound**      **Exhibit 9A-6**  
**Critical Case - PM Peak Hour**



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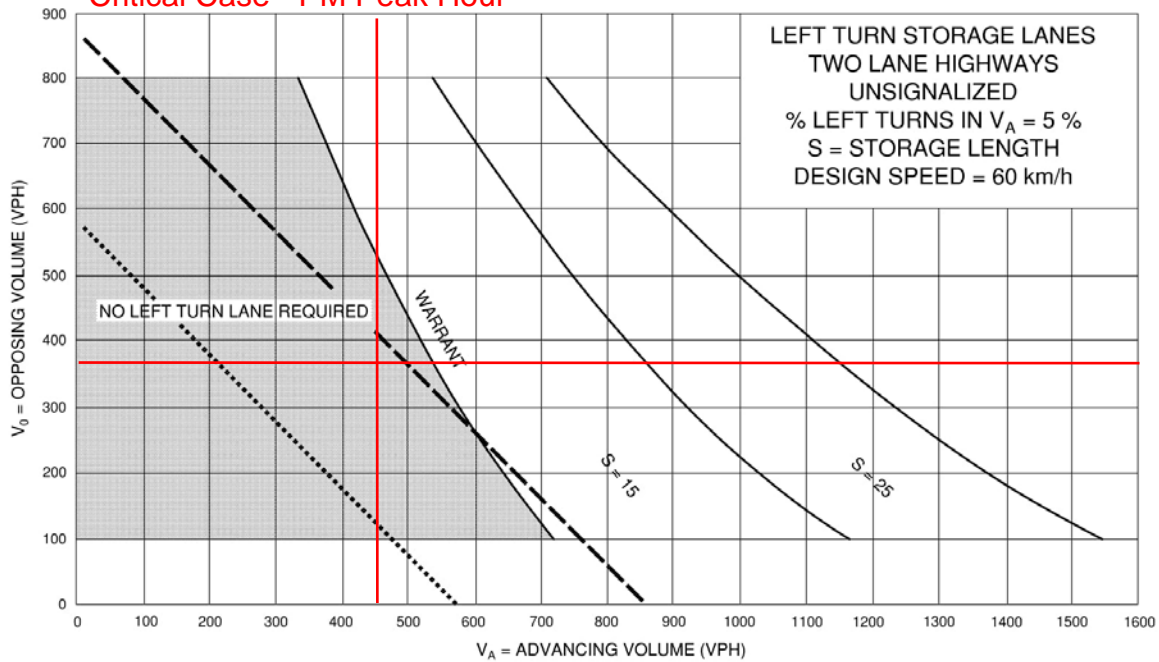


**Wellington Road 7 / North Access**  
**2032 Total - Northbound**      **Exhibit 9A-14**  
**Critical Case - PM Peak Hour**

