CA0013524.1542

January 19, 2024

Andrew Bone, MCIP, LPP
Director of Planning & Development
Clayton Developments Limited
100C – 255 Lacewood Drive
Halifax, NS B3M 4G2 [via email: abone@claytondev.com]

RE: Traffic Impact Analysis
Shannex Parkland, Bedford, Nova Scotia

Dear Mr. Bone:

Plans are being prepared for the proposed Shannex Parkland Development in Bedford, as shown in Figure 1. WSP Canada Inc. has been retained to complete a Traffic Impact Analysis (TIA) for the proposed site based on the latest development plans provided in Figure 2.

BACKGROUND INFORMATION

The proposed site is currently approved for development potential consisting of a combination of 111 Mid-Rise Apartments and 375 Nursing Home Beds. Since this approval, the project is now being analyzed to include a retirement community consisting of various independent living, assisted living and nursing home units.

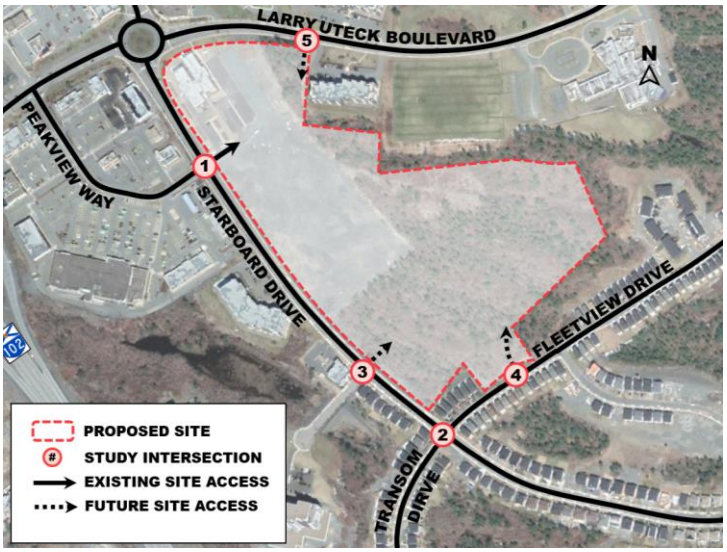


Figure 1 – Study Area

SITE DESCRIPTION AND ACCESS

The proposed Shannex Parkland Development site consists of four parcels bound by Larry Uteck Boulevard, Starboard Drive and Fleetview Drive (PID 41316514, 41316522, 41316548, and 41318049). The majority of the site is unoccupied and being prepared for development, however, the portion of the site fronting Larry Uteck Boulevard has already been developed to include general office space, as shown on the left of Photo 1. The remainder of the site is expected to consist of the Shannex Village Centre with clusters of buildings surrounding it consisting of multiple elements of senior adult living. Vehicle access to the site is planned via the existing signalized entrance, a new primary site driveway on Starboard Drive and a new driveway on Fleetview Drive. There will be additional low-volume driveway connections to Starboard Drive. Two accesses (one right-in right-out and one full movement) to Larry Uteck Boulevard are also proposed that connect to the approximately 36 parking spaces and no internal connection to the larger development.

Photo 1 – Existing Site

1 Spectacle Lake Drive
Dartmouth, NS, Canada B3B 1X7
Tel.: +1 902-835-9955
Fax: +1 902-835-1645
www.wsp.com

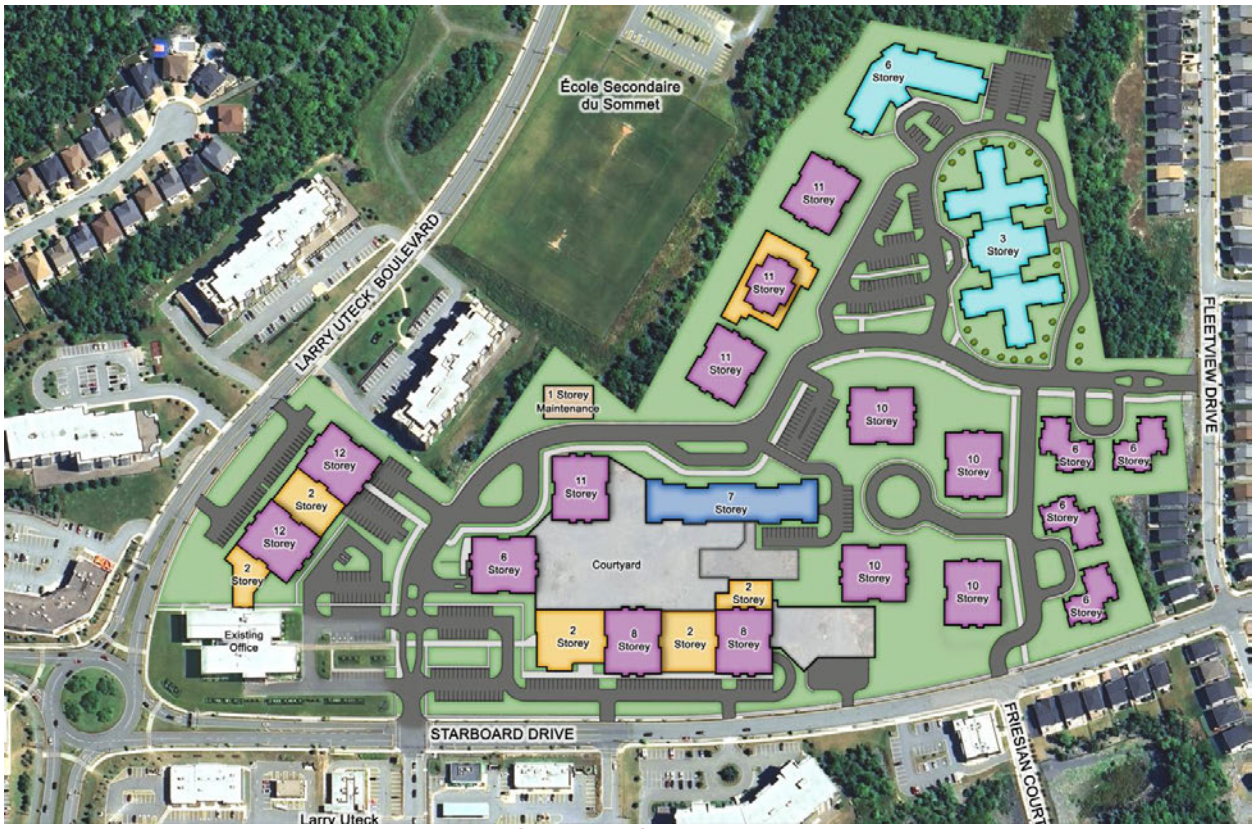


Figure 2 – Site Layout

DESCRIPTION OF EXISTING MAJOR STREETS AND INTERSECTIONS

Starboard Drive is a local collector loop road that connects to Larry Uteck Boulevard on the north and south ends of the street. In general, Starboard Drive consists of one lane in each direction with sidewalks on both sides and the posted speed limit is 50 km/h. Halifax Transit currently operates Route 90 (Larry Uteck) and Route 91 (Hemlock Ravine) past the proposed site.

Fleetview Drive is a local loop road that connects to Starboard Drive on both ends. In the Study Area, Fleetview Drive consists of one lane in each direction with sidewalk on the south side. The regulatory speed limit is 50 km/h.

Starboard Drive at Peakview Way / Shannex Driveway is a 4-leg signalized intersection, as shown in Photo 2. The southbound approach consists of a left-turn lane, a through lane and a shared right-turn/through lane. The northbound and eastbound approaches are supplemented with left-turn lanes. There are pedestrian crosswalks on all approaches.

Photo 2 – Starboard Drive at Peakview Way / Shannex Driveway *(facing Peakview Way)*

Starboard Drive at Fleetview Drive / Transom Drive is a 4-leg stop-controlled intersection with free flow on Starboard Drive, as shown in Photo 3. All approaches are single lane. There is a raised crosswalk crossing Starboard Drive on the south approach.

Photo 3 – Starboard Drive at Fleetview Drive / Transom Drive *(facing south on Starboard Drive)*

TRAFFIC VOLUME DATA

Intersection turning movement counts were collected at the existing Study Intersections by WSP on Thursday, September 28, 2023. The turning movement counts have been tabulated in Tables A-1 and A-2, Appendix A, with peak hours indicated by shaded areas.

FUTURE BACKGROUND 2038 VOLUMES

To account for future potential development in the Study Area, other than the proposed Shannex Parkland site, a 1% annual growth rate was applied to the through volumes along Starboard Drive. It should be noted that no growth factor was applied to volumes to/from Peakview Way, Fleetview Drive or Transom Drive since these areas are considered fully built out. The project is expected to be built out by 2033, and the analysis considers buildout + five years (2038). Future background (2038) traffic volumes without trips generated by the Shannex Parkland Development, are shown diagrammatically in Figure A-1, Appendix A.

ACCESS REVIEW

Vehicle access to the site is planned from three full access primary connections, via the existing signalized intersection at Starboard Drive / Peakview Way, and additional connections to Starboard Drive and Fleetview Drive. Secondary connections are being planned along Starboard Drive and each is aligned with an existing driveway or street on the opposite side of Starboard Drive so as to not increase the number of access points along the street. Driveway connections are also being planned to Larry Uteck Boulevard and a separate access review Memorandum has been submitted that considers those connections. Starboard Drive and Fleetview Drive have generally consistent grade and a straight alignment at the proposed site access locations. There is sufficient intersection sight distance at each proposed driveway for a 60km/h travel speed along Starboard Drive and Fleetview Drive. The sightlines looking left and right from the proposed primary driveway on Starboard Drive are shown in Photo 4 and 5 while the sightlines looking left and right from the proposed driveway on Fleetview Drive are shown in Photo 6 and 7. While on street parking is allowed on Fleetview Drive, the roadway is straight and has adequate sight distance for the speeds in the area.

