
Traffic Impact Study



February 10th, 2022

J Jordan Road Development

Canning, Nova Scotia



SUBMITTED BY:

DesignPoint Engineering & Surveying Ltd.

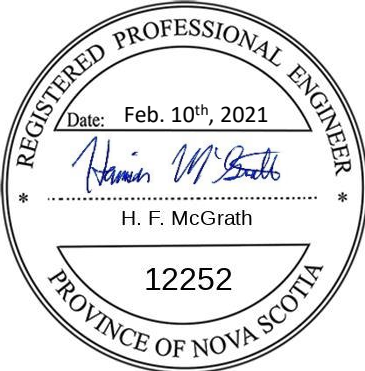
SUBMITTED TO:

Parsons Green Developments



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Issued For	By	Date
Submission to Municipality of the County of Kings	HFM	December 10 th , 2021
Re-submission to Municipality of the County of Kings	HFM	February 10 th , 2022
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1.0 INTRODUCTION

1.1 OVERVIEW

DesignPoint Engineering & Surveying has been hired to complete a traffic impact study for the Parsons Green development located in Canning, Nova Scotia, on J Jordan Road. The Village of Canning is located at the crossroads of provincial Highway 221 and Highway 358, north of Port Williams, and has a population of 850. Many of the commercial properties in Canning are located on Highway 358, and several institutional buildings, including the fire hall, Glooscap Elementary School, and Glooscap District Area, are located on J Jordan Road with the Northeast Kings Education Centre near J Jordan Road on Bains Road.

The Parsons Green development includes a mix of townhouses and apartment buildings that will add 442 units to Canning. This traffic study will consider how the development integrates into the community and reduces impacts from a transportation perspective.



Figure 1: Development site plan and study area

The scope of this study includes the following items:

1. A review of the existing transportation network and operations.
2. Calculation of trips generated by the development and estimated distribution of trips into the transportation network.
3. Analysis of how new volumes affect the level of service of the existing transportation network.
4. Identification of improvements that may be needed to accommodate the transportation needs in the area.

2.0 EXISTING CONDITIONS

2.1 AREA DESCRIPTION

J Jordan Road

J Jordan Road is a low-volume two-lane road with a 50 km/h posted speed and an estimated 2,100 annual average daily traffic (AADT) based on peak hour, representing 12% of the daily traffic volumes. The properties on the eastern side of the street are single-family homes, and properties on the western side are primarily institutional. A concrete sidewalk on the east side of the street connects to Highway 221 and crosses at the fire hall to the west side of the road with a marked crosswalk. The west side sidewalk is asphalt and connects the fire hall, sports fields, elementary school, and arena.

Highway 221

Highway 221 is a two-lane rural highway traveling east-west and connects Canning to neighboring communities, including Sheffield Mills and Centreville. The road has an AADT of approximately 2,000 and a posted speed of 50 km/h within the study area. There is a concrete sidewalk on the north side of the road connecting J Jordan Road to Highway 358 and the main street area of Canning.

Highway 358

Highway 358 is a two-lane rural highway traveling north-south and is also includes the main street area of Canning. The highway has a posted speed of 50 km/h within the study area and an estimated AADT of 2,300 within the study area. A sidewalk is included on at least one side of the road, beginning 200 m south of the Highway 221 intersection and continuing through Canning.

Intersection of J Jordan Road and Highway 2

J Jordan Road intersects with Highway 221 to the south of the development site at a three-legged



Figure 2: Intersection of J Jordan Road and Highway 221

unsignalized intersection. J Jordan Road is stop-controlled, and Highway 221 is free-flowing. There are no auxiliary turn lanes.

Intersection of Highway 221 and Highway 358

The intersection of Highway 221 and Highway 358 is a three-legged unsignalized intersection. Highway 221 is stop-controlled, and Highway 358 is free-flowing. The intersection is skewed, and visibility is limited.



Figure 3: Intersection of Highway 221 and Highway 358

2.2 EXISTING TRAFFIC OPERATIONS (LEVEL OF SERVICE)

A level of service (LOS) analysis is a method to determine how well a transportation facility, typically an intersection, performs from a driver’s perspective during a specific period (usually peak hours). The LOS is measured by the average delay of each vehicle traveling through an intersection with grades ranging from A to F, where A is associated with minimal delay and F is associated with heavily congested conditions. The desired or acceptable level of service can range depending on the location and context of individual streets.

The tables below provide the level of service criteria as defined in the *Highway Capacity Manual* (Transportation Research Board, 2010) for signalized and unsignalized intersections.

Table 1: Level of Service Criteria for Signalized Intersections (HCM 2010)

Level of Service	Average Control Delay (seconds per vehicle)	General Description
A	≤10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable Flow (acceptable delays)
D	>35-55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55-80	Unstable Flow (intolerable delay)
F ¹	>80	Forced Flow (congested and queues fail to clear)

Source: Highway Capacity Manual 2010, Transportation Research Board, 2010

1. If the volume-to-capacity ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group. LOS for overall approach or an intersection is determined solely by the control delay.

Table 2: Level of Service Criteria for Unsignalized Intersections (HCM 2010)

Level of Service	Average Control Delay (seconds per vehicle)
A	≤10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F ¹	>50

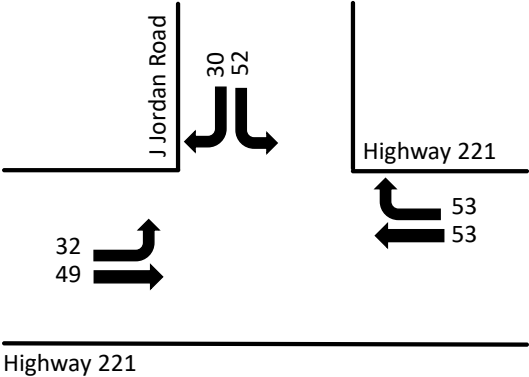
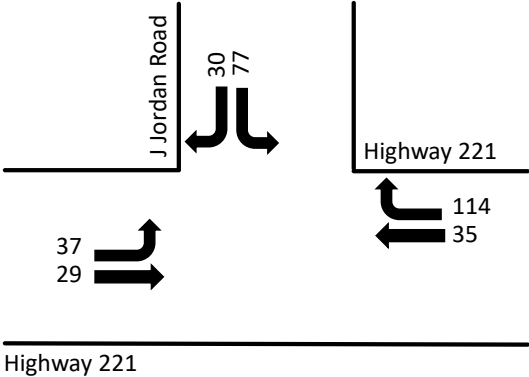
Source: Highway Capacity Manual 2010, Transportation Research Board, 2010

1. If the volume-to-capacity ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group for all unsignalized intersections or minor street approaches at two-way stop-controlled intersections. Overall intersection LOS is determined solely by the control delay.

A level of service analysis has been completed for the intersection of J Jordan Road and Highway 221, the highest volume intersection within the study area, to establish the baseline traffic operations. Traffic data was collected for the intersection of J Jordan Road and Highway 221 on Tuesday, October 26th, 2021, between 7-9 AM and 4-6 PM, and for the intersection of Highway 221 and Highway 358 on Thursday, January 20th, between 7-9 AM and 4-6 PM using Miovision video data collection.

AM Peak 2021 Existing Traffic Volumes

PM Peak 2021 Existing Traffic Volumes



AM Peak 2021 Existing Traffic Volumes

PM Peak 2021 Existing Traffic Volumes

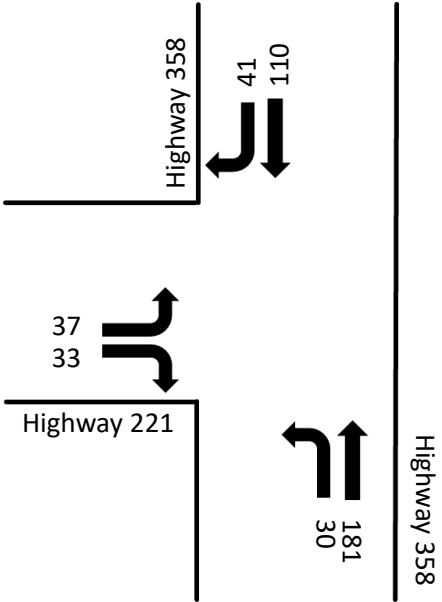
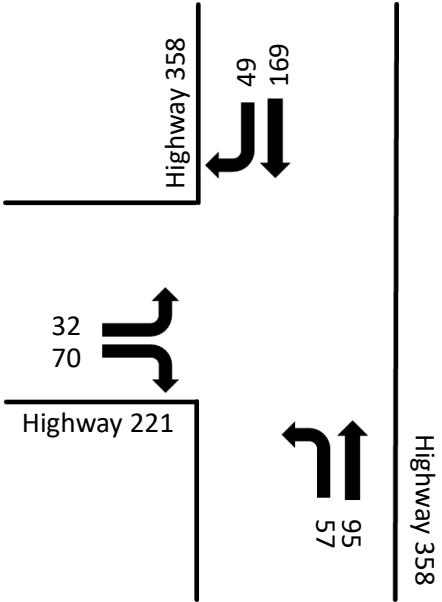


Figure 4: Existing peak hour traffic volumes at the intersections of J Jordan Road and Highway 221, and Highway 221 and Highway 358

Table 3 summarizes Synchro traffic modeling results for the level of service, average delay, volume to capacity ratio, and 95th% queue lengths based on current traffic volumes. All individual movements and the overall intersection operate well and experience limited to no delays during AM and PM peak hours.