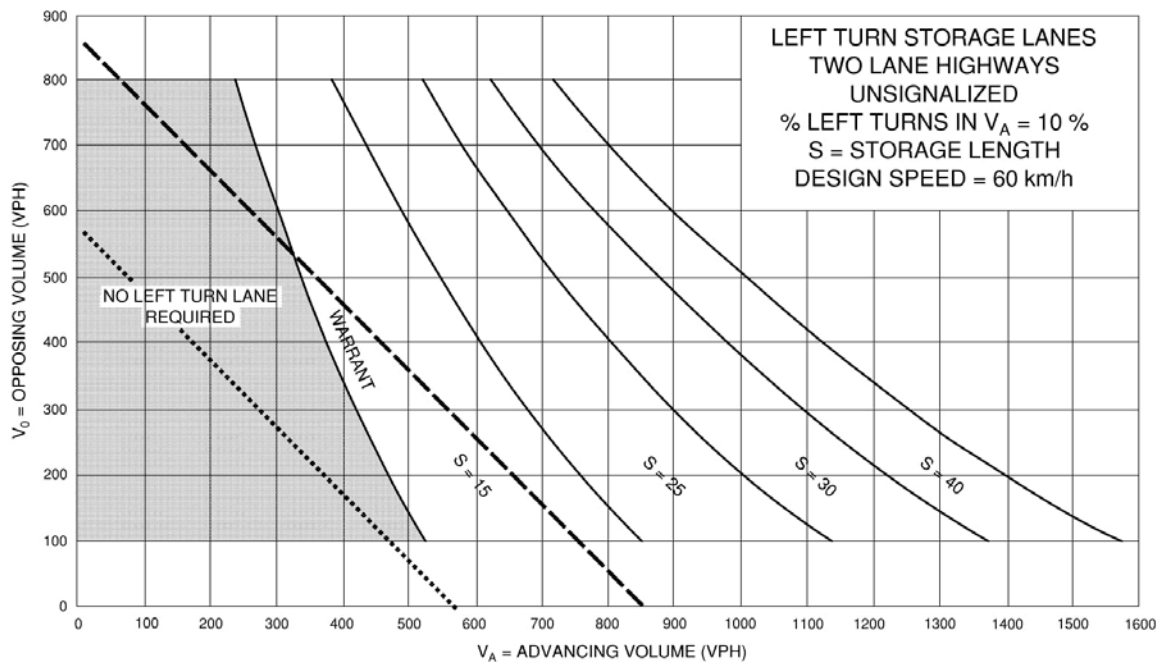




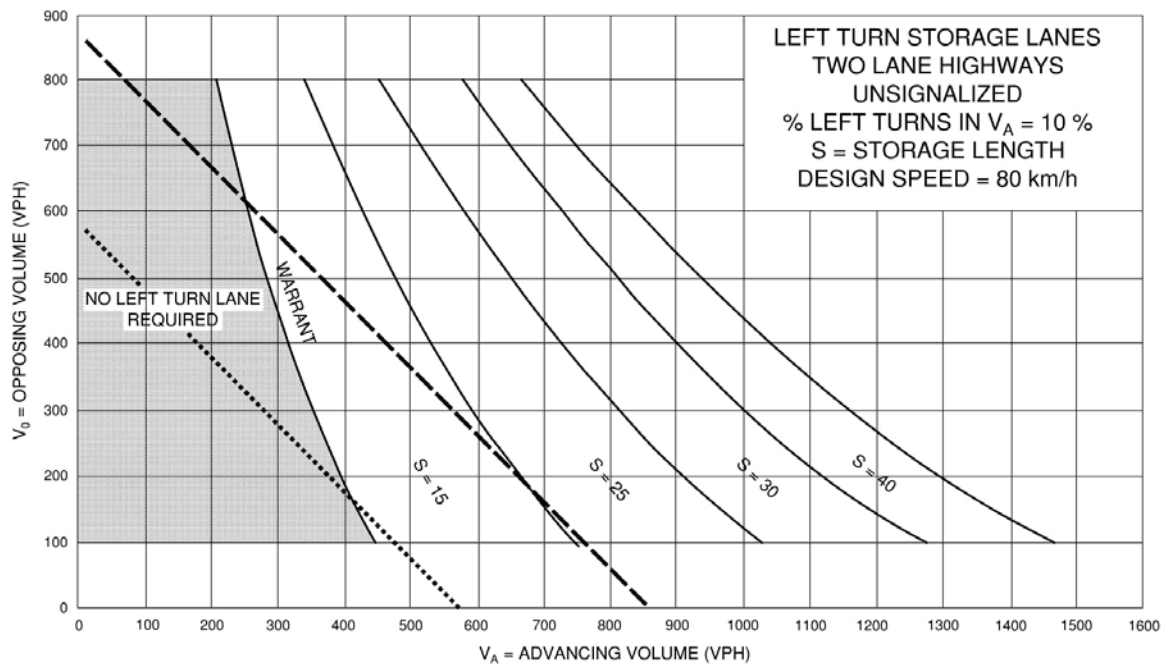
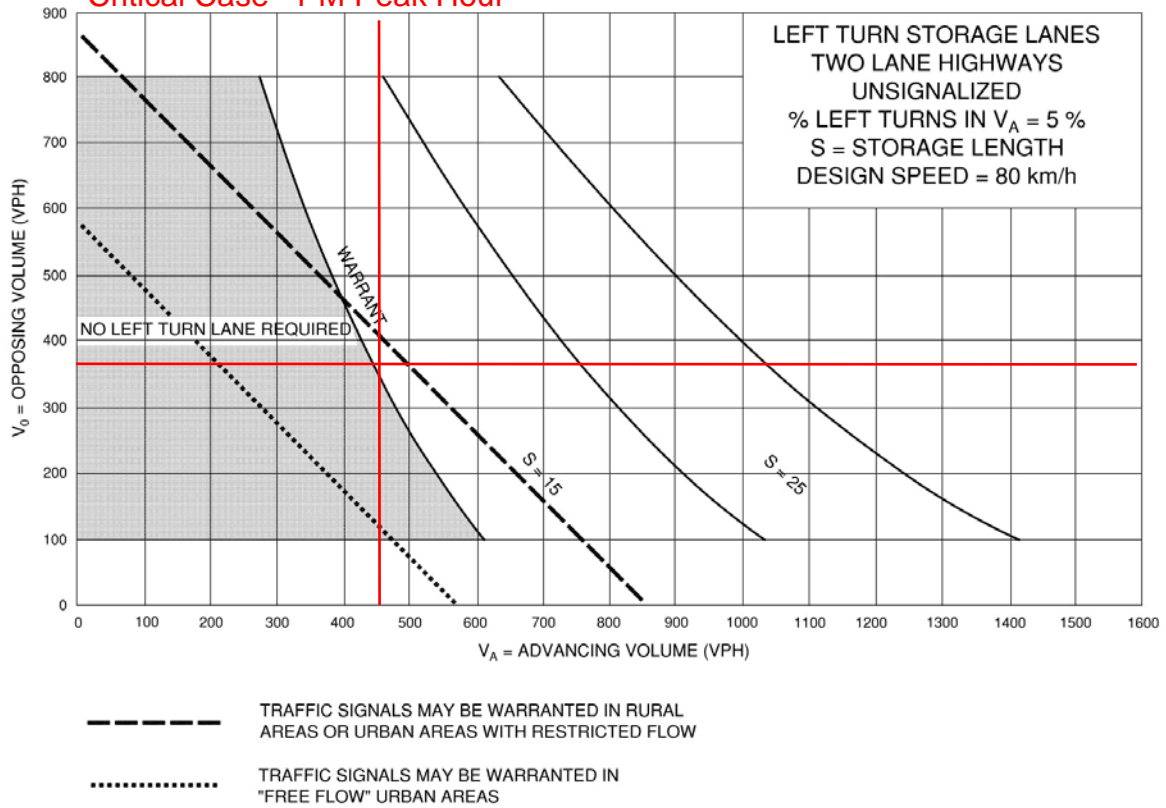
**Wellington Road 7 / Centre Access**  
**2027 Total - Northbound**      **Exhibit 9A-6**  
**Critical Case - PM Peak Hour**



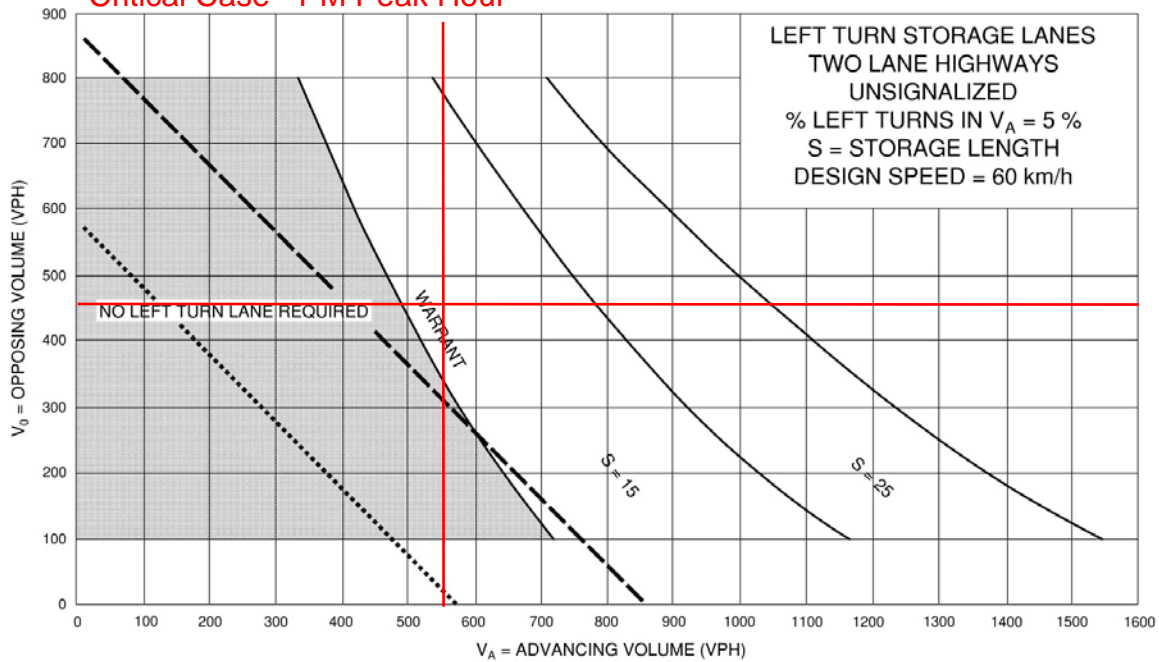
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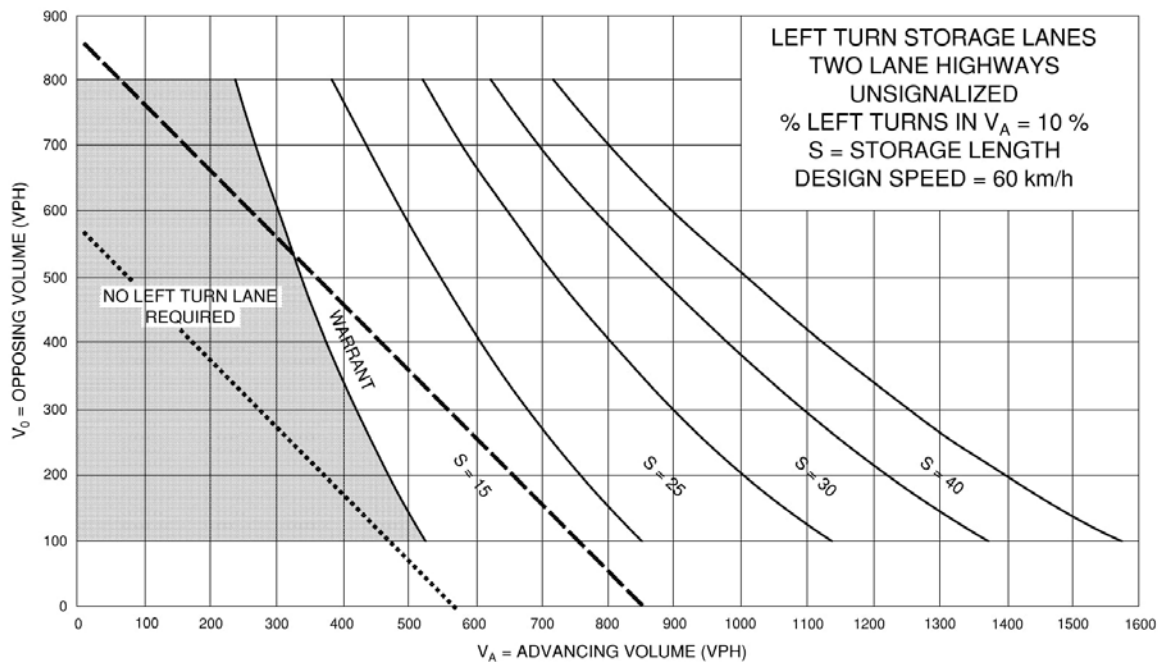
**Wellington Road 7 / Centre Access**  
**2027 Total - Northbound**      **Exhibit 9A-14**  
**Critical Case - PM Peak Hour**