Photo 4 – Looking South (to the left) on Starboard Drive from Approximate location of Future Driveway #1

Photo 5 – Looking North (to the right) on Starboard Drive from Approximate location of Future Driveway #1

Photo 6 – Looking East (to the left) on Fleetview Drive from Approximate location of Future Driveway #2

Photo 7 – Looking West (to the right) on Fleetview Drive from Approximate location of Future Driveway #2

TRIP GENERATION

When using the published trip generation rates in the *Trip Generation Manual, 11th Edition (Institute of Transportation Engineers, Washington, 2021)* the transportation engineer's objective should be to provide a realistic estimate of the number of trips that will be generated. Trip generation directional distribution has been corrected using the *Trip Generation 11th Edition Errata (2021)*.

The site is currently approved for development potential consisting of a combination of 111 Mid-Rise Apartments and 375 Nursing Home Beds. The project is now being analyzed to include a retirement community consisting of various independent living, assisted living and nursing home units.

Trip generation estimates were prepared for the currently approved development potential to provide a comparison to the full build-out of the latest development plans for the proposed site.

Trips generated by Mid-Rise Apartment (Land Use 221) and Continuing Care Retirement Community (Land Use 255) are estimated based on the number of residential units. Trips generated by Nursing Home (Land Use 620) are estimated based on the number of beds. Trips generated by General Office Building (Land Use 710) are estimated based on the Gross Floor Area.

Trip generation estimates for the currently approved development potential are summarized in Table 1. It was estimated that this would generate:

- 91 two-way vehicle trips (47 entering and 44 exiting) during the AM peak hour; and,
- 96 two-way vehicle trips (44 entering and 52 exiting) during the PM peak hour.

Table 1 – Trip Generation Estimates for Previous Development Potential Approval

Land Use[1]	Units[2]	Trip Generation Rates[3]				Trip Generation Estimates[3]			
		AM Peak		PM Peak		AM Peak		PM Peak	
		In	Out	In	Out	In	Out	In	Out
Mid-Rise Apartments (Land Use 221)	111 Units	AM: (T) = 0.44(X) - 11.61 PM: (T) = 0.39(X) + 0.34				9	29	27	17
Nursing Home (Land Use 620)	375 Beds	0.10	0.04	0.05	0.09	38	15	17	35
Trip Generation Estimates for Approved Development Potential						**47**	**44**	**44**	**52**

NOTES:
1. Land Use Code 221 and 620 are from Trip Generation, 11th Edition, (Institute of Transportation Engineers, Washington, 2021).
2. 'Number of Residential Units' for Mid-Rise Apartments and 'Number of Beds' for Nursing Home.
3. Rates are 'vehicles per hour per unit'; trips generated are 'vehicles per hour for peak hours'.

The latest development plan, as shown in Figure 2 proposes 6,000m^2 of additional office and 2,011 units with land uses that are comparable to those included in a Continuing Care Retirement Community (CCRC). A CCRC is described by ITE as a land use that provides multiple elements of senior adult living that combine aspects of independent living with increased care as lifestyle needs change over time *(Page 459 and 460, Land Use 255, Trip Generation Manual, 11th Edition)*. A CCRC may also contain special services such as medical, dining, recreational, and limited supporting retail facilities. The fitted curve equations have been used to provide trip generation estimates for the proposed Shannex Parkland Development.

Trip generation estimates for the latest development plans for the proposed Shannex Parkland site are summarized in Table 2. It was estimated that the site will generate:

- 398 two-way vehicle trips (285 entering and 113 exiting) during the AM peak hour; and,
- 433 two-way vehicle trips (144 entering and 289 exiting) during the PM peak hour.

Table 2 – Trip Generation Estimates for Shannex Parkland Development

Land Use[1]	Units[2]	Trip Generation Rates[3]				Trip Generation Estimates[3]			
		AM Peak		PM Peak		AM Peak		PM Peak	
		In	Out	In	Out	In	Out	In	Out
General Office Building (1000 Sq. Ft) (Land Use 710)	64.58 KGFA	AM: Ln(T) = 0.86*Ln(X) + 1.16 PM: Ln(T) = 0.83*Ln(X) + 1.29				101	14	20	96
Continuing Care Retirement Community (Land Use 255)	2011 Units	AM: (T) = 0.13(X) + 21.60 PM: (T) = 0.13(X) + 55.26				184	99	124	193
Trip Generation Estimates for Shannex Site						**285**	**113**	**144**	**289**

NOTES:
1. Land Use Code 710 and 255 is from Trip Generation, 11th Edition, (Institute of Transportation Engineers, Washington, 2021).
2. 'Gross Floor Area' for General Office Building and 'Number of Residential Units' for Continuing Care Retirement Community.
3. Rates are 'vehicles per hour per unit'; trips generated are 'vehicles per hour for peak hours'.

TRIP DISTRIBUTION AND ASSIGNMENT

Trips generated by the proposed site were assigned to the roadway network based on WSP's collected turning movement counts and local knowledge of the area considering major trip origins and destinations in the region.

North toward Larry Uteck	75%
South toward Bedford Highway	25%

Trips expected to be generated by the proposed site have been assigned to the site driveways based on review of onsite parking and circulation. Site generated trips are shown diagrammatically in Figure A-2, Appendix A. Site generated trips have been added to the future background traffic volumes (Figure A-1, Appendix A) to provide projected AM

and PM peak hourly volumes that include trips generated by proposed redevelopments. The full build-out traffic volumes are illustrated diagrammatically in Figure A-3, Appendix A.

While it is likely that some traffic will use the additional site connections, this traffic is expected to be minor relative to the volumes projected at the primary connections. Analysis of the primary connections assuming no traffic is assigned to these additional connections yields a worst-case scenario and is a conservative assumption.

SIGNAL AND TURN LANE WARRANT ANALYSIS

A signal warrant analysis is completed to determine if the installation of traffic signals at an intersection will provide a positive impact on total intersection operation. That is, the benefits in time saved and improved safety that will accrue to vehicles entering from a side street will exceed the impact that signals will have in time lost and potential additional collisions for vehicles approaching the intersection on the main street.

The intersection review included completion of a traffic signal warrant analysis to consider whether traffic signals are the optimal form of traffic control. The *Canadian Traffic Signal Warrant Matrix Analysis (Transportation Association of Canada (TAC), 2005)* considers 100 warrant points, and higher than 75 vehicles per hour (vph) average approach volume on the side street, as an indication that traffic signals will provide a positive impact. The signal warrant analysis uses vehicular and pedestrian volumes, and intersection, roadway and study area characteristics to calculate a warrant point value.

Traffic signal warrants were completed for Study Intersection #2 (Starboard Drive at Fleetview Drive / Transom Drive) and Study Intersection #3 (Starboard Drive at Site Access - 1) based on projected full build-out traffic volumes. It was determined that:

- Traffic signals are **not warranted** at Study Intersection #2 (Starboard Drive at Fleetview Drive/Transom Drive) with full Build-Out traffic volumes (34 Warrant Points, Table B-1, Appendix B).
- Traffic signals are **not warranted** at Study Intersection #3 (Starboard Drive at Site Access #1) with full Build-Out traffic volumes (7 Warrant Points, Table B-2, Appendix B).

Left-turn movements on a two-lane street may cause both operational and safety problems. Operational problems result as a vehicle stopped waiting for an opportunity to turn across ‘heavy’ opposing traffic causes a queue of stopped vehicles to form. Safety problems result from rear end collisions when a stopped left-turning vehicle is struck by an advancing vehicle, or from head-on or right-angle collisions when a left-turning vehicle is struck by an opposing vehicle.

The Geometric Design Standards for Ontario Highways Manual contains nomographs for left-turn lane analysis for two lane streets at unsignalized intersections. The analysis method, which is normally used by WSP Atlantic to evaluate the warrant for left-turn lanes, uses a series of nomographs that consider speed, advancing volumes, left-turns as a percentage of advancing volumes, and opposing volumes. A point, based on ‘opposing’ and ‘advancing’ volumes, plotted to the right of the ‘warrant line’ of the appropriate ‘% left-turns’ and ‘approach speed’ nomograph, indicates that a left-turn lane is warranted for the conditions used in the analysis. Similarly, a point that is plotted to the left of the warrant line indicates that a left-turn lane is not warranted.

Left-turn lane analyses have been completed for the study intersections using projected 2038 peak hourly volumes that include site generated trips (Figure A-4) and 2038 future background volumes (Figure A-2). A left-turn lane is **not warranted** at the Starboard Drive at Site Access #1 intersection without and with site generated trips. A left-turn lane **is warranted** at the Starboard Drive at Fleetview Drive/Transom Drive intersection without and with site generated trips. The addition of the warranted left-turn lane has been identified based on safety of left turning vehicles but is at the discretion of HRM based on operational needs and right-of-way limitations. Left turn lane warrant analysis is provided in Appendix B.

INTERSECTION CAPACITY ANALYSIS

Synchro 11 software was used to evaluate the performance of the Study Intersections for the following scenarios:

1. Future Background (2038) ***without*** the proposed Shannex Parkland Development; and,
2. Future Background (2038) ***with*** the proposed Shannex Parkland Development.

Detailed analysis results are included in Appendix C and pedestrians have been included in the analysis for all scenarios.

Intersection #1: Starboard Drive at Peakview Way / Shannex Driveway (Table 3) – Without site development, the intersection is expected to operate within available capacity during the AM and PM peak hours. With site development the intersection is expected to continue to operate within HRM guidelines.

Intersection #2: Starboard Drive at Fleetview Drive / Transom Drive (Table 4) – The overall performance of this intersection is expected to be satisfactory both without and with the addition of site generated trips. All movements are expected to operate within HRM guidelines.

Intersection #3: Starboard Drive at Site Access - 1 (Table 5) – The overall performance of this intersection is expected to be satisfactory with the addition of site generated trips. All movements are expected to operate within HRM guidelines.

Intersection #4: Fleetview Drive at Site Access - 2 (Table 6) – The overall performance of this intersection is expected to be satisfactory with the addition of site generated trips. All movements are expected to operate within HRM guidelines.