Table 3: Traffic modeling results summary for existing intersections and volumes

2021 AM Existing Volumes							
	Hwy 221		Hwy 221		J Jordan Rd		
LOS Criteria	EBL	EBT	WBT	WBR	SBL	SBR	Intersection
Vehicle Count	37	29	35	115	77	30	
LOS	A	-	-	-	B	-	A
Delay (s)	8	-	-	-	10	-	4
v/c	0.3	-	-	-	0.15	-	
95th% Queue (m)	0	-	-	-	4	-	
2021 PM Existing Volumes							
	Hwy 221		Hwy 221		J Jordan Rd		
LOS Criteria	EBL	EBT	WBT	WBR	SBL	SBR	Intersection
Vehicle Count	32	49	53	53	52	30	
LOS	A	-	-	-	A	-	A
Delay (s)	8	-	-	-	10	-	4
v/c	0.02	-	-	-	0.11	-	
95th% Queue (m)	1	-	-	-	5	-	

2021 AM Existing Volumes							
	Hwy 221		Hwy 358		Hwy 358		
LOS Criteria	EBL	EBR	NBL	NBT	SBT	SBR	Intersection
Vehicle Count	32	70	57	95	169	49	
LOS	B	-	A	-	-	-	A
Delay (s)	11	-	8	-	-	-	3
v/c	0.16	-	0.05	-	-	-	
95th% Queue (m)	5	-	0	-	-	-	
2021 PM Existing Volumes							
	Hwy 221		Hwy 358		Hwy 358		
LOS Criteria	EBL	EBR	NBL	NBT	SBT	SBR	Intersection
Vehicle Count	37	33	30	181	110	41	
LOS	B	-	A	-	-	-	A
Delay (s)	11	-	8	-	-	-	2
v/c	0.11	-	0.02	-	-	-	
95th% Queue (m)	5	-	0	-	-	-	

2.3 AUXILIARY TURN LANE ANALYSIS

An auxiliary turn lane warrant analysis has been completed for the intersections of J Jordan Road and Highway 221, and Highway 221 and Highway 358 for existing conditions using the Ministry of Transportation Ontario

(MTO) *Geometric Design Standards for Ontario Highways* left turn lane warrant analysis and the Ohio Department of Transportation’s *State Highway Access Management Manual* right turn lane warrant analysis. The analysis results are provided in Table 4, and the warrant tables are included in Appendix B.

Table 4: Auxiliary turn lane warrant results for existing traffic volumes

Intersection	Turn Movement	Volume Scenario	Warrant Result
Highway 221 / J Jordan Road	Eastbound Left	2021 AM Existing Volumes	Not Warranted
	Eastbound Left	2021 PM Existing Volumes	Not Warranted
	Westbound Right	2021 AM Existing Volumes	Not Warranted
	Westbound Right	2021 PM Existing Volumes	Not Warranted
Highway 221 / Highway 358	Northbound Left	2021 AM Existing Volumes	Not Warranted
	Northbound Left	2021 PM Existing Volumes	Not Warranted
	Southbound Right	2021 AM Existing Volumes	Not Warranted
	Southbound Right	2021 PM Existing Volumes	Not Warranted

2.4 TRAFFIC SIGNAL WARRANT ANALYSIS

This study uses the Transportation Association of Canada’s (TAC) *Canadian Traffic Signal Warrant Matrix Procedure* to evaluate if traffic signals are warranted at unsignalized intersections. The warrant procedure considers multiple factors, including geometry, volumes of vehicles and pedestrians, and conflicts between vehicle-vehicle and vehicle-pedestrian movements, among other factors. Traffic volumes at the intersection of J Jordan Road and Highway 221 are well below the volumes that warrant traffic signals. The level of service analysis supports that the intersection functions well without signals.

3.0 PROPOSED DEVELOPMENT

The Parsons Green development consists of six apartment buildings with a combined 420 units (70 units each) and 22 townhouse or single-family home units for a total unit count of 442. The site is located on the east side of J Jordan Road and south of Summer Street, behind existing residential properties. Two apartment buildings will use a single driveway on J Jordan Road, approximately 40 m north of the fire hall. The remaining buildings and townhouses will have two access points through a new crescent-shaped road that will connect to Summer Street, approximately 115 m east of the J Jordan Road intersection, and J Jordan Road, opposite the northern driveway of the elementary school.

3.1 ACCESS REVIEW

Stopping sight distance is an important factor in reviewing access to the adjacent street network. Providing sufficient stopping sight distances at intersections and driveways greatly reduces the likelihood of collisions. Sight distance is defined as the distance a motorist can see approaching vehicles before their line of sight is blocked by an obstruction near the intersection. The stopping sight distance is the distance required for a driver to identify they need to stop (decision time) and come to a full stop based on their operating speed based on several factors and assumptions. A site visit was completed to confirm sufficient sight distances at each driveway location. There are no site distance limitations to any of the three access locations.



Figure 5: Access to Summer Street facing west



Figure 6: Access to Summer Street facing east



Figure 7: Northern access to J Jordan Road facing south



Figure 8: Northern access to J Jordan Road facing north



Figure 9: Southern access to J Jordan Road facing south



Figure 10: Southern access to J Jordan Road facing north

3.2 SITE TRAFFIC GENERATION

Trips generated by the completed development have been estimated using the Institute of Transportation Engineers (ITE), Trip Generation Manual 10th Edition. Table 5 provides the number of trips during AM and PM peak hours in and out of the development.

Table 5: Estimated site generated traffic volumes based on ITE trip generation rates

Land Use	Units	Trip Generation Rates						Trips Generated			
		AM Peak			PM Peak			AM Peak		PM Peak	
		Rate	In	Out	Rate	In	Out	In	Out	In	Out
Single-Family Detached Housing (Code 210)	22	0.76	26%	74%	1.00	64%	36%	4	12	14	8
Multifamily (Mid-Rise) (Code 221)	420	0.32	27%	73%	0.41	60%	40%	36	98	103	69
Total Estimated Site Generated Trips								41	110	117	77
Notes:	Trip Generation rates from Institute of Transportation Engineers <i>Trip Generation Manual, 10th Edition</i>										

3.3 TRIP DISTRIBUTION

Trip distribution has been estimated using existing traffic patterns of turning movement data collected at the intersection of J Jordan Road and Highway 221 and calculating the shortest routes by time to major destinations such as commercial properties in Canning, municipalities in the area including Kentville, Port Williams and Wolfville, and access to Highway 101. Figure 11 provides the estimated distribution of site-generated trips throughout the study area.

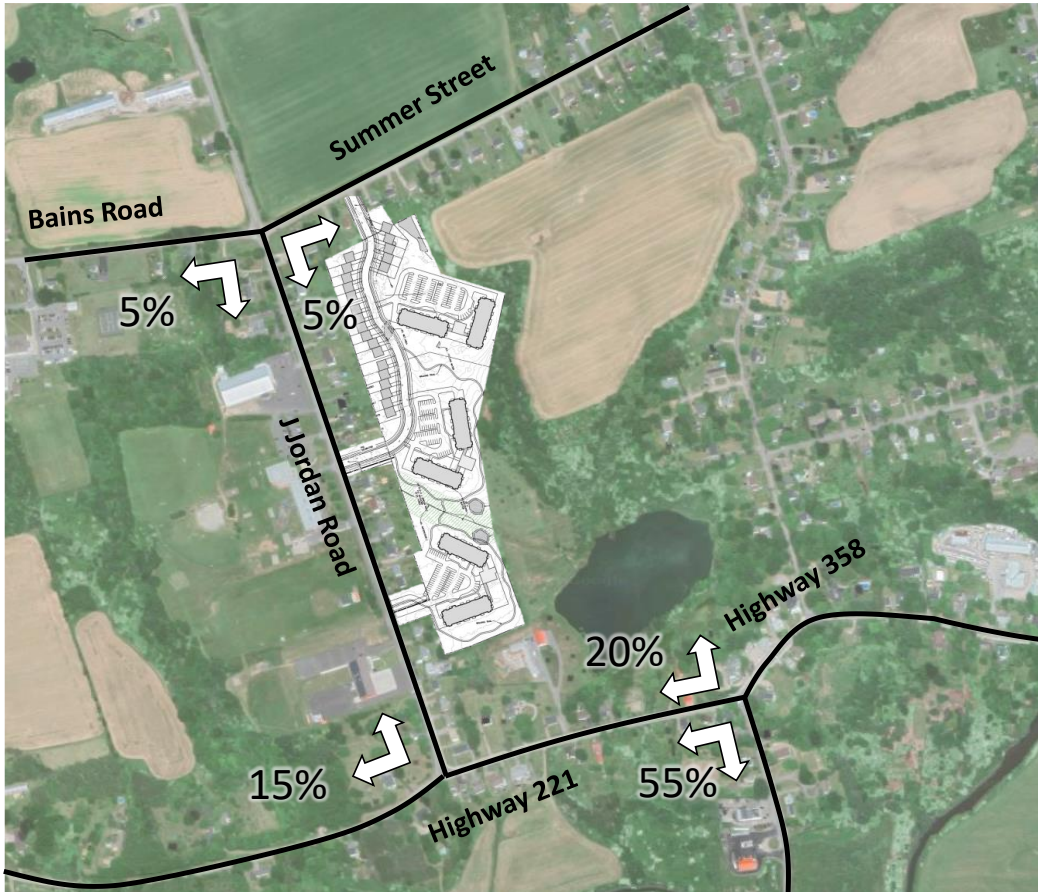


Figure 11: Estimated distribution of site-generated traffic

4.0 FUTURE CONDITIONS

4.1 2036 BACKGROUND TRAFFIC VOLUMES

The development is expected to be completed within 10-15 years. A 2036 horizon year has been used to evaluate future traffic conditions. Historical traffic counts on Highway 221 show that traffic volumes have been relatively consistent over the past ten years, with a 6% total growth in volumes between 2009 and 2018 resulting in less than 1% annual growth. Traffic volumes between 2015 and 2018 increased by 13%, resulting in an annual growth rate of 4%. The Parsons Green development is expected to account for a significant share of the growth in the area during this 10 to 15-year period, which is likely to reduce the amount of additional annual traffic growth outside of this development. An annual growth rate of 2% has been used for forecasting background traffic volumes, resulting in a 35% increase in traffic volumes between 2021 and the 2036 horizon year. Background traffic volumes for the intersection of J Jordan Road and Highway 221 are provided in figure 13.