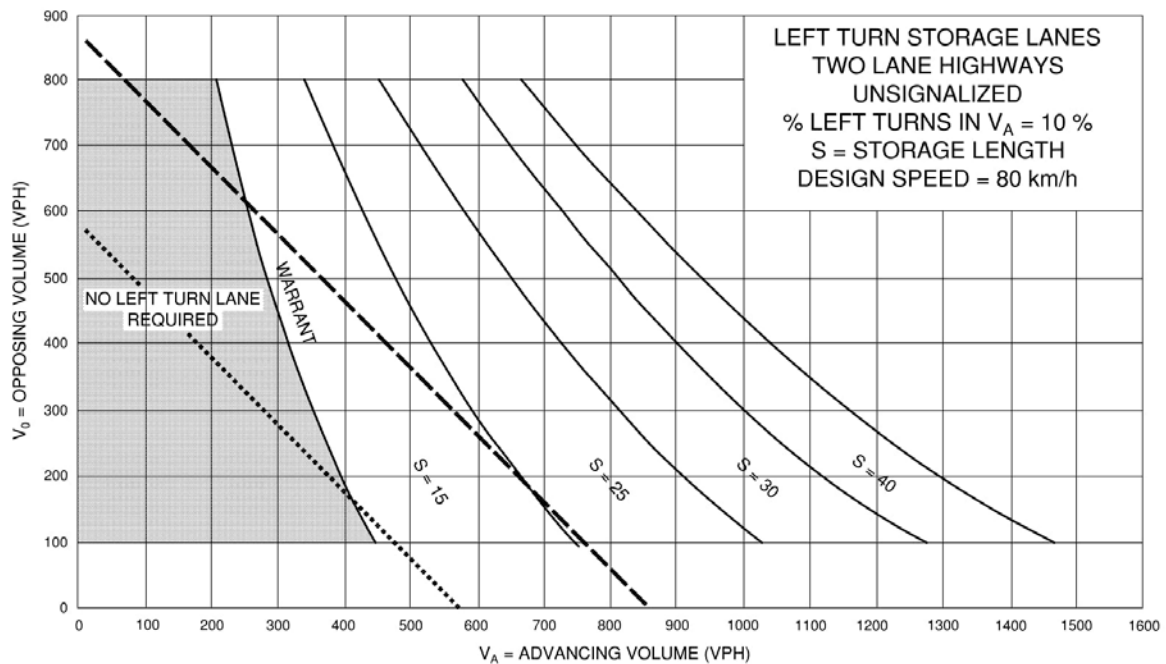
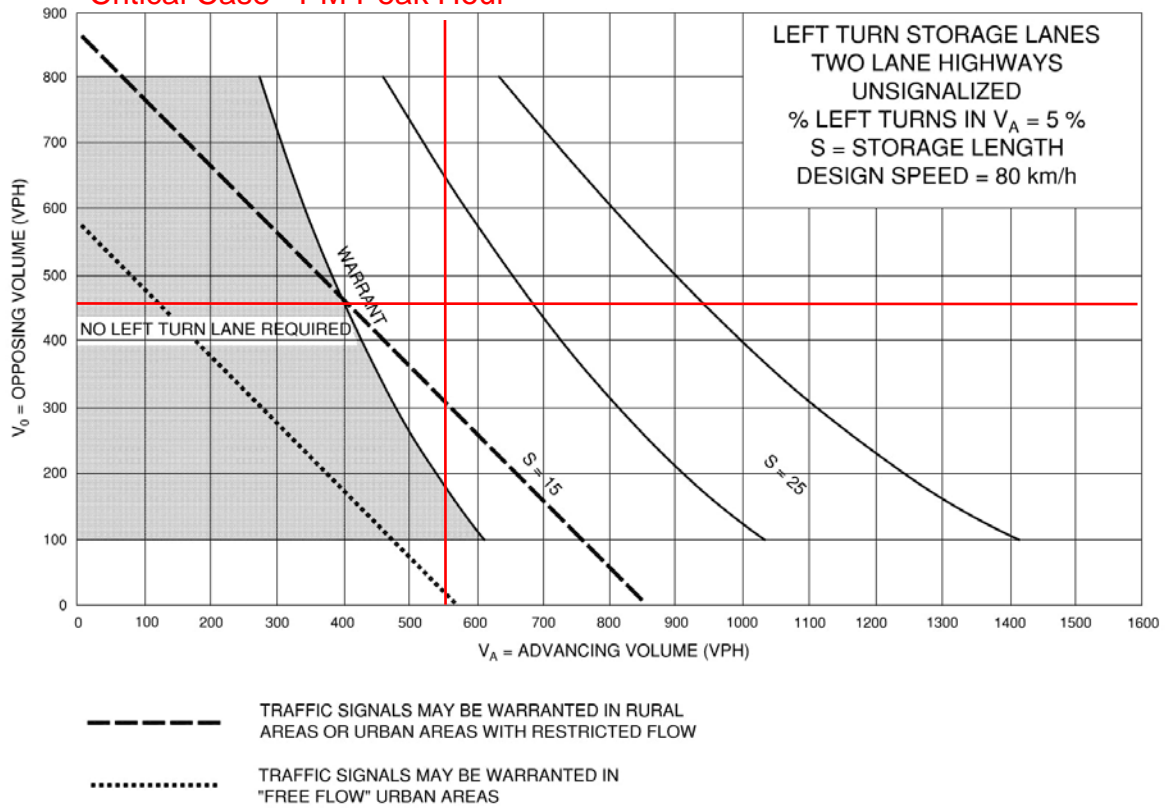
**Wellington Road 7 / Centre Access**  
**2032 Total - Northbound**      **Exhibit 9A-6**  
**Critical Case - PM Peak Hour**