Table 3 – Intersection Capacity Analysis for Starboard Drive at Peakview Way / Shannex Driveway

LOS Criteria	Control Delay (sec/veh), v/c Ratio, and 95th %ile Queue (m) by Intersection Movement								Overall Intersection
	Starboard Drive				Peakview Way		Shannex Driveway		
	NB-L	NB-TR	SB-L	SB-TR	EB-L	EB-TR	WB-L	WB-TR	Delay
Scenario 1 - 2038 Future Background without Development AM Peak Hour (Page C-1)									
Delay	8.3	10.7	9.0	4.2	18.4	8.2	12.8	9.2	9.1
v/c	0.12	0.48	0.17	0.23	0.44	0.13	0.02	0.04	
Queue	8.8	58.4	11.1	12.6	27.3	8.5	2.4	3.9	
Scenario 2 - 2038 Future Background with Development AM Peak Hour (Page C-5)									
Delay	7.5	10.7	19.9	3.9	32.0	13.0	22.7	8.4	12.2
v/c	0.12	0.54	0.66	0.24	0.56	0.15	0.06	0.21	
Queue	9.5	76.8	57.7	15.8	41.0	11.9	6.8	11.2	
Scenario 1 - 2038 Future Background without Development PM Peak Hour (Page C-3)									
Delay	16.3	18.1	13.8	11.5	15.7	0.2	7.0	2.8	12.4
v/c	0.17	0.46	0.02	0.57	0.63	0.08	0.01	0.16	
Queue	8.3	35.2	2.4	28.3	47.0	0.0	1.6	6.7	
Scenario 2 - 2038 Future Background with Development PM Peak Hour (Page C-9)									
Delay	19.9	24.5	22.9	15.8	17.4	0.1	7.7	2.5	14.8
v/c	0.22	0.63	0.41	0.65	0.63	0.07	0.07	0.34	
Queue	8.8	46.0	19.2	33.6	67.6	0.0	7.4	11.1	

Table 4 – Intersection Capacity Analysis for Starboard Drive at Fleetview Drive / Transom Drive

LOS Criteria	Control Delay (sec/veh), v/c Ratio, and 95th %ile Queue (m) by Intersection Movement				Overall Intersection
	Starboard Drive		Transom Drive	Fleetview Drive	
	NB-LTR	SB-LTR	EB-LTR	WB-LTR	Delay
Scenario 1 - 2038 Future Background without Development AM Peak Hour (Page C-2)					
Delay	0.2	2.1	17.2	10.6	5.6
v/c	0.15	0.12	0.25	0.15	
Queue	0.1	0.7	7.7	4.2	
Scenario 2 - 2038 Future Background with Development AM Peak Hour (Page C-6)					
Delay	0.2	2.5	21.1	11.9	6.0
v/c	0.20	0.15	0.30	0.20	
Queue	0.1	1.0	10.0	6.0	
Scenario 1 - 2038 Future Background without Development PM Peak Hour (Page C-4)					
Delay	0.2	2.6	22.7	11.0	4.8
v/c	0.16	0.29	0.24	0.14	
Queue	0.1	2.0	7.4	3.7	
Scenario 2 - 2038 Future Background with Development PM Peak Hour (Page C-10)					
Delay	0.2	2.7	28.5	13.7	5.6
v/c	0.19	0.35	0.30	0.23	
Queue	0.1	2.3	9.6	7.2	

Table 5 – Intersection Capacity Analysis for Starboard Drive at Site Access - 1

LOS Criteria	Control Delay (sec/veh), v/c Ratio, and 95th %ile Queue (m) by Intersection Movement			Overall Intersection
	Starboard Drive		Site Access #1	
	NB-TR	SB-LT	WB-LR	Delay
Scenario 2 - 2038 Future Background with Development AM Peak Hour (Page C-7)				
Delay	0.0	1.2	14.3	0.7
v/c	0.36	0.33	0.05	
Queue	0.0	0.8	1.3	
Scenario 2 - 2038 Future Background with Development PM Peak Hour (Page C-11)				
Delay	0.0	0.5	12.0	0.9
v/c	0.17	0.41	0.08	
Queue	0.0	0.4	2.0	

Table 6 – Intersection Capacity Analysis for Fleetview Drive at Site Access - 2

LOS Criteria	Control Delay (sec/veh), v/c Ratio, and 95th %ile Queue (m) by Intersection Movement			Overall Intersection
	Fleetview Drive		Site Access #2	
	EB-LT	WB-TR	SB- LR	Delay
Scenario 2 - 2038 Future Background with Development AM Peak Hour (Page C-8)				
Delay	3.1	0.0	9.1	2.0
v/c	0.06	0.07	0.02	
Queue	0.6	0.0	0.6	
Scenario 2 - 2038 Future Background with Development PM Peak Hour (Page C-12)				
Delay	1.4	0.0	9.1	2.1
v/c	0.09	0.06	0.05	
Queue	0.4	0.0	1.2	

SUMMARY

1. Plans are being prepared for Shannex Parkland Development, a Continued Care Retirement Community consisting of approximately 2,011 units as well as 6,000m^2 of additional office development bound by Larry Uteck Boulevard, Starboard Drive and Fleetview Drive, in Bedford, NS.
2. Vehicular access to the site is planned to be primarily via two full access driveways on Starboard Drive and one to Fleetview Drive. Additional secondary access points to Starboard Drive and Larry Uteck Boulevard are being considered and each access has sufficient intersection sight distance.
3. Trip generation estimates for the current approved land use on the site as well as the latest development plans were prepared using rates published in *Trip Generation, 11th Edition (Institute of Transportation Engineers, Washington 2021).*
    - It was estimated that the approved development potential of the site would generate:
        - 90 two-way vehicle trips (43 entering and 47 exiting) during the AM peak hour; and,
        - 95 two-way vehicle trips (49 entering and 46 exiting) during the PM peak hour.
    - It was estimated that the latest development plans for the Shannex Parkland site will generate:
        - 398 two-way vehicle trips (285 entering and 113 exiting) during the AM peak hour; and,
        - 433 two-way vehicle trips (144 entering and 289 exiting) during the PM peak hour.
4. Traffic signals are not expected to be warranted at the intersection of Starboard Drive at Fleetview Drive / Transom Drive without or with the proposed Shannex Parkland Development. Similarly, traffic signals are not expected to be warranted at the proposed driveway on Starboard Drive.
5. There is currently a left-turn lane at the signalized site access. Review of volumes indicates that left-turn lanes are not expected to be warranted at the proposed site driveways on Starboard Drive or Fleetview Drive.
6. Left-turn lanes are warranted without and with site generated trips at the Starboard Drive at Fleetview Drive intersection.
7. All Study Intersections are expected to operate within available capacity during the AM and PM peak hours. All movements at the Study Intersections are expected to operate within HRM acceptable limits without and with full build-out of the proposed Shannex Parkland Development.

CONCLUSION

8. The proposed Shannex Parkland site, based on the latest development plans, is not expected to have any significant impact to levels of performance on adjacent streets and intersections or to the regional street system.

If you have any questions or comments, please contact me by email at patrick.hatton@wsp.com or by telephone at 902-444-7712.

Sincerely,

[redacted]

Patrick Hatton, P.Eng.
Senior Transportation Engineer
WSP Canada Inc.

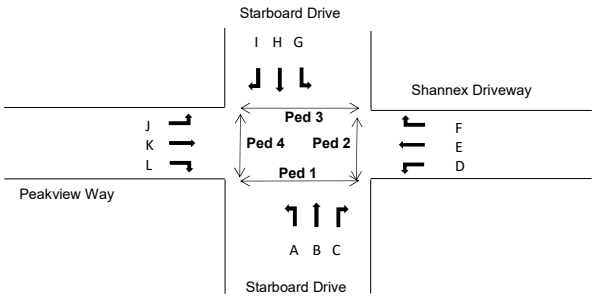
APPENDIX A

TRAFFIC VOLUME DATA

Table A-1

Starboard Drive
@
Peakview Way

Bedford NS
Thursday, September 28, 2023



AM Peak Period Volume Data

Time		Starboard Drive Northbound Approach			Shannex Driveway Westbound Approach			Starboard Drive Southbound Approach			Peakview Way Eastbound Approach			Total Vehicles
		A	B	C	D	E	F	G	H	I	J	K	L	
07:00	07:15	8	35	1	4	0	0	2	11	21	21	2	3	108
07:15	07:30	8	69	0	0	0	2	7	21	19	20	4	5	155
07:30	07:45	13	78	0	0	1	2	11	22	31	18	2	3	181
07:45	08:00	9	63	6	0	0	2	26	17	31	28	0	6	188
08:00	08:15	12	78	0	0	0	3	22	29	27	18	4	6	199
08:15	08:30	11	90	1	1	2	3	14	37	34	30	7	6	236
08:30	08:45	24	168	2	0	2	3	25	61	93	69	4	9	460
08:45	09:00	7	61	1	0	0	1	10	41	45	30	5	12	213
AM Peak Hour		**54**	**397**	**4**	**1**	**4**	**10**	**71**	**168**	**199**	**147**	**20**	**33**	**1108**
07:00	**08:00**	**38**	**245**	**7**	**4**	**1**	**6**	**46**	**71**	**102**	**87**	**8**	**17**	**632**
08:00	**09:00**	**54**	**397**	**4**	**1**	**4**	**10**	**71**	**168**	**199**	**147**	**20**	**33**	**1108**
		Ped 1			**Ped 2**			**Ped 3**			**Ped 4**			**Total Peds**
07:00	**08:00**	**2**			**7**			**8**			**6**			**23**
08:00	**09:00**	**8**			**14**			**8**			**8**			**38**