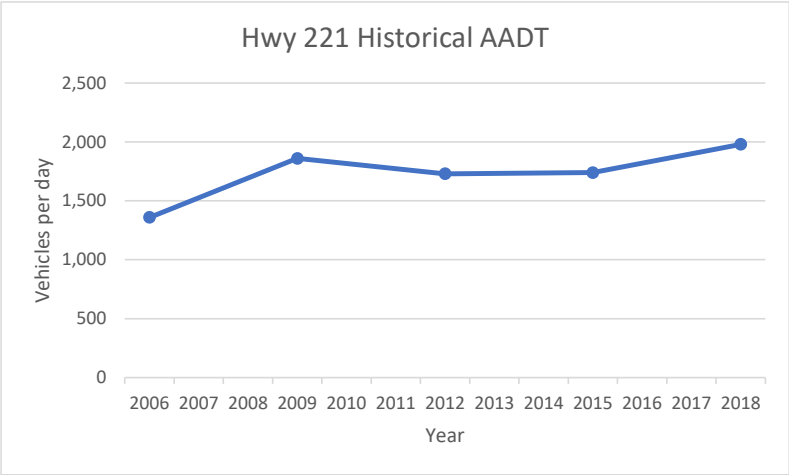
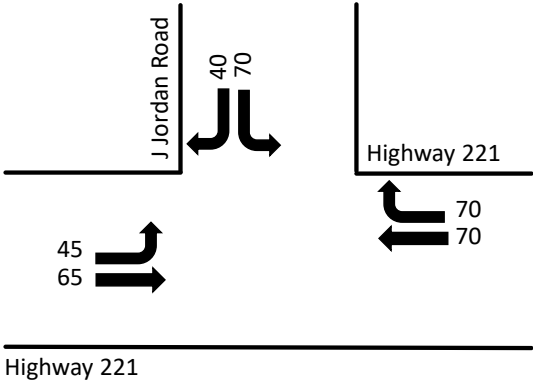
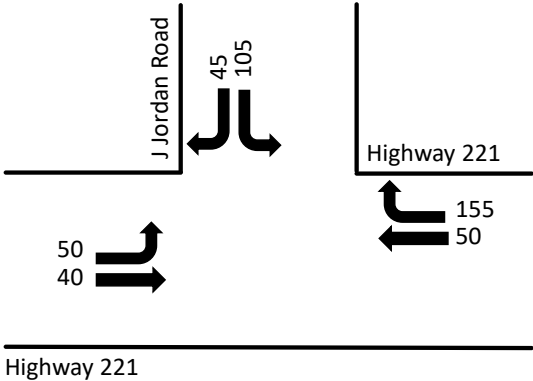


Figure 12: Historical AADT on Highway 221 west of Sheffield Mills collected by the Province of Nova Scotia

AM Peak 2036 Background Traffic Volumes

PM Peak 2036 Background Traffic Volumes



AM Peak 2036 Background Traffic Volumes

PM Peak 2036 Background Traffic Volumes

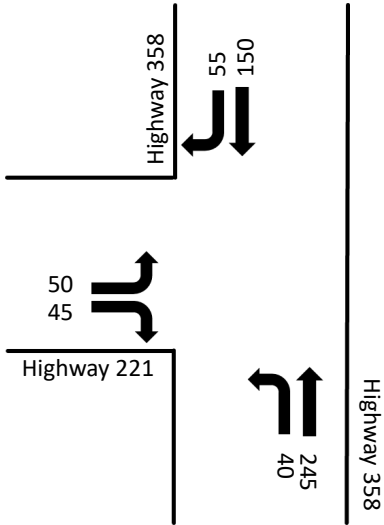
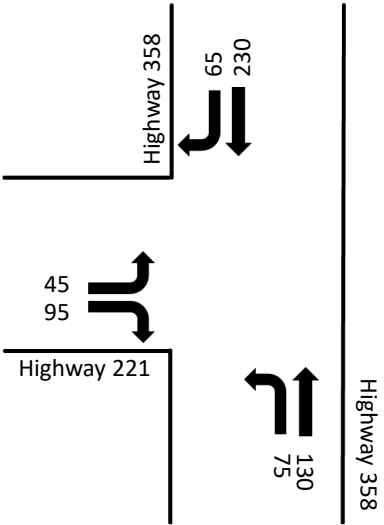
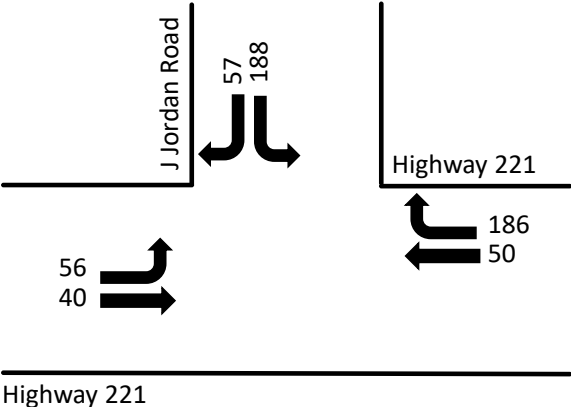


Figure 13: 2036 background traffic volumes at the intersections of J Jordan Road and Highway 221, and Highway 221 and Highway 358

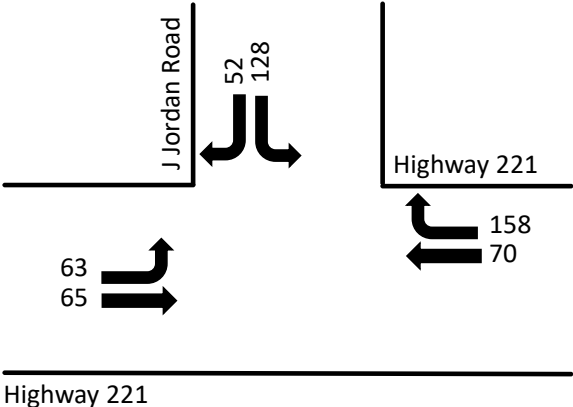
4.2 2036 TOTAL TRAFFIC VOLUMES

The total traffic volumes for 2036 have been estimated by adding site-generated traffic volumes to 2036 background traffic volumes based on the estimated trip distribution. Total traffic volumes are provided in figure 14.

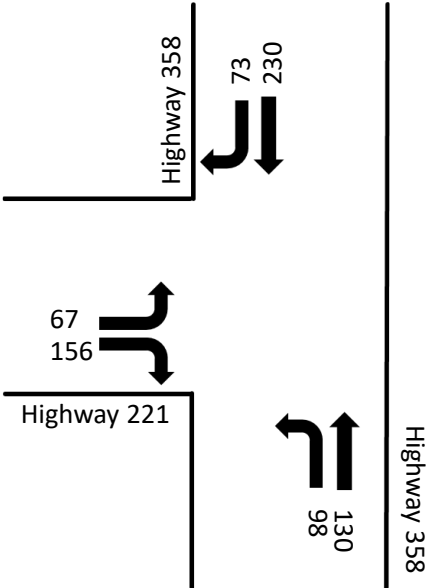
AM Peak 2036 Total Traffic Volumes



PM Peak 2036 Total Traffic Volumes



AM Peak 2036 Total Traffic Volumes



PM Peak 2036 Total Traffic Volumes

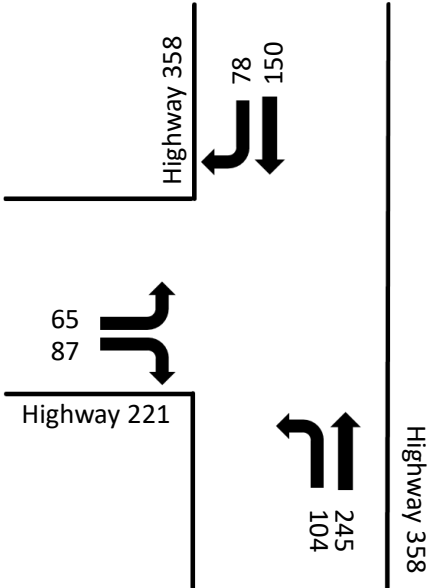


Figure 14: 2036 peak hour total traffic volumes at the intersections of J Jordan Road and Highway 221, and Highway 221 and Highway 358

4.3 NETWORK UPGRADES – 2036 TOTAL TRAFFIC VOLUMES

4.3.1 Auxiliary Turn Lane Analysis

The auxiliary lane warrant analysis has been completed for 2036 total traffic volumes to determine if annual traffic growth and the addition of site-generated traffic to the intersection of J Jordan Road and Highway 221 would create conditions that would warrant turn lanes. The analysis results in a northbound left turn with 15 m of storage is warranted at the intersection of Highway 358 and Highway 221. No other turn lanes are warranted.