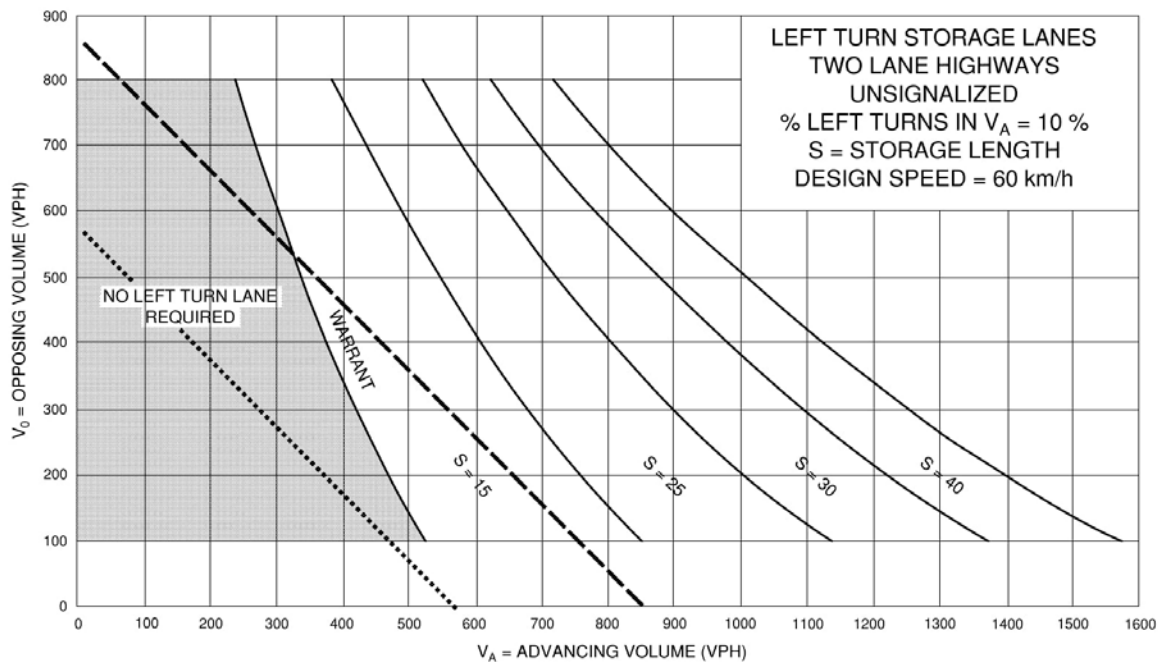
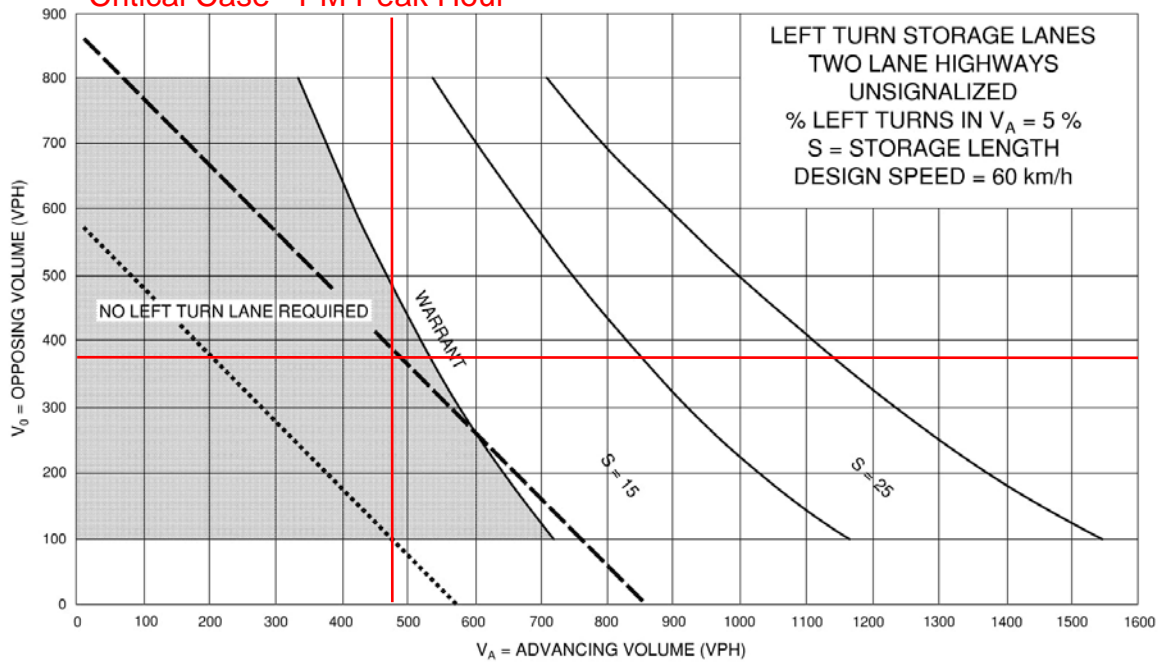
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**Wellington Road 7 / Centre Access**  
**2032 Total - Northbound**      **Exhibit 9A-14**  
**Critical Case - PM Peak Hour**