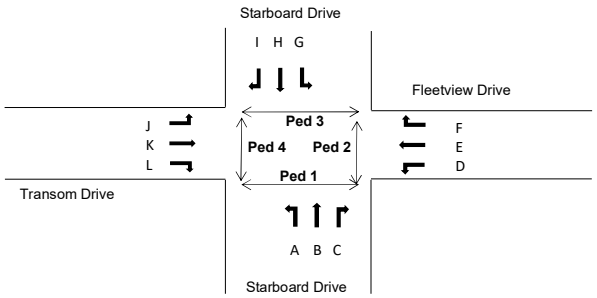
PM Peak Period Volume Data

Time		Starboard Drive Northbound Approach			Shannex Driveway Westbound Approach			Starboard Drive Southbound Approach			Peakview Way Eastbound Approach			Total Vehicles
		A	B	C	D	E	F	G	H	I	J	K	L	
16:00	16:15	10	31	0	2	3	29	1	69	63	84	1	17	310
16:15	16:30	11	46	0	2	0	30	0	74	57	78	1	16	315
16:30	16:45	3	45	0	0	1	28	1	63	40	79	0	15	275
16:45	17:00	5	58	0	0	3	17	1	82	41	75	0	17	299
17:00	17:15	10	66	0	1	1	8	1	64	46	82	2	13	294
17:15	17:30	7	64	0	2	0	5	2	85	61	79	0	20	325
17:30	17:45	7	60	0	1	0	4	0	42	52	76	0	13	255
17:45	18:00	5	73	0	0	0	5	0	60	51	80	0	14	288
PM Peak Hour		**29**	**180**	**0**	**4**	**7**	**104**	**3**	**288**	**201**	**316**	**2**	**65**	**1199**
16:00	**17:00**	**29**	**180**	**0**	**4**	**7**	**104**	**3**	**288**	**201**	**316**	**2**	**65**	**1199**
17:00	**18:00**	**29**	**263**	**0**	**4**	**1**	**22**	**3**	**251**	**210**	**317**	**2**	**60**	**1162**
		Ped 1			**Ped 2**			**Ped 3**			**Ped 4**			**Total Peds**
16:00	**17:00**	**10**			**16**			**32**			**15**			**73**
17:00	**18:00**	**15**			**22**			**16**			**11**			**64**

Table A-2

Starboard Drive
@
Fleetview Drive/Transom Drive

Bedford NS
Thursday, September 28, 2023

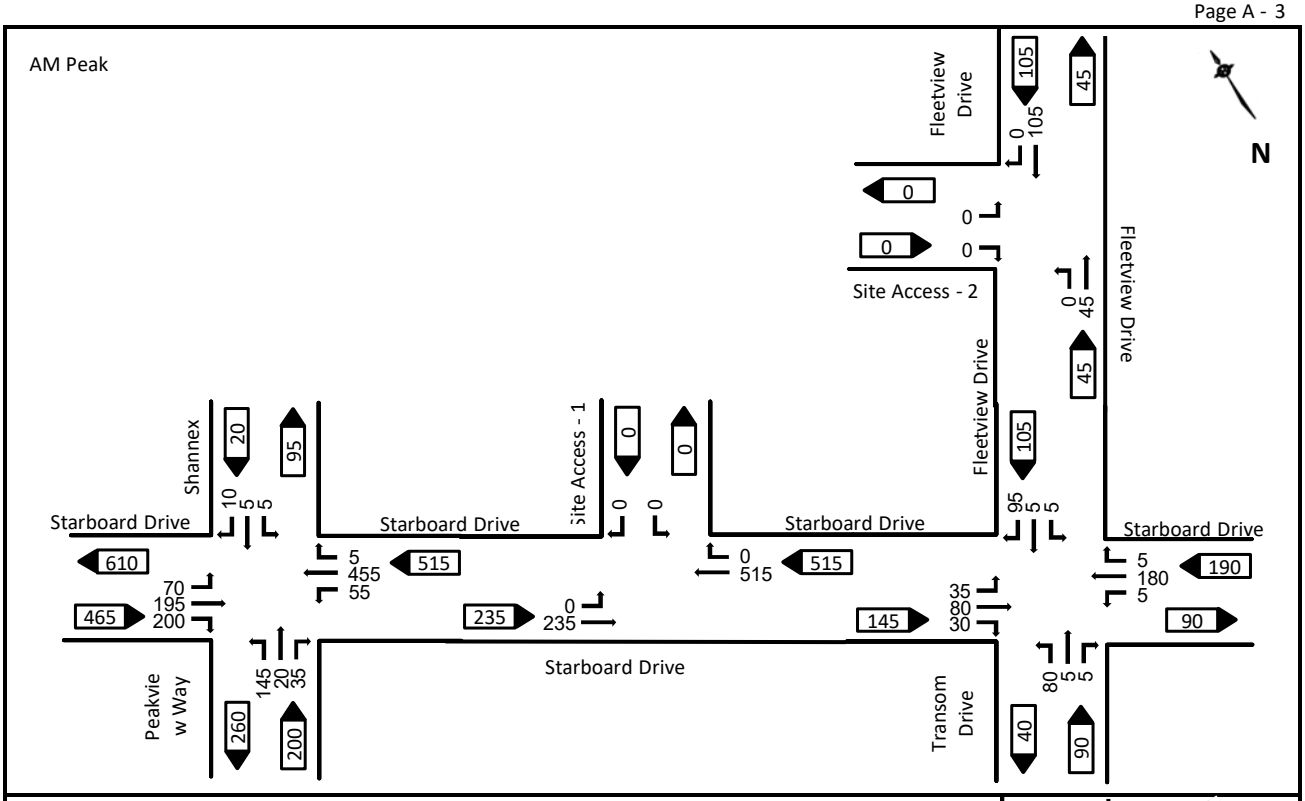


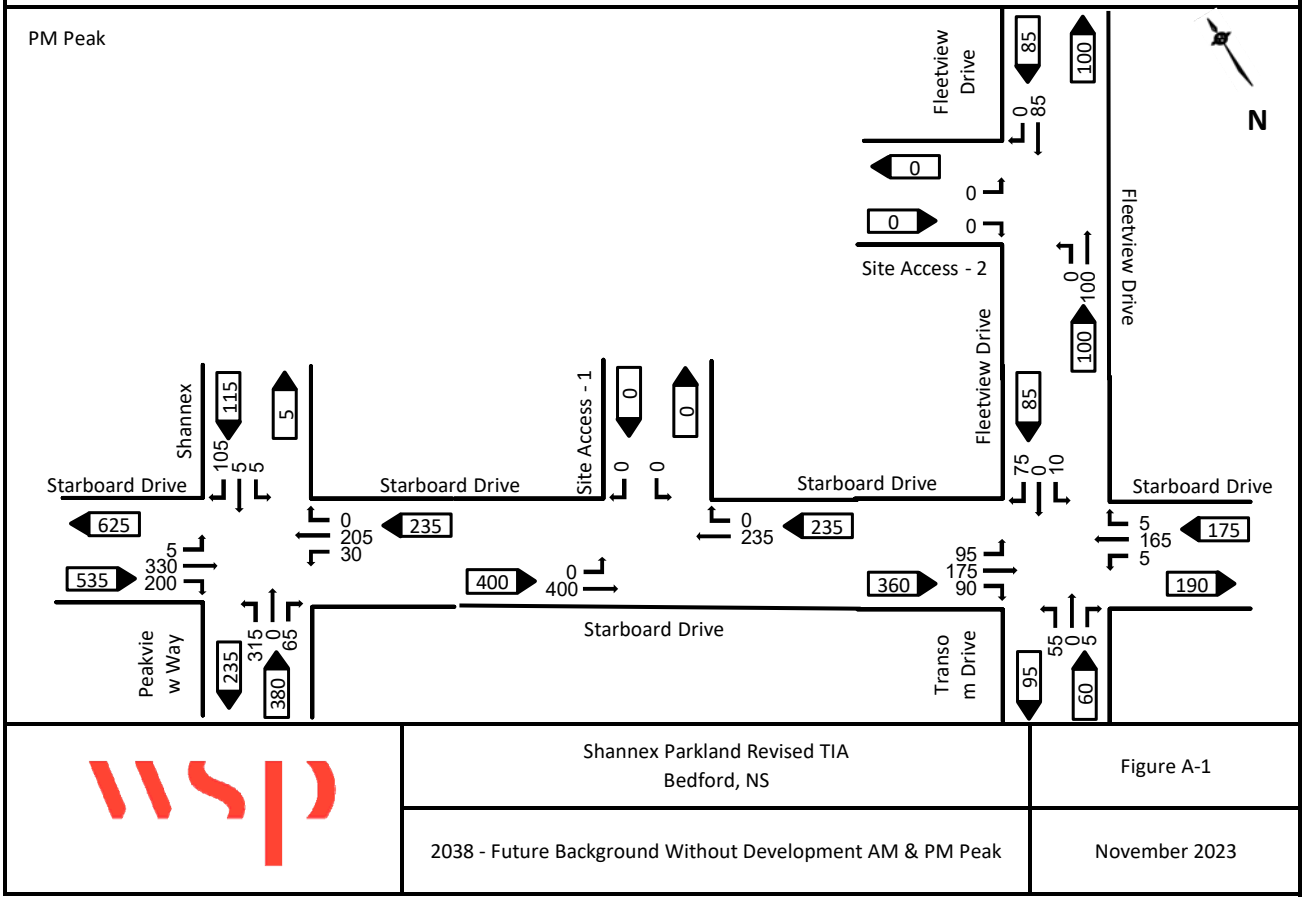
AM Peak Period Volume Data

Time		Starboard Drive Northbound Approach			Fleetview Drive Westbound Approach			Starboard Drive Southbound Approach			Transom Drive Eastbound Approach			Total Vehicles
		A	B	C	D	E	F	G	H	I	J	K	L	
07:00	07:15	0	13	0	0	0	13	8	12	4	8	0	0	58
07:15	07:30	1	24	0	1	0	22	12	10	9	17	2	1	99
07:30	07:45	2	46	2	2	2	22	13	15	8	24	0	0	136
07:45	08:00	0	29	0	0	1	18	8	12	1	19	2	2	92
08:00	08:15	0	40	1	0	1	24	3	11	5	16	1	2	104
08:15	08:30	1	42	0	1	0	33	8	23	7	25	0	0	140
08:30	08:45	1	41	0	0	1	19	9	21	10	22	0	0	124
08:45	09:00	1	32	1	0	1	21	16	16	8	15	0	3	114
AM Peak Hour		**3**	**155**	**2**	**1**	**3**	**97**	**36**	**71**	**30**	**78**	**1**	**5**	**482**
07:00	**08:00**	**3**	**112**	**2**	**3**	**3**	**75**	**41**	**49**	**22**	**68**	**4**	**3**	**385**
08:00	**09:00**	**3**	**155**	**2**	**1**	**3**	**97**	**36**	**71**	**30**	**78**	**1**	**5**	**482**
		Ped 1			**Ped 2**			**Ped 3**			**Ped 4**			**Total Peds**
07:00	**08:00**	**7**			**7**			**4**			**5**			**23**
08:00	**09:00**	**25**			**17**			**3**			**16**			**61**