Table 6: Auxiliary turn lane warrant results for future traffic volumes

Intersection	Turn Movement	Volume Scenario	Warrant Result
Highway 221 / J Jordan Road	Eastbound Left	2036 AM Total Traffic Volumes	Not Warranted
	Eastbound Left	2036 PM Total Traffic Volumes	Not Warranted
	Westbound Right	2036 AM Total Traffic Volumes	Not Warranted
	Westbound Right	2036 PM Total Traffic Volumes	Not Warranted
Highway 221 / Highway 358	Northbound Left	2036 AM Total Traffic Volumes	Not Warranted
	Northbound Left	2036 PM Total Traffic Volumes	Not Warranted
	Northbound Left	2036 AM Total Traffic Volumes	Not Warranted
	Northbound Left	2036 PM Total Traffic Volumes	Warranted
	Southbound Right	2036 AM Total Traffic Volumes	Not Warranted
	Southbound Right	2036 PM Total Traffic Volumes	Not Warranted

Although a northbound left-turn lane is warranted at the intersection of Highway 358 and Highway 221, a significant realignment of the intersection would be needed due to the existing geometry. The level of service analysis for future traffic volumes, provided in section 4.4, shows that the intersection will operate with minimal delay and the northbound left-turn achieves a level of service of A in all scenarios. Given this area's rural nature, the intersection's geometry and traffic modeling results requiring a northbound left-turn lane is not necessary.

4.3.2 Traffic Signal Warrant Analysis

The 2036 total traffic volumes at the intersection of J Jordan Road and Highway 221 remain much lower than those that warrant signals, and analysis has not been completed.

4.4 LEVEL OF SERVICE ANALYSIS – FUTURE CONDITIONS

A level of service analysis has been completed for the existing intersection configuration to confirm that it can accommodate the 2036 total traffic volumes and continue to operate at an acceptable level of service. The traffic analysis results are provided in table 5 and show that the intersection will continue to operate well.

Table 7: Traffic modeling results summary for existing intersections with 2036 total traffic volumes

2036 AM Total Volumes							
	Hwy 221		Hwy 221		J Jordan Rd		
LOS Criteria	EBL	EBT	WBT	WBR	SBL	SBR	Intersection
Vehicle Count	56	40	40	186	188	57	
LOS	A	-	-	-	B	-	A
Delay (s)	8	-	-	-	14	-	7
v/c	0.05	-	-	-	0.39	-	
95th% Queue (m)	1	-	-	-	10	-	
2036 PM Total Volumes							
	Hwy 221		Hwy 221		J Jordan Rd		
LOS Criteria	EBL	EBT	WBT	WBR	SBL	SBR	Intersection
Vehicle Count	63	65	70	158	128	52	
LOS	A	-	-	-	B	-	A
Delay (s)	8	-	-	-	13	-	5
v/c	0.05	-	-	-	0.3	-	
95th% Queue (m)	1	-	-	-	5	-	

2036 AM Total Volumes							
	Hwy 221		Hwy 358		Hwy 358		
LOS Criteria	EBL	EBR	NBL	NBT	SBT	SBR	Intersection
Vehicle Count	67	156	98	130	230	73	
LOS	C	-	A	-	-	-	A
Delay (s)	15	-	8	-	-	-	6
v/c	0.41	-	0.09	-	-	-	
95th% Queue (m)	10	-	0	-	-	-	
2036 PM Total Volumes							
	Hwy 221		Hwy 358		Hwy 358		
LOS Criteria	EBL	EBR	NBL	NBT	SBT	SBR	Intersection
Vehicle Count	65	87	104	245	150	78	
LOS	B	-	A	-	-	-	A
Delay (s)	15	-	8	-	-	-	4
v/c	0.09	-	0.09	-	-	-	
95th% Queue (m)	10	-	0	-	-	-	

The northern portion of the development will connect to J Jordan Road opposite the elementary school and create the most direct pedestrian route between 302 units and destinations on J Jordan Road. The existing sidewalk on J Jordan Road connects to Highway 221 and continues to Highway 358. A marked pedestrian crosswalk with side-mounted signage would provide a safe crossing location for a significant portion of the development to the existing sidewalk and directly to the elementary school. The southern development access on J Jordan Road is expected to have lower pedestrian volumes as it only serves two apartment buildings. An additional marked crosswalk at this location would be approximately 100 m from the existing marked crosswalk at the fire hall and is not required.

5.0 HIGHWAY 221 / HIGHWAY 358 GEOMETRY IMPROVEMENTS

Although not required, it is recommended that the Nova Scotia Department of Public Works considers improving the geometry of the intersection of Highway 221 and Highway 358 during future capital renewal projects. The intersection could be realigned to a more traditional three-legged intersection.



Figure 15: Existing intersection layout



Figure 16: Conceptual option 1 for intersection realignment



Figure 17: Conceptual option 2 for intersection realignment

6.0 CONCLUSIONS AND RECOMMENDATIONS

The Parsons Green development is expected to be completed by 2036 and will add 442 residential units to Canning on J Jordan Road. Many of the institutional properties in Canning are located on J Jordan Road, and it is important to consider how this development integrates within the community without causing adverse impacts to current residents, especially when it comes to safety.

A review of the current transportation infrastructure and operations on J Jordan Road, the intersection of J Jordan Road and Highway 221, and the intersection of Highway 221 and Highway 358 has shown that the street network and infrastructure operate well and have no apparent safety concerns under future traffic volumes.

While the left turn lane warrant analysis results in a northbound left-turn lane being warranted on Highway 358 at the intersection of Highway 221, the degree of the warrant recommendation is low. The existing geometry of the intersection would require a significant realignment of the roads. Traffic analysis results show that the intersection will operate well, with little delay, without auxiliary turn lane and future traffic volumes. The requirement of a left turn lane is not expected to be necessary. The Nova Scotia Department of Public Works should evaluate the opportunity to realign this intersection when there is a capital renewal project for this area.

The analysis shows that no upgrades to traffic infrastructure are needed to accommodate future traffic volumes.

A marked pedestrian crosswalk with ground-mounted signs should be added at the northern J Jordan Road access location and connect to the existing sidewalk on the west side of the street.

APPENDIX A – SYNCHRO REPORTS

AM Peak - 2021 Existing Volumes
5: Hwy 221 & J Jordan Rd

HCM 6th TWSC

Intersection						
Int Delay, s/veh	4.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	37	29	35	114	77	30
Future Vol, veh/h	37	29	35	114	77	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	32	38	124	84	33

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	162	0	-	0	212
Stage 1	-	-	-	-	100
Stage 2	-	-	-	-	112
Critical Hdwy	4.12	-	-	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	2.218	-	-	-	3.518
Pot Cap-1 Maneuver	1417	-	-	-	776
Stage 1	-	-	-	-	924
Stage 2	-	-	-	-	913
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1417	-	-	-	753
Mov Cap-2 Maneuver	-	-	-	-	753
Stage 1	-	-	-	-	897
Stage 2	-	-	-	-	913

Approach	EB	WB	SB
HCM Control Delay, s	4.3	0	10.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1417	-	-	-	801
HCM Lane V/C Ratio	0.028	-	-	-	0.145
HCM Control Delay (s)	7.6	0	-	-	10.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

AM Peak - 2021 Existing Volumes
6: Hwy 358 & Hwy 221

HCM 6th TWSC

Intersection						
Int Delay, s/veh	3.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	32	70	57	95	169	49
Future Vol, veh/h	32	70	57	95	169	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	35	76	62	103	184	53

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	438	211	237	0	0
Stage 1	211	-	-	-	-
Stage 2	227	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	576	829	1330	-	-
Stage 1	824	-	-	-	-
Stage 2	811	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	548	829	1330	-	-
Mov Cap-2 Maneuver	548	-	-	-	-
Stage 1	784	-	-	-	-
Stage 2	811	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11	2.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1330	-	714	-	-
HCM Lane V/C Ratio	0.047	-	0.155	-	-
HCM Control Delay (s)	7.8	0	11	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-

AM Peak - 2036 Background Volumes
5: Hwy 221 & J Jordan Rd

HCM 6th TWSC

Intersection						
Int Delay, s/veh	4.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	50	40	50	155	105	40
Future Vol, veh/h	50	40	50	155	105	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	43	54	168	114	43

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	222	0	-	0	289 138
Stage 1	-	-	-	-	138 -
Stage 2	-	-	-	-	151 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1347	-	-	-	702 910
Stage 1	-	-	-	-	889 -
Stage 2	-	-	-	-	877 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1347	-	-	-	673 910
Mov Cap-2 Maneuver	-	-	-	-	673 -
Stage 1	-	-	-	-	853 -
Stage 2	-	-	-	-	877 -

Approach	EB	WB	SB
HCM Control Delay, s	4.3	0	11.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1347	-	-	-	725
HCM Lane V/C Ratio	0.04	-	-	-	0.217
HCM Control Delay (s)	7.8	0	-	-	11.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.8