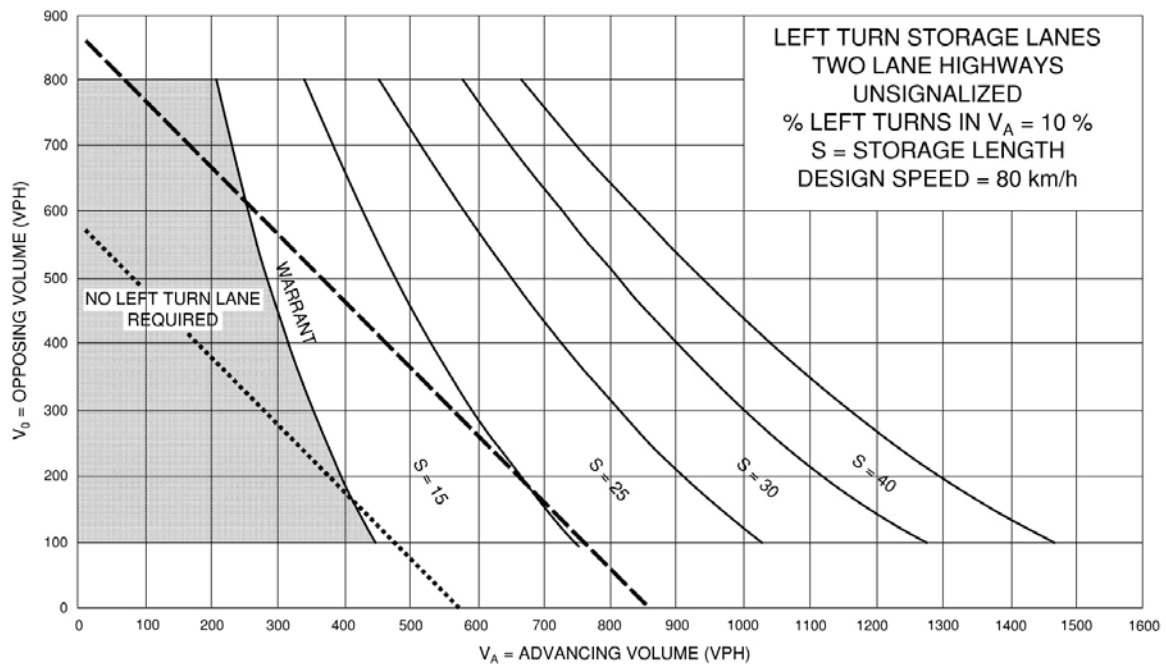
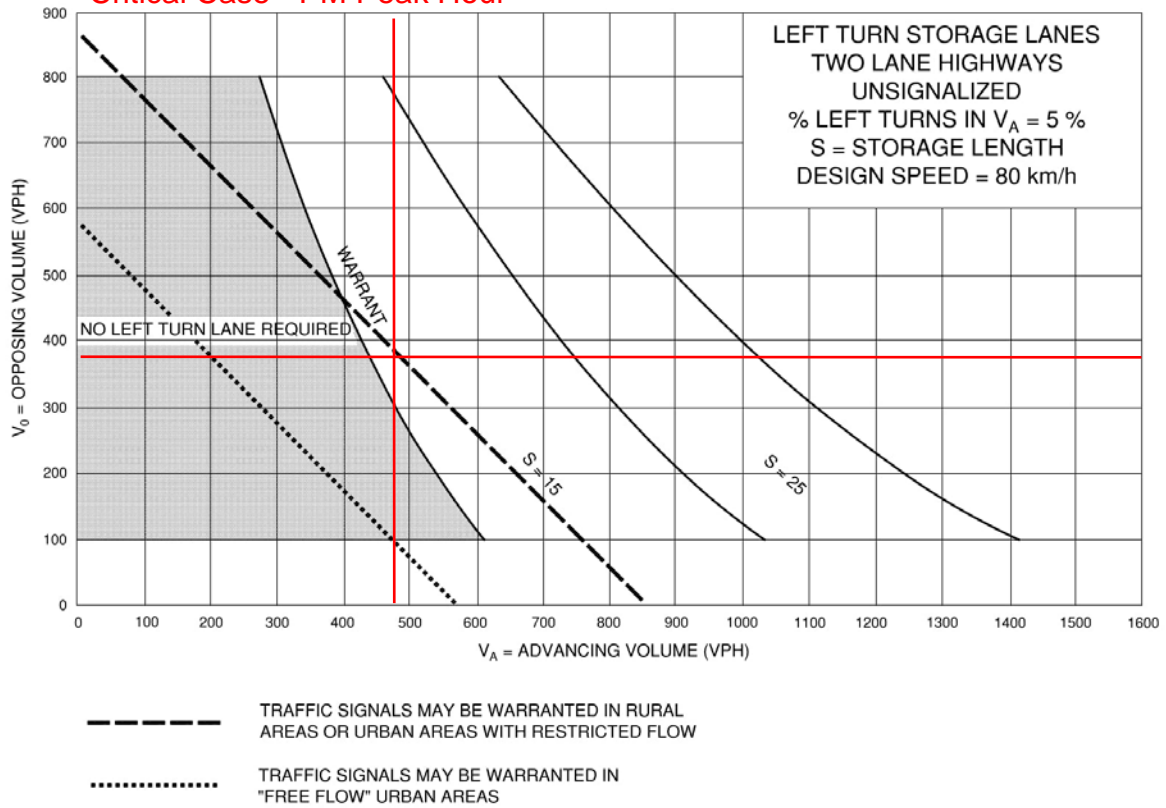
**Wellington Road 7 / South Access**  
**2027 Total - Northbound**      **Exhibit 9A-6**  
**Critical Case - PM Peak Hour**