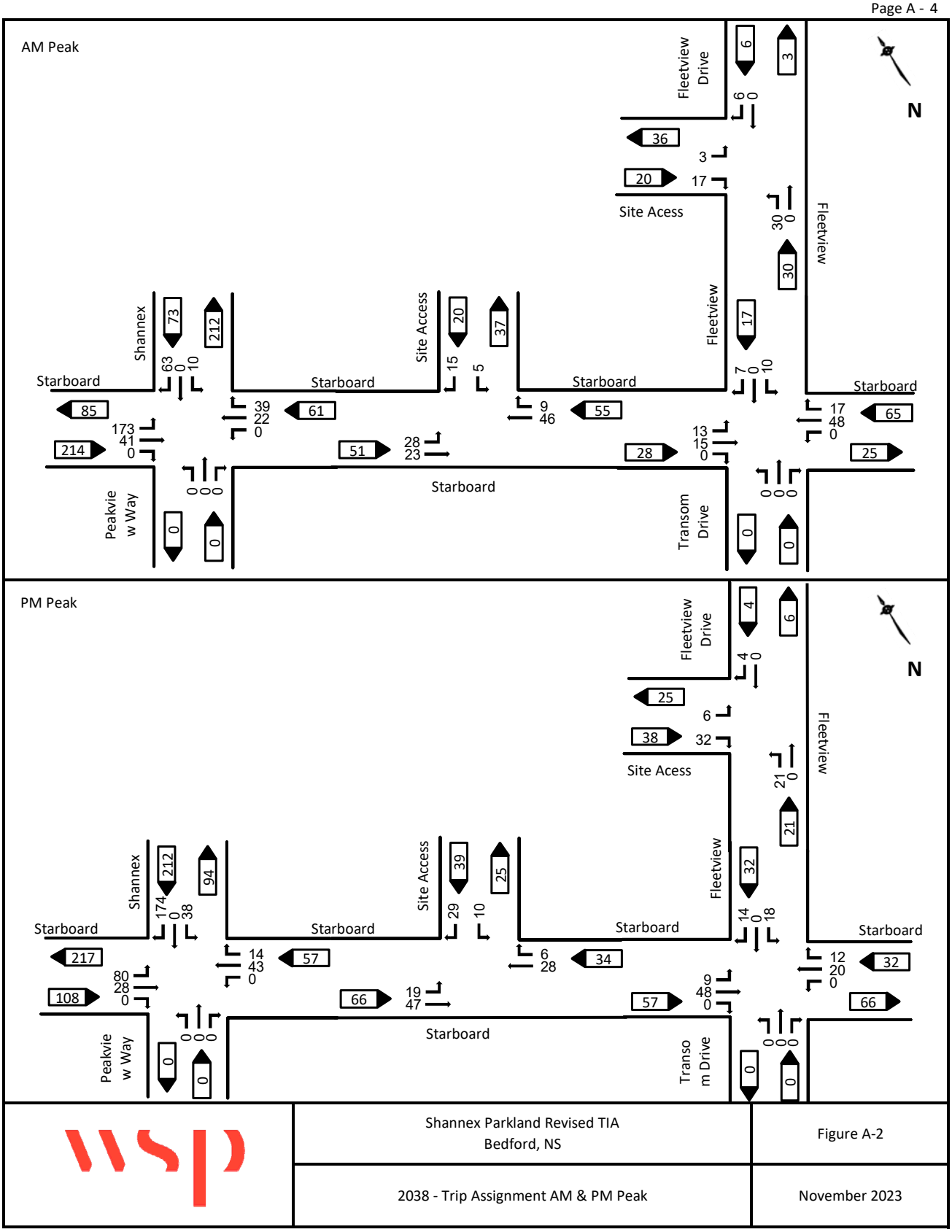
PM Peak Period Volume Data

Time		Starboard Drive Northbound Approach			Fleetview Drive Westbound Approach			Starboard Drive Southbound Approach			Transom Drive Eastbound Approach			Total Vehicles
		A	B	C	D	E	F	G	H	I	J	K	L	
16:00	16:15	0	20	0	2	0	14	27	38	21	8	0	0	130
16:15	16:30	2	29	2	0	1	10	13	44	17	7	0	0	125
16:30	16:45	1	28	0	1	1	10	18	36	19	7	0	0	121
16:45	17:00	1	27	2	1	0	17	25	41	21	12	1	1	149
17:00	17:15	0	37	1	1	2	18	28	35	26	12	0	4	164
17:15	17:30	1	31	1	1	0	19	21	61	33	11	0	1	180
17:30	17:45	4	37	0	3	0	16	22	35	8	17	1	1	144
17:45	18:00	2	40	1	3	0	22	24	23	22	14	0	1	152
PM Peak Hour		**7**	**145**	**3**	**8**	**2**	**75**	**95**	**154**	**89**	**54**	**1**	**7**	**640**
16:00	**17:00**	**4**	**104**	**4**	**4**	**2**	**51**	**83**	**159**	**78**	**34**	**1**	**1**	**525**
17:00	**18:00**	**7**	**145**	**3**	**8**	**2**	**75**	**95**	**154**	**89**	**54**	**1**	**7**	**640**
		Ped 1			**Ped 2**			**Ped 3**			**Ped 4**			**Total Peds**
16:00	**17:00**	**6**			**17**			**3**			**12**			**38**
17:00	**18:00**	**19**			**11**			**1**			**31**			**62**

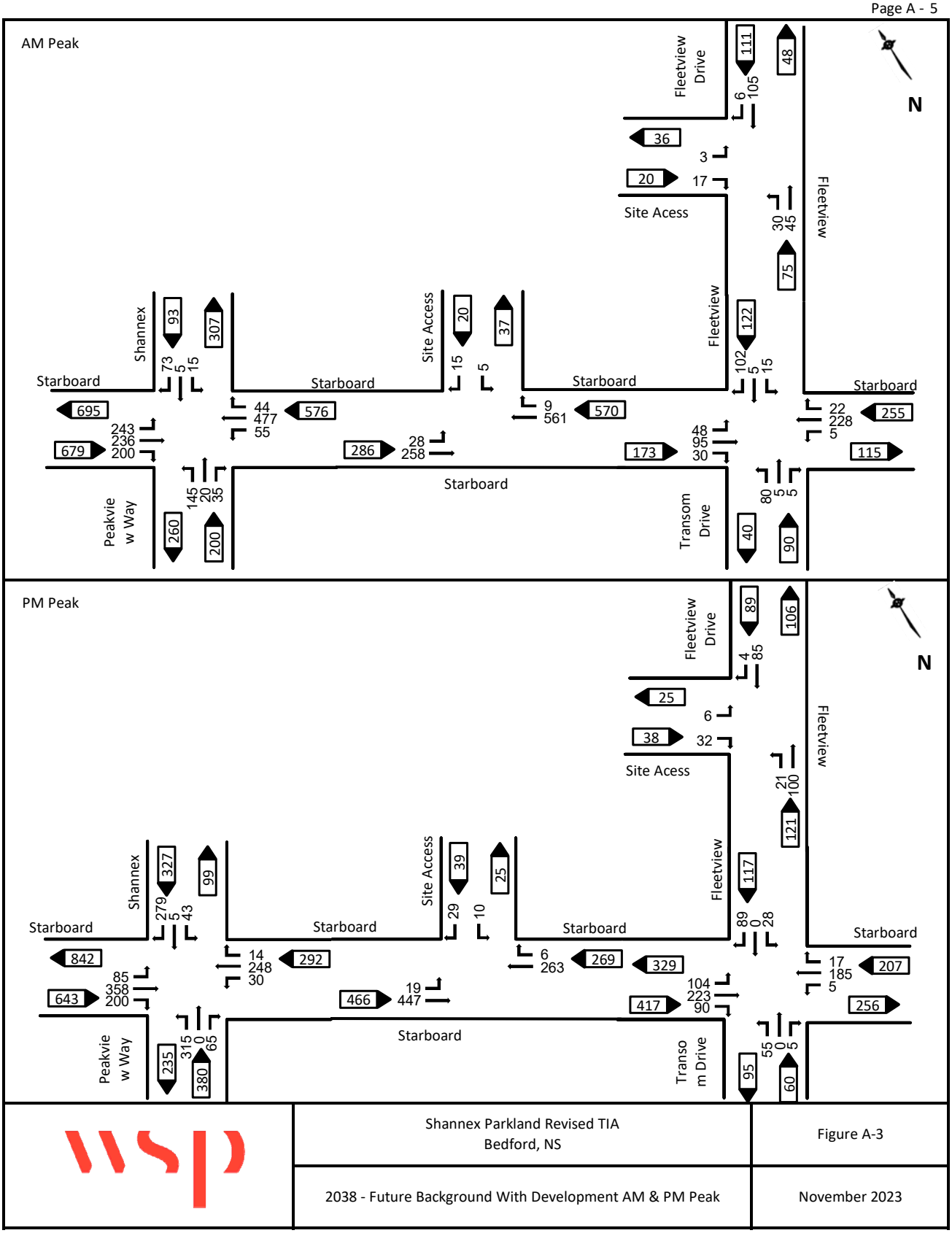




wsp	Shannex Parkland Revised TIA Bedford, NS	Figure A-1
	2038 - Future Background Without Development AM & PM Peak	November 2023



wsp	Shannex Parkland Revised TIA Bedford, NS	Figure A-2
	2038 - Trip Assignment AM & PM Peak	November 2023



wsp	Shannex Parkland Revised TIA Bedford, NS	Figure A-3
	2038 - Future Background With Development AM & PM Peak	November 2023