AM Peak - 2036 Background Volumes
6: Hwy 358 & Hwy 221

HCM 6th TWSC

Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	45	95	75	130	230	65
Future Vol, veh/h	45	95	75	130	230	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	49	103	82	141	250	71

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	591	286	321	0	-	0
Stage 1	286	-	-	-	-	-
Stage 2	305	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	470	753	1239	-	-	-
Stage 1	763	-	-	-	-	-
Stage 2	748	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	436	753	1239	-	-	-
Mov Cap-2 Maneuver	436	-	-	-	-	-
Stage 1	708	-	-	-	-	-
Stage 2	748	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.9	3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1239	-	610	-	-
HCM Lane V/C Ratio	0.066	-	0.249	-	-
HCM Control Delay (s)	8.1	0	12.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1	-	-

AM Peak - 2036 Total Volumes
5: Hwy 221 & J Jordan Rd

HCM 6th TWSC

Intersection						
Int Delay, s/veh	6.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	50	40	50	155	105	40
Future Vol, veh/h	56	40	50	186	188	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	61	43	54	202	204	62

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	256	0	0	320	155
Stage 1	-	-	-	155	-
Stage 2	-	-	-	165	-
Critical Hdwy	4.12	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	1309	-	-	673	891
Stage 1	-	-	-	873	-
Stage 2	-	-	-	864	-
Platoon blocked, %		-	-		
Mov Cap-1 Maneuver	1309	-	-	641	891
Mov Cap-2 Maneuver	-	-	-	641	-
Stage 1	-	-	-	831	-
Stage 2	-	-	-	864	-

Approach	EB	WB	SB
HCM Control Delay, s	4.6	0	13.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1309	-	-	-	686
HCM Lane V/C Ratio	0.047	-	-	-	0.388
HCM Control Delay (s)	7.9	0	-	-	13.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	1.8

AM Peak - 2036 Total Volumes
6: Hwy 358 & Hwy 221

HCM 6th TWSC

Intersection						
Int Delay, s/veh	5.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	45	95	75	130	230	65
Future Vol, veh/h	67	156	98	130	230	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	73	170	107	141	250	79

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	645	290	329	0	-	0
Stage 1	290	-	-	-	-	-
Stage 2	355	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	437	749	1231	-	-	-
Stage 1	759	-	-	-	-	-
Stage 2	710	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	396	749	1231	-	-	-
Mov Cap-2 Maneuver	396	-	-	-	-	-
Stage 1	688	-	-	-	-	-
Stage 2	710	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.3	3.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1231	-	591	-	-
HCM Lane V/C Ratio	0.087	-	0.41	-	-
HCM Control Delay (s)	8.2	0	15.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.3	-	2	-	-

PM Peak - 2021 Existing Volumes
5: Hwy 221 & J Jordan Rd

HCM 6th TWSC

Intersection						
Int Delay, s/veh	3.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	32	49	53	53	52	30
Future Vol, veh/h	32	49	53	53	52	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	35	53	58	58	57	33

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	116	0	-	0	210 87
Stage 1	-	-	-	-	87 -
Stage 2	-	-	-	-	123 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1473	-	-	-	778 971
Stage 1	-	-	-	-	936 -
Stage 2	-	-	-	-	902 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1473	-	-	-	759 971
Mov Cap-2 Maneuver	-	-	-	-	759 -
Stage 1	-	-	-	-	914 -
Stage 2	-	-	-	-	902 -

Approach	EB	WB	SB
HCM Control Delay, s	3	0	9.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1473	-	-	-	825
HCM Lane V/C Ratio	0.024	-	-	-	0.108
HCM Control Delay (s)	7.5	0	-	-	9.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

PM Peak - 2021 Existing Volumes
6: Hwy 358 & Hwy 221

HCM 6th TWSC

Intersection						
Int Delay, s/veh	2.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T		T		T	
Traffic Vol, veh/h	37	33	30	181	110	41
Future Vol, veh/h	37	33	30	181	110	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	36	33	197	120	45

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	406	143	165	0	-	0
Stage 1	143	-	-	-	-	-
Stage 2	263	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	601	905	1413	-	-	-
Stage 1	884	-	-	-	-	-
Stage 2	781	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	585	905	1413	-	-	-
Mov Cap-2 Maneuver	585	-	-	-	-	-
Stage 1	861	-	-	-	-	-
Stage 2	781	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	1.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1413	-	702	-	-
HCM Lane V/C Ratio	0.023	-	0.108	-	-
HCM Control Delay (s)	7.6	0	10.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

PM Peak - 2036 Background Volumes
5: Hwy 221 & J Jordan Rd

HCM 6th TWSC

Intersection						
Int Delay, s/veh	4.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	45	65	70	70	70	40
Future Vol, veh/h	45	65	70	70	70	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	2	2	2	2	2
Mvmt Flow	49	71	76	76	76	43

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	152	0	-	0	283
Stage 1	-	-	-	-	114
Stage 2	-	-	-	-	169
Critical Hdwy	4.11	-	-	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	2.209	-	-	-	3.518
Pot Cap-1 Maneuver	1435	-	-	-	707
Stage 1	-	-	-	-	911
Stage 2	-	-	-	-	861
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1435	-	-	-	682
Mov Cap-2 Maneuver	-	-	-	-	682
Stage 1	-	-	-	-	878
Stage 2	-	-	-	-	861

Approach	EB	WB	SB
HCM Control Delay, s	3.1	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1435	-	-	-	757
HCM Lane V/C Ratio	0.034	-	-	-	0.158
HCM Control Delay (s)	7.6	0	-	-	10.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6

PM Peak - 2036 Background Volumes
6: Hwy 358 & Hwy 221

HCM 6th TWSC

Intersection						
Int Delay, s/veh	2.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	50	45	40	245	150	55
Future Vol, veh/h	50	45	40	245	150	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	49	43	266	163	60

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	545	193	223	0	-	0
Stage 1	193	-	-	-	-	-
Stage 2	352	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	499	849	1346	-	-	-
Stage 1	840	-	-	-	-	-
Stage 2	712	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	481	849	1346	-	-	-
Mov Cap-2 Maneuver	481	-	-	-	-	-
Stage 1	809	-	-	-	-	-
Stage 2	712	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.2	1.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1346	-	605	-	-
HCM Lane V/C Ratio	0.032	-	0.171	-	-
HCM Control Delay (s)	7.8	0	12.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.6	-	-

PM Peak - 2036 Total Volumes
5: Hwy 221 & J Jordan Rd

HCM 6th TWSC

Intersection						
Int Delay, s/veh	5.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	45	65	70	70	70	40
Future Vol, veh/h	63	65	70	157	127	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	68	71	76	171	138	57

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	247	0	-	0	369 162
Stage 1	-	-	-	-	162 -
Stage 2	-	-	-	-	207 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1319	-	-	-	631 883
Stage 1	-	-	-	-	867 -
Stage 2	-	-	-	-	828 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1319	-	-	-	597 883
Mov Cap-2 Maneuver	-	-	-	-	597 -
Stage 1	-	-	-	-	820 -
Stage 2	-	-	-	-	828 -

Approach	EB	WB	SB
HCM Control Delay, s	3.9	0	12.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1319	-	-	-	659
HCM Lane V/C Ratio	0.052	-	-	-	0.295
HCM Control Delay (s)	7.9	0	-	-	12.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	1.2

PM Peak - 2036 Total Volumes
6: Hwy 358 & Hwy 221

HCM 6th TWSC

Intersection						
Int Delay, s/veh	4.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	50	45	40	245	150	55
Future Vol, veh/h	65	87	104	245	150	78
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	71	95	113	266	163	85

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	698	206	248	0	0
Stage 1	206	-	-	-	-
Stage 2	492	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	407	835	1318	-	-
Stage 1	829	-	-	-	-
Stage 2	615	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	366	835	1318	-	-
Mov Cap-2 Maneuver	366	-	-	-	-
Stage 1	745	-	-	-	-
Stage 2	615	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.6	2.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1318	-	539	-	-
HCM Lane V/C Ratio	0.086	-	0.307	-	-
HCM Control Delay (s)	8	0	14.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.3	-	1.3	-	-

APPENDIX B – AUXILARY TURN LANE WARRANTS

Table B1: Highway 221 at J Jordan Road Left Turn Lane Warrant Analysis (2021 Existing Traffic Volumes)