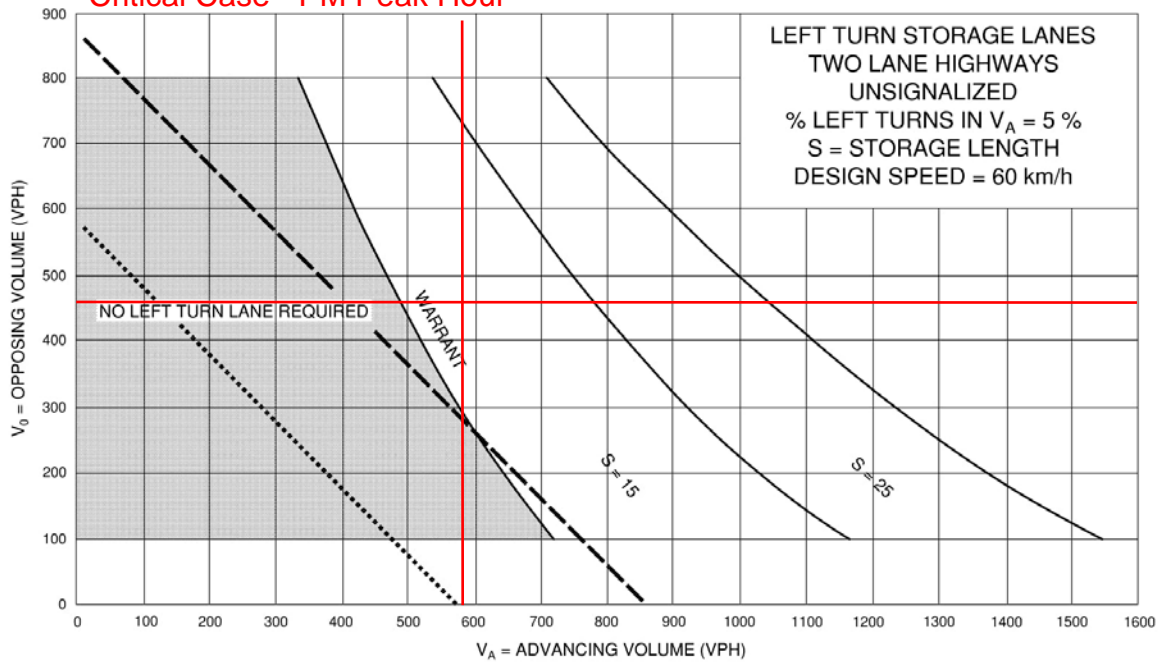
**Wellington Road 7 / South Access**

2027 Total - Northbound **Exhibit 9A-14**

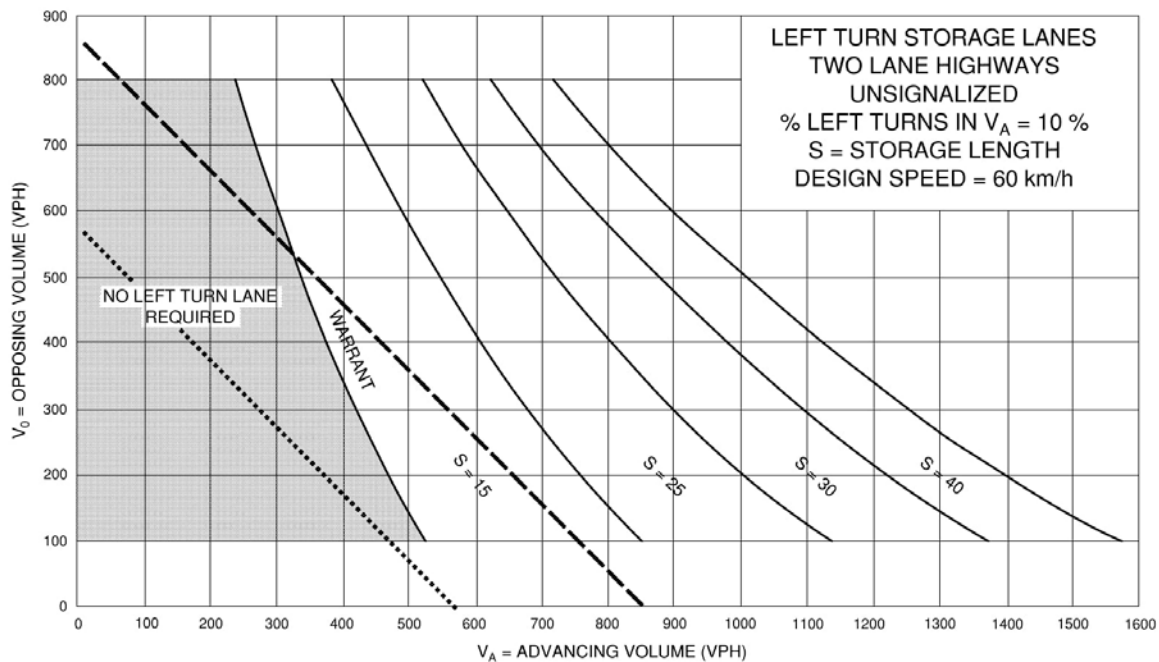
Critical Case - PM Peak Hour



**Wellington Road 7 / South Access**  
**2032 Total - Northbound**      **Exhibit 9A-6**  
**Critical Case - PM Peak Hour**



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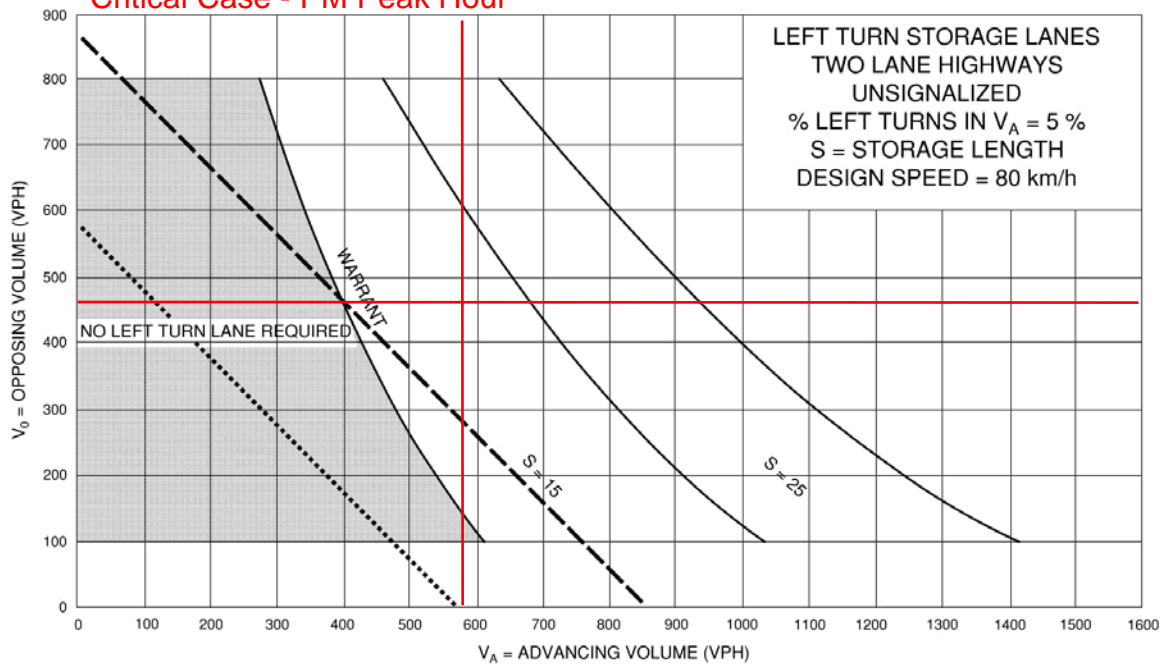