APPENDIX B

WARRANTS

2005 Canadian Traffic Signal Warrant Matrix Analysis

Table: B-1 - Starboard Drive @ Fleetview Drive/Transom Drive

2038 Future Background with Development

Main Street (name)	Starboard Drive	Direction (EW or NS)	NS	Date:	January 2024
Side Street (name)	Fleetview/Transom	Direction (EW or NS)	EW	City:	Bedford, NS

Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes	
Starboard Drive	NB			1				1	
Starboard Drive	SB			1				1	
Fleetview Drive	WB			1					
Transom Drive	EB			1					

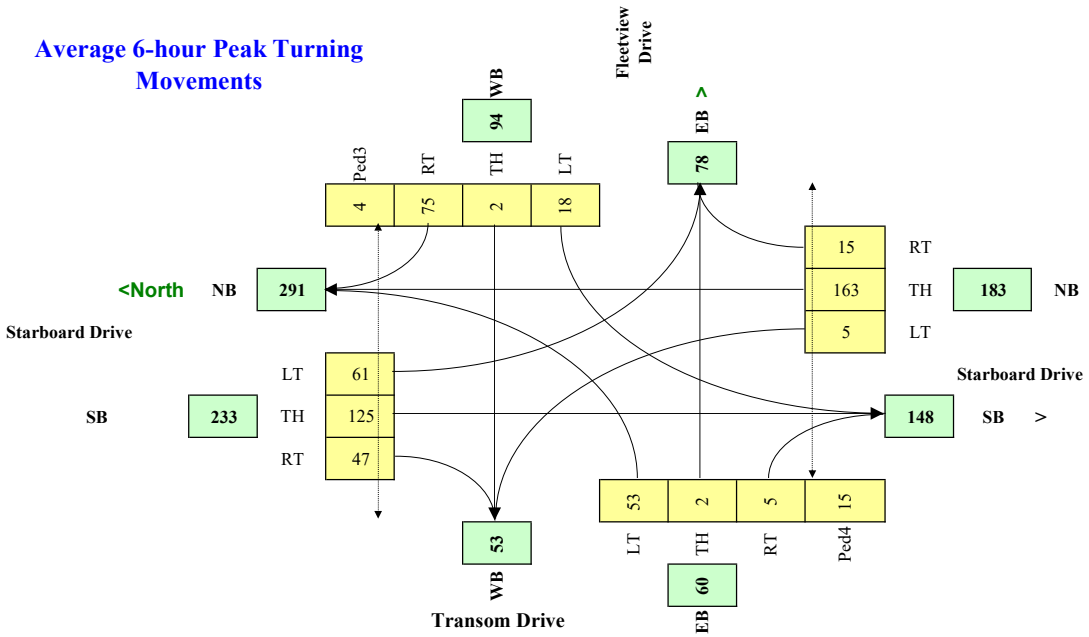
Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Starboard Drive	NS	60	2.0%	y	0.0
Fleetview/Transom	EW	60	2.0%	n	

	Ped1 NS W Side	Ped2 NS E Side	Ped3 EW N Side	Ped4 EW S side
7:00 - 8:00	5	7	4	7
8:00 - 9:00	16	17	3	25
11:30 - 12:30	15	15	5	15
12:30 - 13:30	15	15	5	15
16:00 - 17:00	12	17	3	6
17:00 - 18:00	31	11	1	19
Total (6-hour peak)	**94**	**82**	**21**	**87**
Average (6-hour peak)	**16**	**14**	**4**	**15**

Demographics		
Elementary School	(y/n)	n
Senior's Complex	(y/n)	y
Pathway to School	(y/n)	n
Metro Area Population	(#)	400,000
Central Business District	(y/n)	n

Traffic Input	NB			SB			WB			EB		
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
7:00 - 8:00	5	230	20	50	95	30	15	5	100	80	5	5
8:00 - 9:00	5	195	20	40	80	25	15	5	85	70	5	5
11:30 - 12:30	5	105	10	40	80	30	10	0	50	35	0	5
12:30 - 13:30	5	105	10	40	80	30	10	0	50	35	0	5
16:00 - 17:00	5	155	15	90	190	75	25	0	75	45	0	5
17:00 - 18:00	5	185	15	105	225	90	30	0	90	55	0	5
Total (6-hour peak)	**30**	**975**	**90**	**365**	**750**	**280**	**105**	**10**	**450**	**320**	**10**	**30**
Average (6-hour peak)	**5**	**163**	**15**	**61**	**125**	**47**	**18**	**2**	**75**	**53**	**2**	**5**

Average 6-hour Peak Turning Movements



$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$

W =	34	27	7
		Veh	*Ped*

NOT Warranted

2005 Canadian Traffic Signal Warrant Matrix Analysis

Table: B-2 - Starboard Drive @ Site Access - 1

2038 Future Background with Development

Main Street (name)	Starboard Drive	Direction (EW or NS)	NS	Date:	January 2024
Side Street (name)	Site Access - 1	Direction (EW or NS)	EW	City:	Bedford, NS

Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes	
Starboard Drive	NB			1				1	
Starboard Drive	SB			1				1	
Site Access - 1	WB			1					

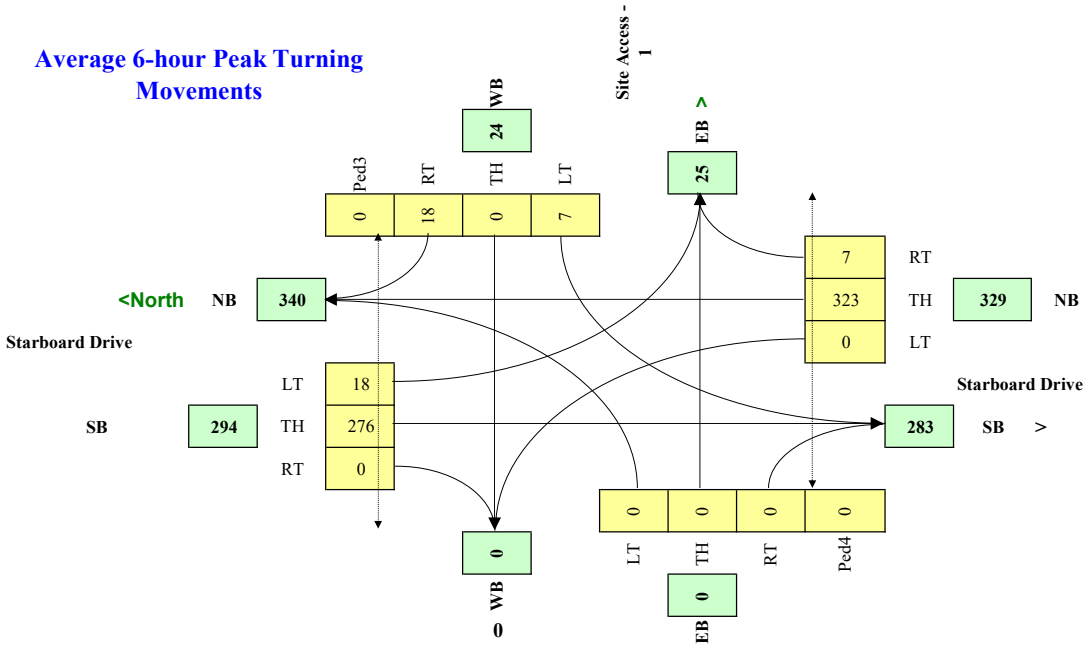
Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Starboard Drive	NS	60	2.0%	y	0.0
Site Access - 1	EW	60	2.0%	n	

	Ped1 NS W Side	Ped2 NS E Side	Ped3 EW N Side	Ped4 EW S side
8:00 - 9:00		10		
9:00 - 10:00		10		
11:30 - 12:30		10		
12:30 - 13:30		10		
16:00 - 17:00		10		
17:00 - 18:00		10		
Total (6-hour peak)	**0**	**60**	**0**	**0**
Average (6-hour peak)	**0**	**10**	**0**	**0**

Demographics		
Elementary School	(y/n)	n
Senior's Complex	(y/n)	y
Pathway to School	(y/n)	n
Metro Area Population	(#)	400,000
Central Business District	(y/n)	n

Traffic Input	NB			SB			WB			EB		
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
8:00 - 9:00	0	560	10	30	260	0	5	0	15	0	0	0
9:00 - 10:00	0	475	10	25	220	0	5	0	15	0	0	0
11:30 - 12:30	0	205	5	10	175	0	5	0	10	0	0	0
12:30 - 13:30	0	205	5	10	175	0	5	0	10	0	0	0
16:00 - 17:00	0	225	5	15	380	0	10	0	25	0	0	0
17:00 - 18:00	0	265	5	20	445	0	10	0	30	0	0	0
Total (6-hour peak)	**0**	**1,935**	**40**	**110**	**1,655**	**0**	**40**	**0**	**105**	**0**	**0**	**0**
Average (6-hour peak)	**0**	**323**	**7**	**18**	**276**	**0**	**7**	**0**	**18**	**0**	**0**	**0**