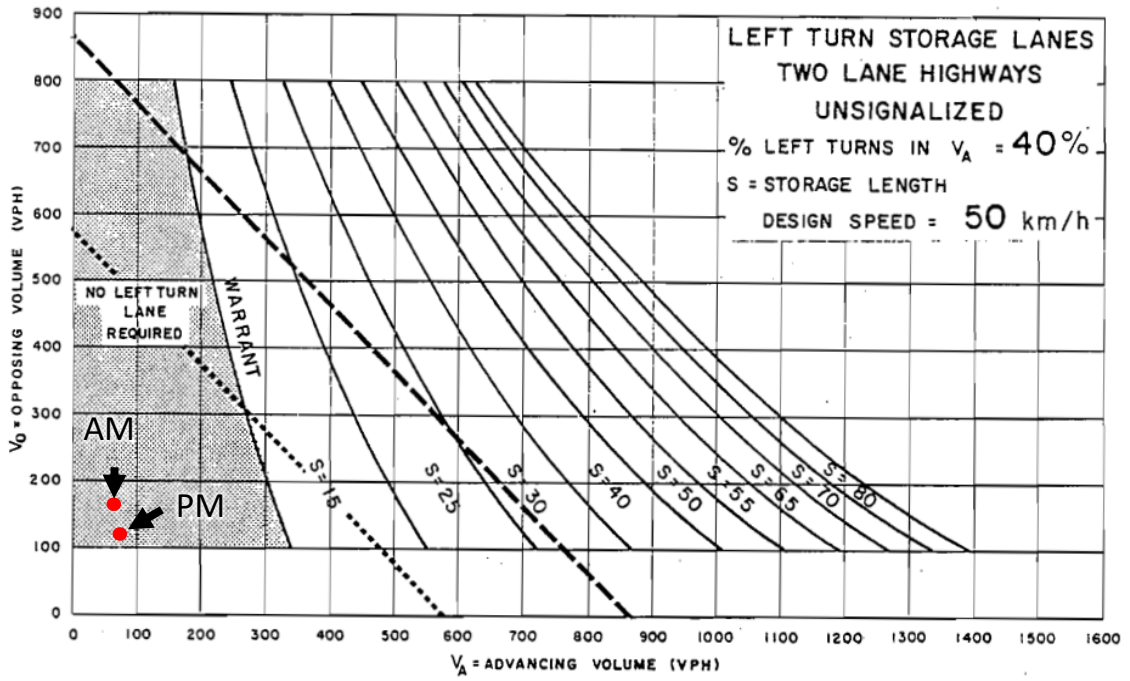


Table B2: Highway 221 at J Jordan Road Right Turn Lane Warrant Analysis (2021 Existing Traffic Volumes)

2-Lane Highway Right Turn Lane Warrant

= < 40 mph or 70 kph Posted Speed

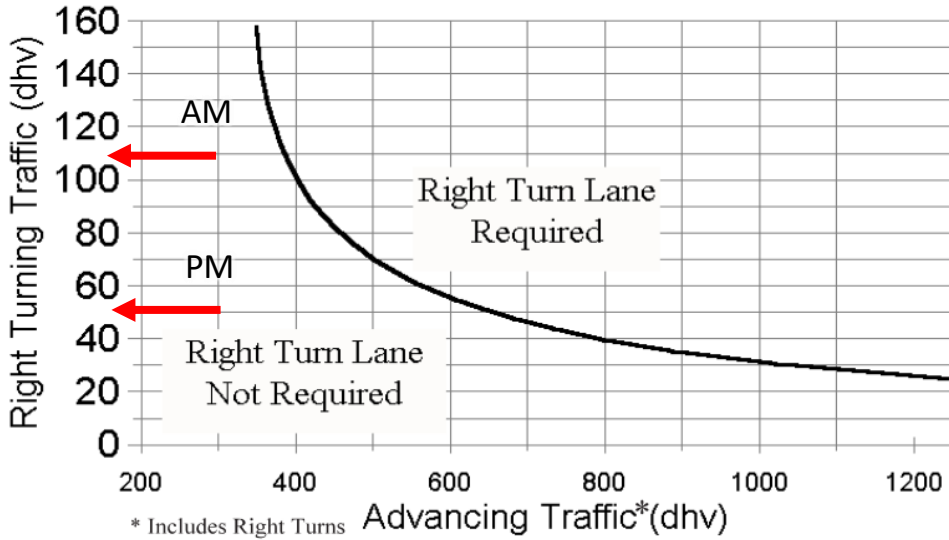


Table B3: Highway 221 at Highway 358 Left Turn Lane Warrant Analysis (2021)
Existing Traffic Volumes

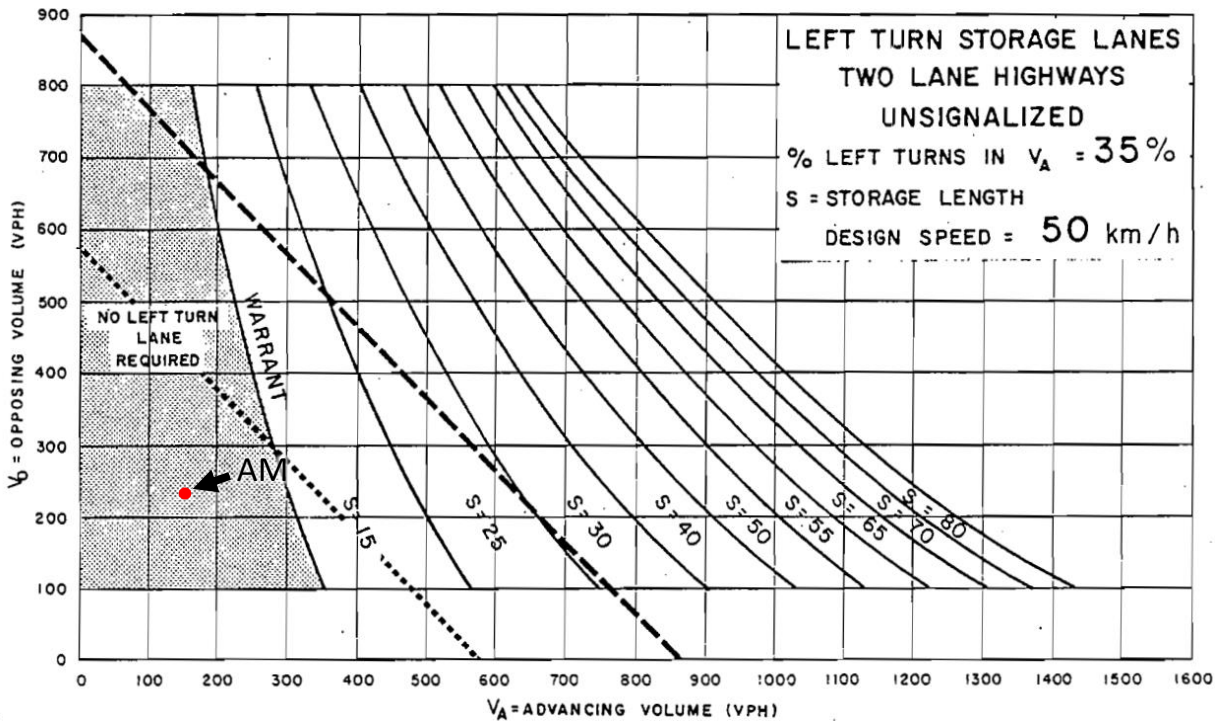


Table B4: Highway 221 at Highway 358 Left Turn Lane Warrant Analysis (2021)
Existing Traffic Volumes

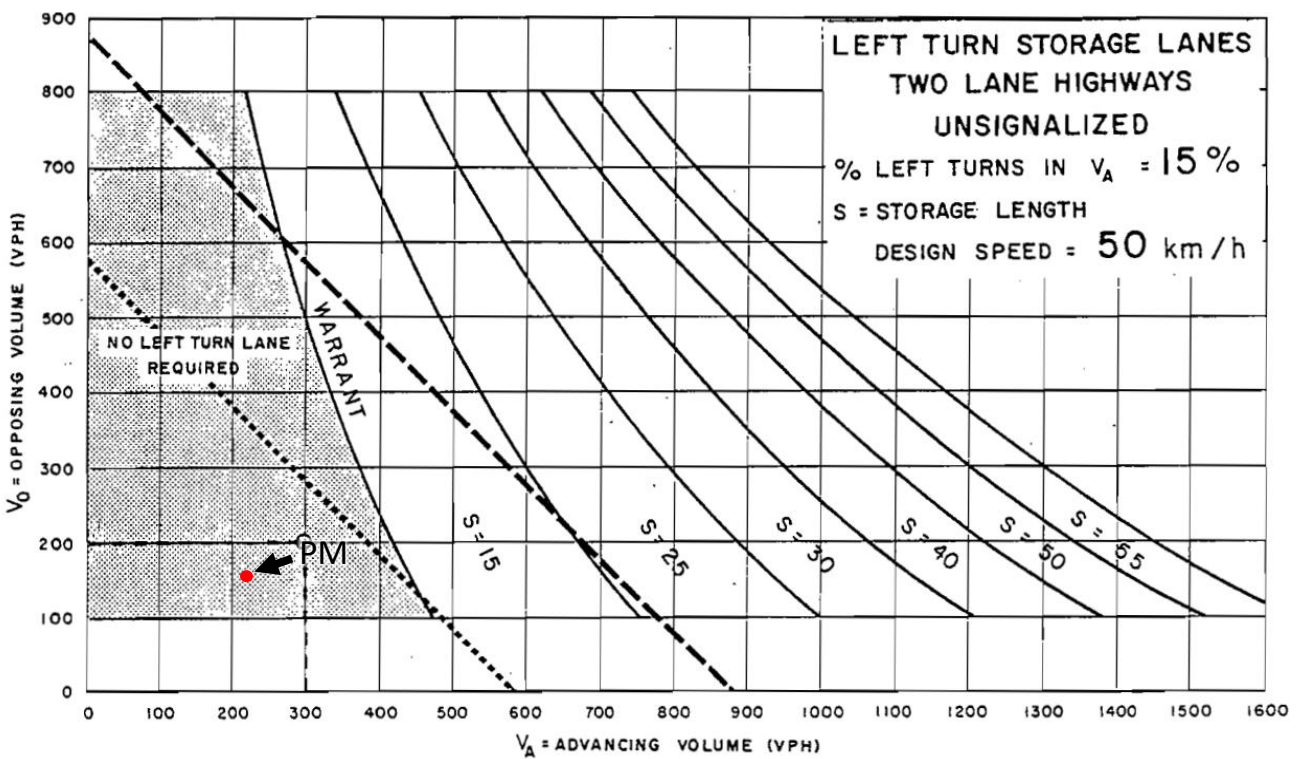


Table B5: Highway 221 at Highway 358 Right Turn Lane Warrant Analysis (2021 Existing Traffic Volumes)