**Wellington Road 7 / South Access**

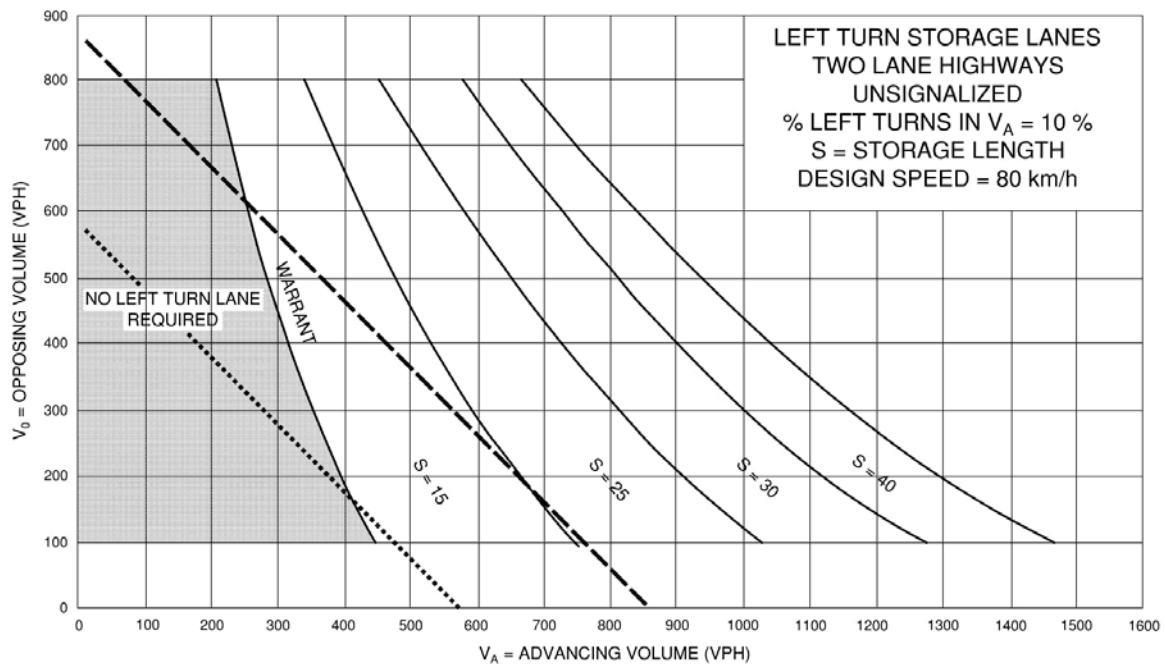
2032 Total - Northbound

**Exhibit 9A-14**

Critical Case - PM Peak Hour



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## Appendix G – OTM Signal Justification Sheets

**Justification No. 7 - 2032 Total Traffic (Critical Case)**

Wellington Road 7 / Middlebrook Road / David Street West

Justification	Description	Compliance			Signal Warrant	Underground Provisions Warrant	
		Rest. Flow	Sectional				Entire %
			Numerical	%			
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	720	553	77%	37%	NO	
	B. Vehicle volume, along minor streets (average hour)	170	76	45%		NO	
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	720	430	60%	41%	NO	
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	37	50%		NO	

**Justification No. 7 - 2032 Total Traffic (Critical Case)**

Wellington Road 7 / North Access

Justification	Description	Compliance			Signal Warrant	Underground Provisions Warrant
		Rest. Flow	Sectional			
			Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	720	426	59%	3%	NO
	B. Vehicle volume, along minor streets (average hour)	255	10	4%		NO
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	720	413	57%	4%	NO
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	4	5%		NO

**Justification No. 7 - 2032 Total Traffic (Critical Case)**

Wellington Road 7 / Centre Access

Justification	Description	Compliance			Signal Warrant	Underground Provisions Warrant	
		Rest. Flow	Sectional				Entire %
			Numerical	%			
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	720	430	60%	3%	NO	
	B. Vehicle volume, along minor streets (average hour)	255	12	5%		NO	
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	720	416	58%	3%	NO	
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	3	4%		NO	

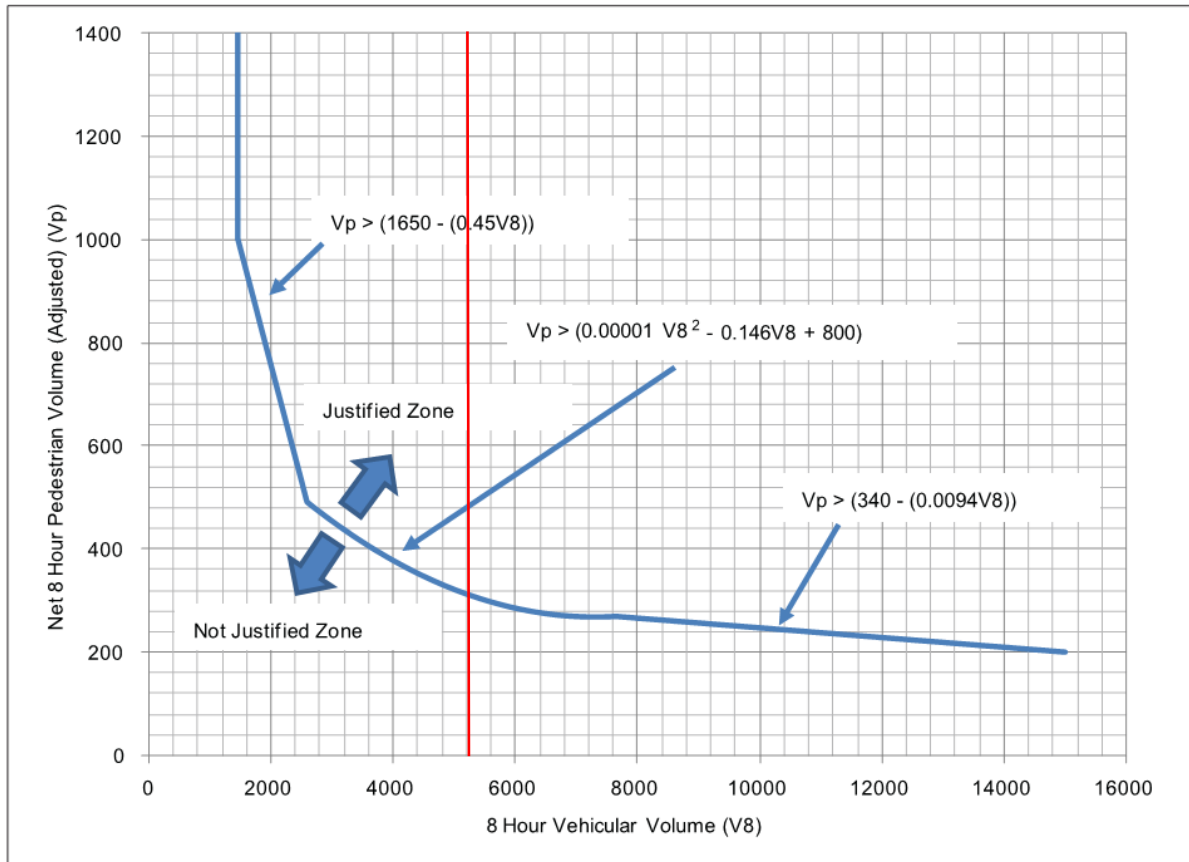
**Justification No. 7 - 2032 Total Traffic (Critical Case)**

Wellington Road 7 / South Access

Justification	Description	Compliance			Signal Warrant	Underground Provisions Warrant
		Rest. Flow	Sectional			
			Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	720	443	61%	3%	NO
	B. Vehicle volume, along minor streets (average hour)	255	12	5%		NO
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	720	429	60%	2%	NO
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	2	3%		NO