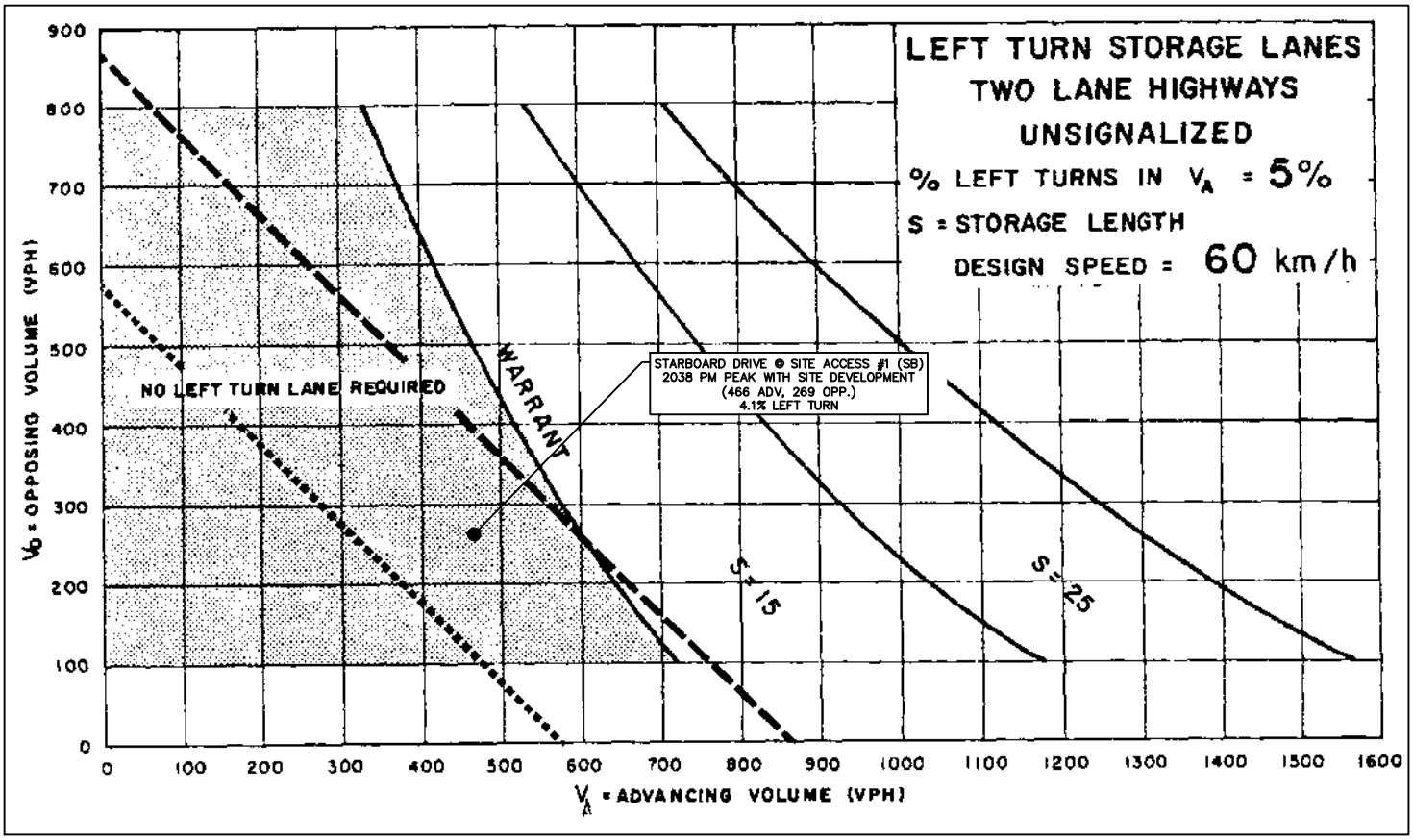
Average 6-hour Peak Turning Movements

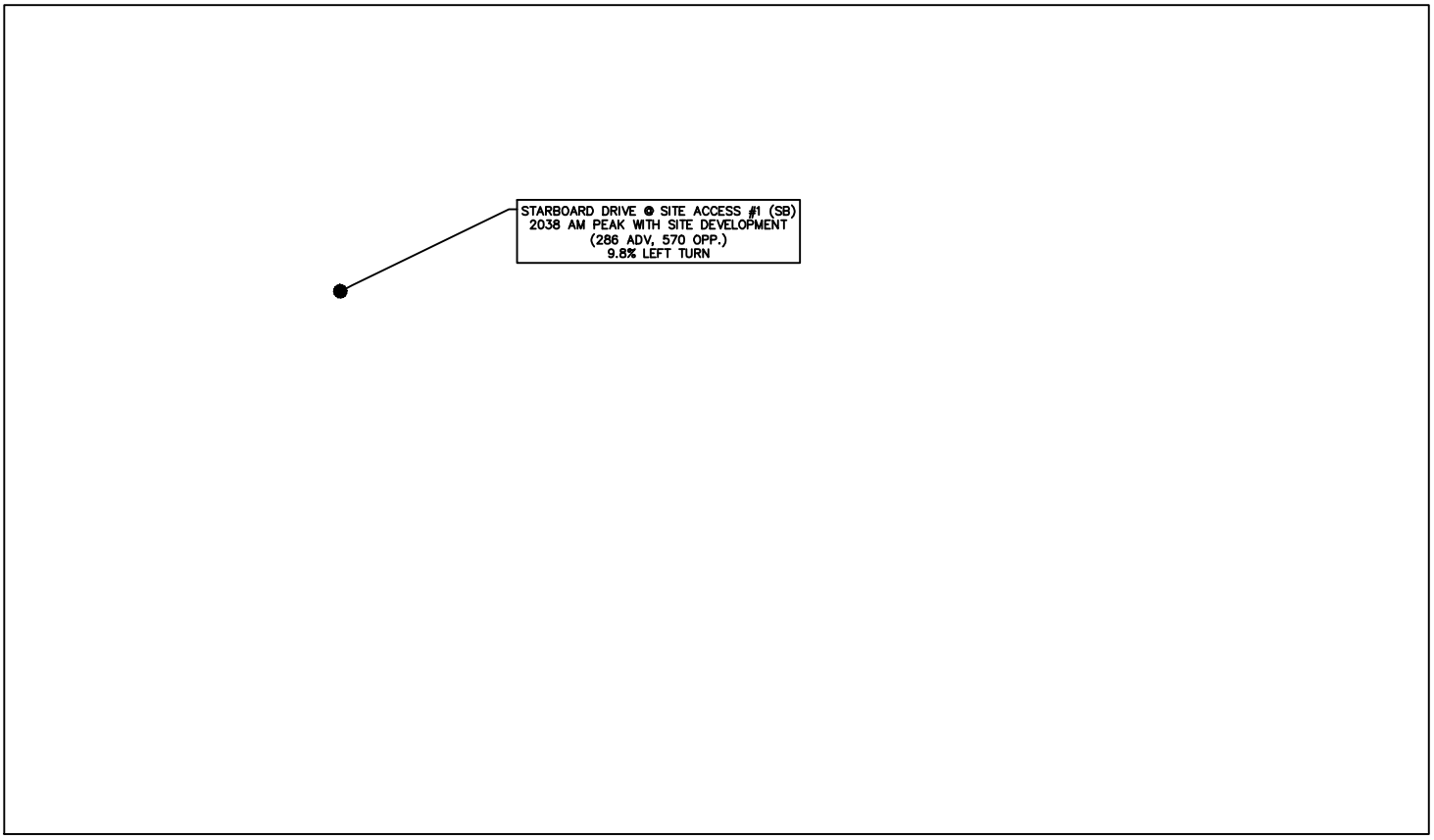


$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$

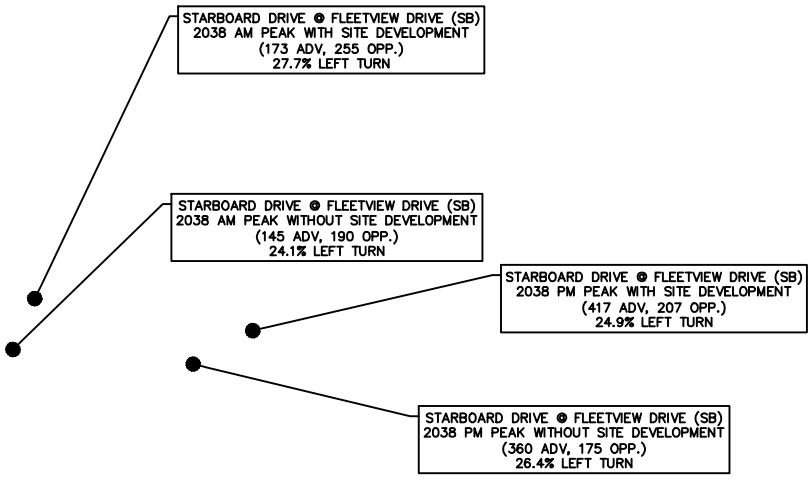
W =	7	7	0
		Veh	*Ped*

Not Warranted - Vs<75





wsp	Shannex Parkland Revised TIA Bedford, NS	Figure B-1
	Left Turn Lane Warrants - Starboard Drive at Site Access #1	November 2023



wsp	Shannex Parkland Revised TIA Bedford, NS	Figure B-2
	Left Turn Lane Warrants - Starboard Drive at Fleetview Drive	November 2023

APPENDIX C

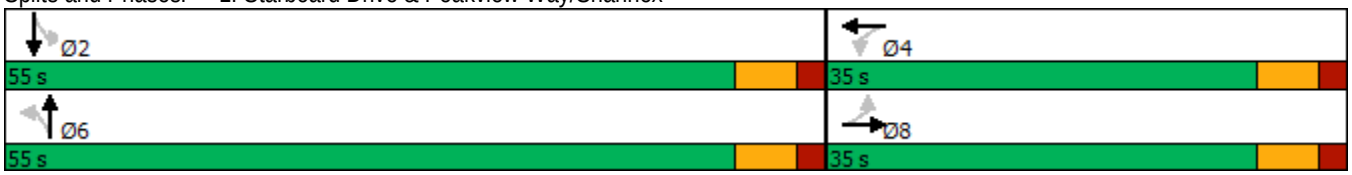
INTERSECTION OPERATIONAL ANALYSIS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	20	35	5	5	10	55	455	5	70	195	200
Future Volume (vph)	145	20	35	5	5	10	55	455	5	70	195	200
Satd. Flow (prot)	1770	1662	0	1770	1629	0	1770	1858	0	1770	3209	0
Flt Permitted	0.747			0.718			0.502			0.435		
Satd. Flow (perm)	1368	1662	0	1325	1629	0	926	1858	0	801	3209	0
Satd. Flow (RTOR)		38			11			1			217	
Lane Group Flow (vph)	158	60	0	5	16	0	60	500	0	76	429	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	35.0	35.0		35.0	35.0		55.0	55.0		55.0	55.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Act Effct Green (s)	10.8	10.8		10.3	10.3		23.2	23.2		23.2	23.2	
Actuated g/C Ratio	0.26	0.26		0.25	0.25		0.56	0.56		0.56	0.56	
v/c Ratio	0.44	0.13		0.02	0.04		0.12	0.48		0.17	0.23	
Control Delay	18.4	8.2		12.8	9.2		8.3	10.7		9.0	4.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	18.4	8.2		12.8	9.2		8.3	10.7		9.0	4.2	
LOS	B	A		B	A		A	B		A	A	
Approach Delay		15.6			10.1			10.4			4.9	
Approach LOS		B			B			B			A	
Queue Length 50th (m)	8.8	1.1		0.3	0.3		2.3	24.9		3.1	4.3	
Queue Length 95th (m)	27.3	8.5		2.4	3.9		8.8	58.4		11.1	12.6	
Internal Link Dist (m)		160.6			115.1			97.4			137.9	
Turn Bay Length (m)	13.0			15.0			46.0			40.0		
Base Capacity (vph)	985	1207		953	1175		905	1816		783	3141	
Starvation Cap Reductn	0	0		0	0		0	23		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.16	0.05		0.01	0.01		0.07	0.28		0.10	0.14	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 41.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 9.1
Intersection LOS: A
Intersection Capacity Utilization 59.0%
ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Starboard Drive & Peakview Way/Shannex