2-Lane Highway Right Turn Lane Warrant
=< 40 mph or 70 kph Posted Speed

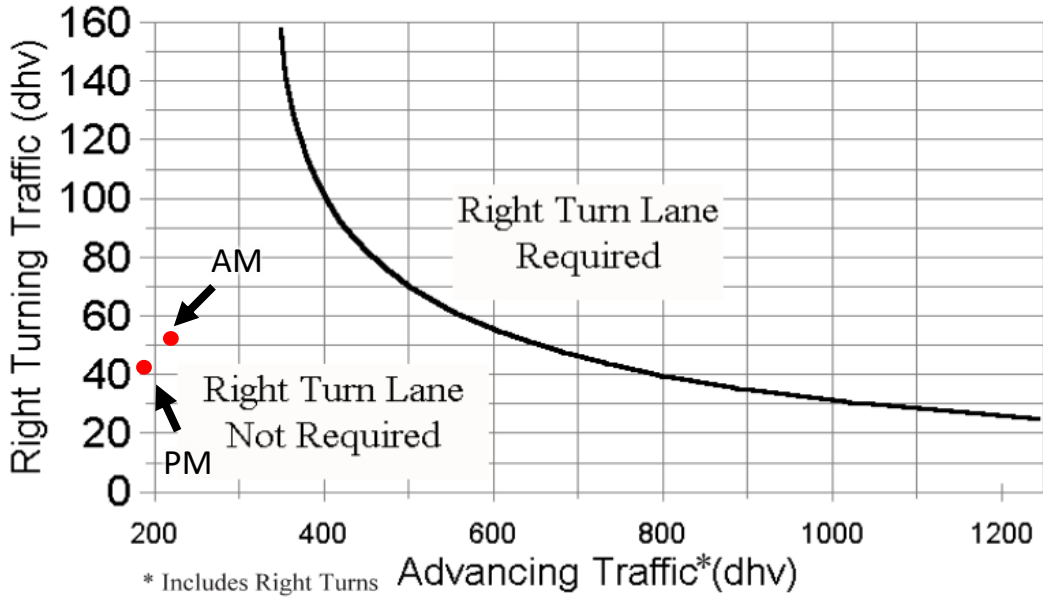


Table B6: Highway 221 at Highway 358 Left Turn Lane Warrant Analysis (2036 Background Traffic Volumes)

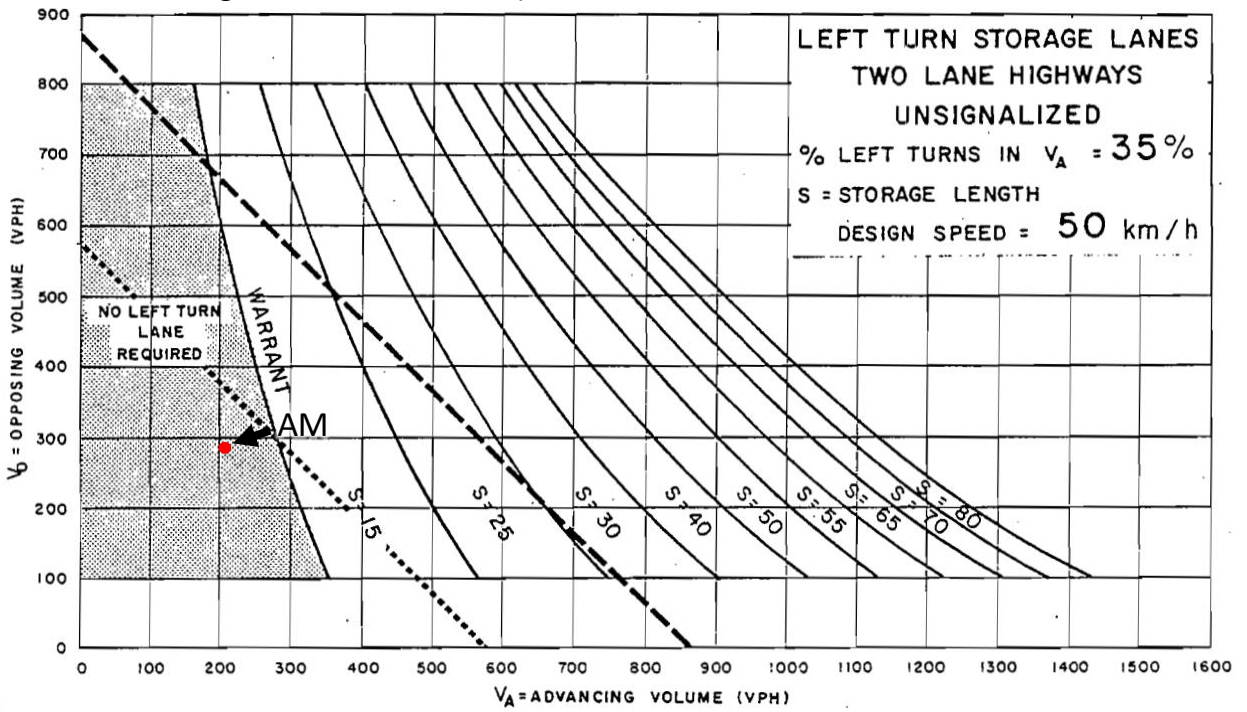


Table B7: Highway 221 at Highway 358 Left Turn Lane Warrant Analysis (2036 Background Traffic Volumes)

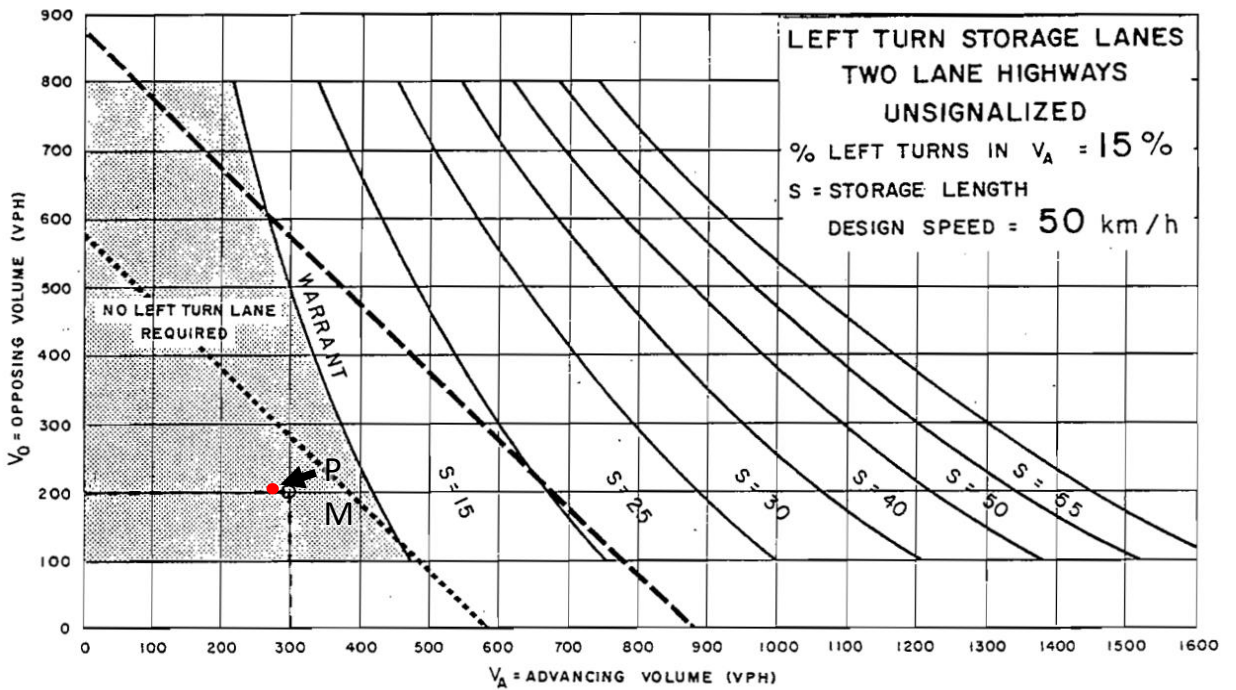


Table B8: Highway 221 at J Jordan Road Left Turn Lane Warrant Analysis (2036 Total Traffic Volumes)