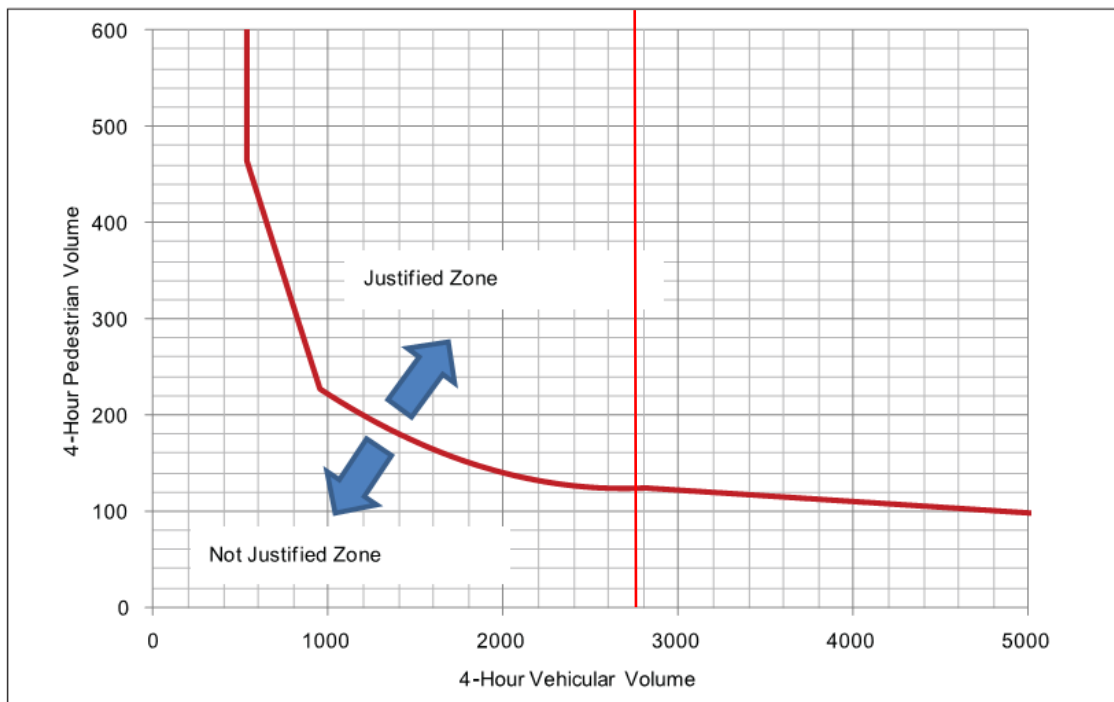
## Appendix H – Pedestrian Crossing Warrant

**Wellington Road 7 / Middlebrook Road / David Street West**  
Total 2032 - Southbound



**Figure 3: OTM Book 12 Justification 6 - Pedestrian Volume**

**Wellington Road 7 / Middlebrook Road / David Street West**  
Total 2032 - Southbound



**Figure 5: 4-Hour Pedestrian Volume Criterion for Communities of Population Less than 10,000**



## Appendix I – 2016 Transportation Tomorrow Survey Output

<p>Fri Oct 14 2022 18:46:52 GMT-0400 (Eastern Daylight Time) - Run Time: 2990ms</p> <p>Cross Tabulation Query Form - Trip - 2016 v1.1 Row: Planning district of destination - pd_dest Column: 2006 GTA zone of household - gta06_hhld</p> <p>Filters: (2006 GTA zone of household - gta06_hhld In 8344); and (Start time of trip - start_time In 700 - 900); and (Trip purpose of destination - purp_dest In W, R)</p> <p>Trip 2016 ROW : pd_dest COLUMN : gta06_hhld</p>	<p>Fri Oct 14 2022 18:48:57 GMT-0400 (Eastern Daylight Time) - Run Time: 2650ms</p> <p>Cross Tabulation Query Form - Trip - 2016 v1.1 Row: 2006 GTA zone of destination - gta06_dest Column: 2006 GTA zone of household - gta06_hhld</p> <p>Filters: (2006 GTA zone of household - gta06_hhld In 8344); and (Start time of trip - start_time In 700 - 900); and (Trip purpose of destination - purp_dest In W); and (Planning district of destination - pd_dest In 73)</p> <p>ROW : gta06_dest COLUMN : gta06_hhld</p>
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# TTS Cross Tabulation

## Cross Tabulation Query Form - Trip - 2016 v1.1

### Filter Variables

Planning district of desti... X ▾    2006 GTA zone of hous... X ▾    (Optional) Table Attribute ▾

### Group Attributes

Row Grouping    Column Grouping    Table Grouping

Grouping file: [Choose File](#) No file chosen

### Filter Selection +

2006 GTA zone of household ▾ In ▾ 8344

And ▾

Start time of trip ▾ In ▾ 700 - 900

And ▾

Trip purpose of destination ▾ In ▾ W, R

Add    Delete

### Output

Comma-delimited table     Column format    Expansion Factor On    [Click to Select Load](#)    Load

[Execute Query](#)    [Select All](#)    [Save As](#)

Tue Nov 01 2022 17:14:53 GMT-0400 (Eastern Daylight Time) - Run Time: 2558ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of destination - pd\_dest  
Column: 2006 GTA zone of household - gta06\_hhld

Filters:  
2006 GTA zone of household - gta06\_hhld In 8344  
and  
Start time of trip - start\_time In 700 - 900  
and  
Trip purpose of destination - purp\_dest In W, R

Trip 2016  
ROW : pd\_dest  
COLUMN : gta06\_hhld

pd_dest	gta06_hhld	total
4	8344	50
14	8344	7
36	8344	19
39	8344	25
46	8344	27
63	8344	112
64	8344	115
65	8344	83
69	8344	31
70	8344	301
72	8344	19
73	8344	452
79	8344	26
121	8344	94

## TTS Cross Tabulation

### Cross Tabulation Query Form - Trip - 2016 v1.1

#### Filter Variables

#### Group Attributes

Grouping file:  No file chosen

#### Filter Selection +

2006 GTA zone of household In 8344

And

Start time of trip In 700 - 900

And

Trip purpose of destination In W, R

And

Planning district of destination In 73,

Add

Delete

#### Output

Comma-delimited table  Column format

Expansion Factor On

Tue Nov 01 2022 17:16:43 GMT-0400 (Eastern Daylight Time) - Run Time: 2377ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of destination - gta06\_dest

Column: 2006 GTA zone of household - gta06\_hhld

Filters:

2006 GTA zone of household - gta06\_hhld In 8344

and

Start time of trip - start\_time In 700 - 900

and

Trip purpose of destination - purp\_dest In W, R

and

Planning district of destination - pd\_dest In 73,

Trip 2016

Table:

,8344  
8344,136  
8346,60  
8350,18  
8351,206  
8354,16  
8355,16