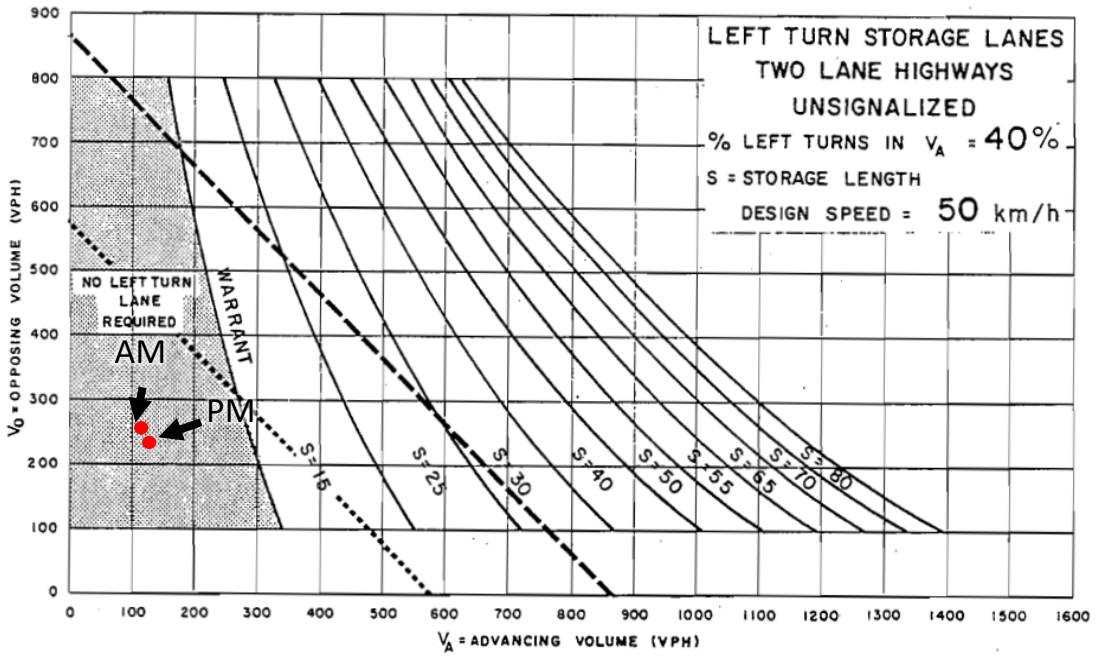


Table B9: Highway 221 at J Jordan Road Right Turn Lane Warrant Analysis (2036 Total Traffic Volumes)

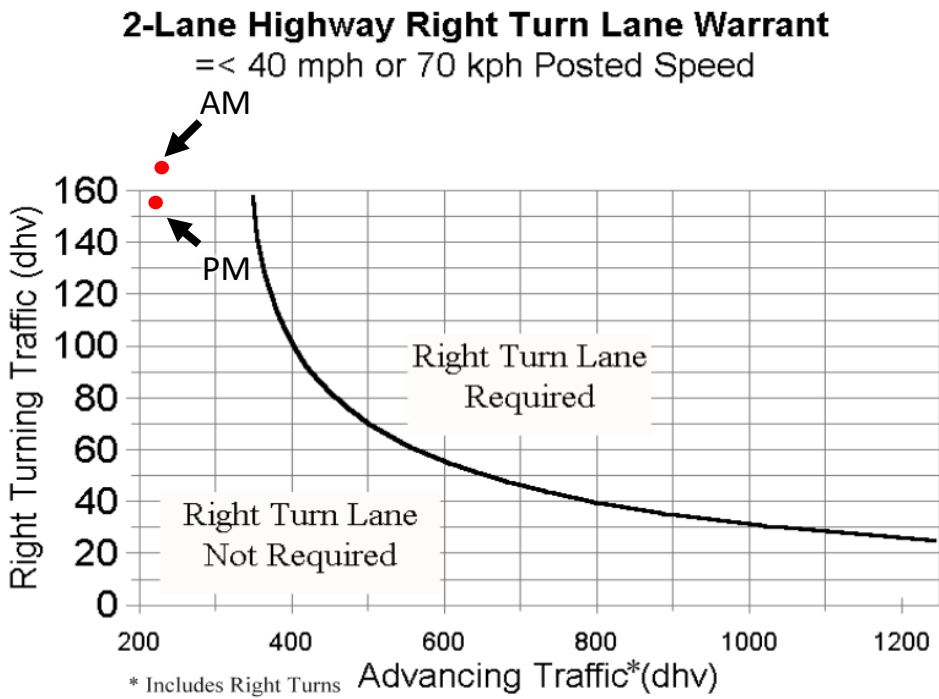


Table B10: Highway 221 at Highway 358 Left Turn Lane Warrant Analysis (2036 Total Traffic Volumes)

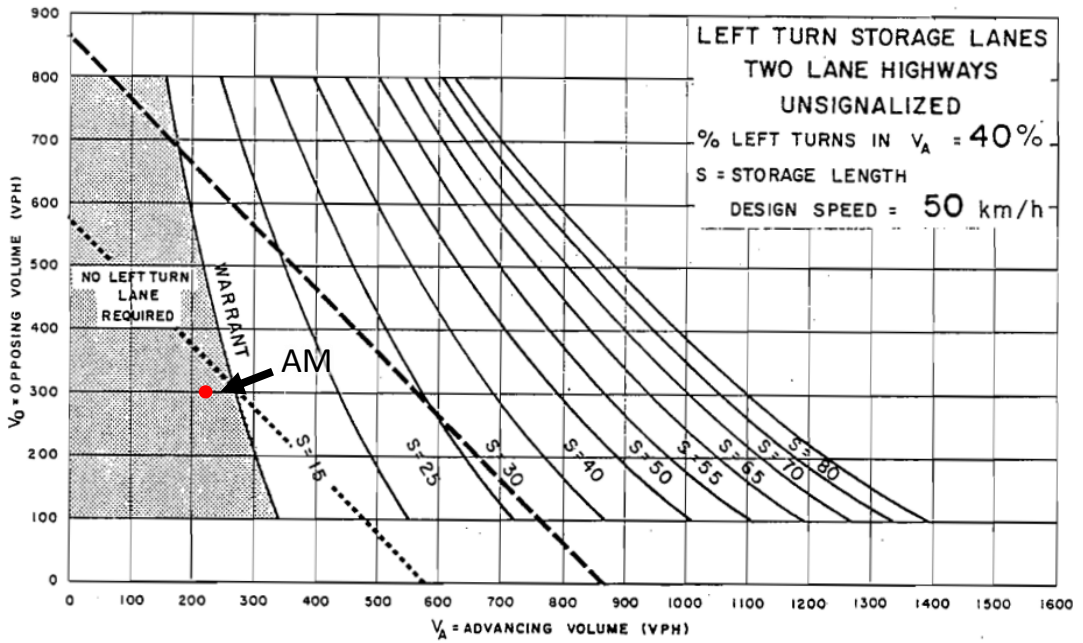


Table B11: Highway 221 at Highway 358 Left Turn Lane Warrant Analysis (2036 Total Traffic Volumes)

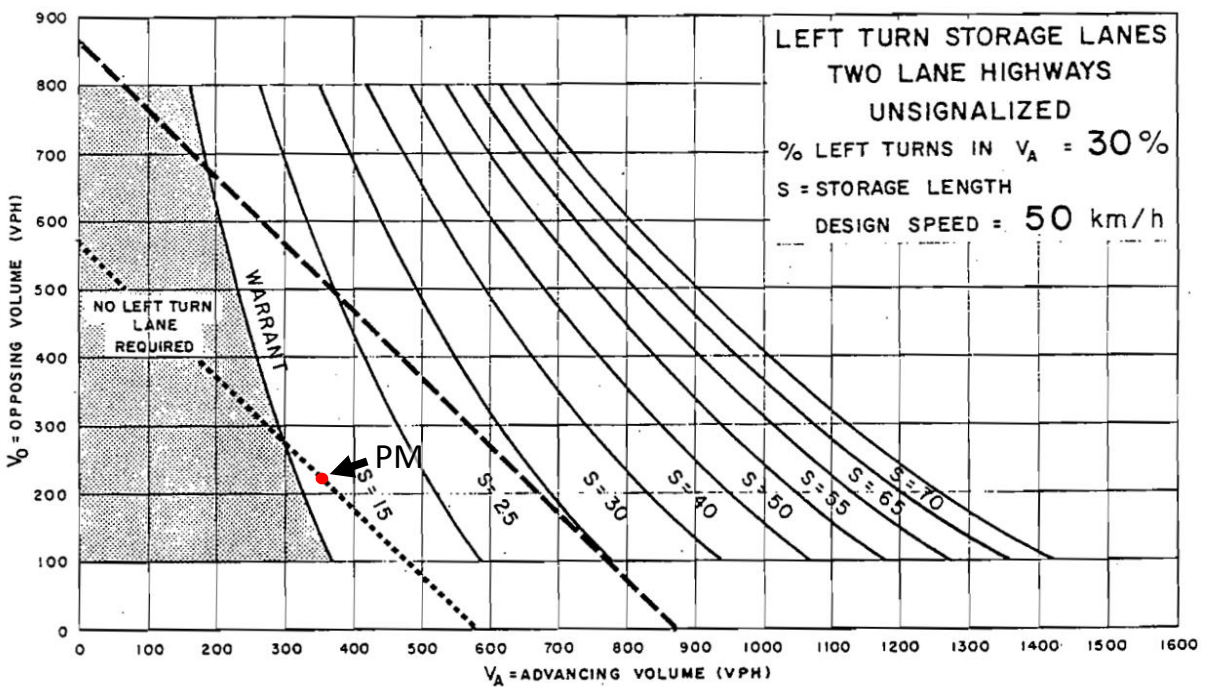


Table B12: Highway 221 at Highway 358 Right Turn Lane Warrant Analysis (2021 Total Traffic Volumes)

2-Lane Highway Right Turn Lane Warrant

= < 40 mph or 70 kph Posted Speed