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	5	5	5	5	95	5	180	5	35	80	30
Future Volume (Veh/h)	80	5	5	5	5	95	5	180	5	35	80	30
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	5	5	5	5	103	5	196	5	38	87	33
Pedestrians		20			20			25			5	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		2			2			2			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	518	430	148	440	444	224	140			221		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	518	430	148	440	444	224	140			221		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	77	99	99	99	99	87	100			97		
cM capacity (veh/h)	376	484	865	476	476	799	1419			1326		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	97	113	206	158
Volume Left	87	5	5	38
Volume Right	5	103	5	33
cSH	392	754	1419	1326
Volume to Capacity	0.25	0.15	0.00	0.03
Queue Length 95th (m)	7.7	4.2	0.1	0.7
Control Delay (s)	17.2	10.6	0.2	2.1
Lane LOS	C	B	A	A
Approach Delay (s)	17.2	10.6	0.2	2.1
Approach LOS	C	B		

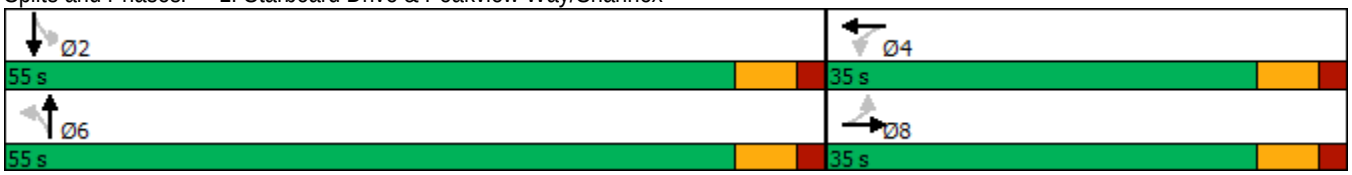
Intersection Summary				
Average Delay	5.6			
Intersection Capacity Utilization	45.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	315	0	65	5	5	105	30	205	0	5	330	200
Future Volume (vph)	315	0	65	5	5	105	30	205	0	5	330	200
Satd. Flow (prot)	1770	1544	0	1770	1461	0	1770	1863	0	1770	3273	0
Flt Permitted	0.681			0.711			0.419			0.619		
Satd. Flow (perm)	1195	1544	0	1309	1461	0	770	1863	0	1124	3273	0
Satd. Flow (RTOR)		433			114						217	
Lane Group Flow (vph)	342	71	0	5	119	0	33	223	0	5	576	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	35.0	35.0		35.0	35.0		55.0	55.0		55.0	55.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Act Effct Green (s)	20.0	20.0		20.0	20.0		11.4	11.4		11.4	11.4	
Actuated g/C Ratio	0.45	0.45		0.45	0.45		0.26	0.26		0.26	0.26	
v/c Ratio	0.63	0.08		0.01	0.16		0.17	0.46		0.02	0.57	
Control Delay	15.7	0.2		7.0	2.8		16.3	18.1		13.8	11.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.7	0.2		7.0	2.8		16.3	18.1		13.8	11.5	
LOS	B	A		A	A		B	B		B	B	
Approach Delay		13.0			3.0			17.9			11.6	
Approach LOS		B			A			B			B	
Queue Length 50th (m)	18.7	0.0		0.3	0.3		2.1	15.1		0.3	12.6	
Queue Length 95th (m)	47.0	0.0		1.6	6.7		8.3	35.2		2.4	28.3	
Internal Link Dist (m)		160.6			115.1			97.4			137.9	
Turn Bay Length (m)	13.0			15.0			46.0			40.0		
Base Capacity (vph)	807	1184		885	1024		752	1820		1098	3202	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.42	0.06		0.01	0.12		0.04	0.12		0.00	0.18	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 44
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 12.4
Intersection LOS: B
Intersection Capacity Utilization 59.2%
ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Starboard Drive & Peakview Way/Shannex



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	0	5	10	0	75	5	165	5	95	175	90
Future Volume (Veh/h)	55	0	5	10	0	75	5	165	5	95	175	90
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	0	5	11	0	82	5	179	5	103	190	98
Pedestrians		35			20			20			5	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		3			2			2			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	758	694	294	682	740	206	323			204		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	758	694	294	682	740	206	323			204		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	76	100	99	97	100	90	100			92		
cM capacity (veh/h)	255	322	712	317	302	817	1201			1345		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	65	93	189	391
Volume Left	60	11	5	103
Volume Right	5	82	5	98
cSH	268	688	1201	1345
Volume to Capacity	0.24	0.14	0.00	0.08
Queue Length 95th (m)	7.4	3.7	0.1	2.0
Control Delay (s)	22.7	11.0	0.2	2.6
Lane LOS	C	B	A	A
Approach Delay (s)	22.7	11.0	0.2	2.6
Approach LOS	C	B		

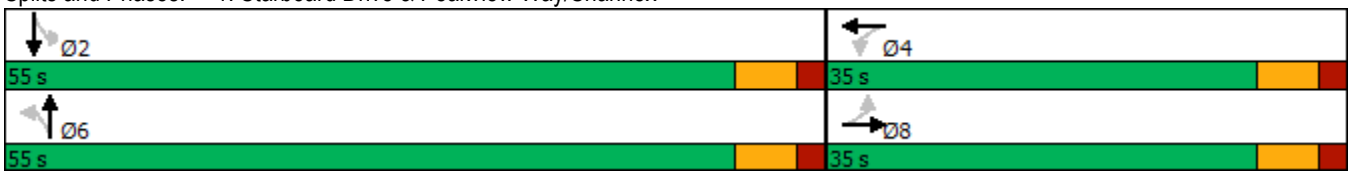
Intersection Summary				
Average Delay	4.8			
Intersection Capacity Utilization	53.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	20	35	15	5	73	55	477	44	243	236	200
Future Volume (vph)	145	20	35	15	5	73	55	477	44	243	236	200
Satd. Flow (prot)	1770	1653	0	1770	1523	0	1770	1827	0	1770	3217	0
Flt Permitted	0.702			0.718			0.481			0.378		
Satd. Flow (perm)	1270	1653	0	1314	1523	0	881	1827	0	692	3217	0
Satd. Flow (RTOR)		38			79			8			217	
Lane Group Flow (vph)	158	60	0	16	84	0	60	566	0	264	474	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	35.0	35.0		35.0	35.0		55.0	55.0		55.0	55.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Act Effct Green (s)	13.8	13.8		13.8	13.8		35.9	35.9		35.9	35.9	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.57	0.57		0.57	0.57	
v/c Ratio	0.56	0.15		0.06	0.21		0.12	0.54		0.66	0.24	
Control Delay	32.0	13.0		22.7	8.4		7.5	10.7		19.9	3.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	32.0	13.0		22.7	8.4		7.5	10.7		19.9	3.9	
LOS	C	B		C	A		A	B		B	A	
Approach Delay		26.8			10.7			10.4			9.7	
Approach LOS		C			B			B			A	
Queue Length 50th (m)	15.7	2.0		1.4	0.5		2.9	35.8		19.0	6.5	
Queue Length 95th (m)	41.0	11.9		6.8	11.2		9.5	76.8		57.7	15.8	
Internal Link Dist (m)		160.6			105.4			98.3			148.1	
Turn Bay Length (m)	13.0			15.0			46.0			40.0		
Base Capacity (vph)	617	823		638	781		713	1480		560	2645	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.26	0.07		0.03	0.11		0.08	0.38		0.47	0.18	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 62.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 12.2
Intersection LOS: B
Intersection Capacity Utilization 72.5%
ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: Starboard Drive & Peakview Way/Shannex



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	5	5	15	5	102	5	228	22	48	95	30
Future Volume (Veh/h)	80	5	5	15	5	102	5	228	22	48	95	30
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	5	5	16	5	111	5	248	24	52	103	33
Pedestrians		20			20			25			5	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		2			2			2			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	632	546	164	546	550	285	156			292		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	632	546	164	546	550	285	156			292		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	71	99	99	96	99	85	100			96		
cM capacity (veh/h)	305	411	847	400	409	738	1400			1249		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	97	132	277	188
Volume Left	87	16	5	52
Volume Right	5	111	24	33
cSH	320	652	1400	1249
Volume to Capacity	0.30	0.20	0.00	0.04
Queue Length 95th (m)	10.0	6.0	0.1	1.0
Control Delay (s)	21.1	11.9	0.2	2.5
Lane LOS	C	B	A	A
Approach Delay (s)	21.1	11.9	0.2	2.5
Approach LOS	C	B		

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	15	561	9	28	258
Future Volume (Veh/h)	5	15	561	9	28	258
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	16	610	10	30	280
Pedestrians	10					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						347
pX, platoon unblocked						
vC, conflicting volume	965	625			630	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	965	625			630	
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			97	
cM capacity (veh/h)	271	481			944	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	21	620	310
Volume Left	5	0	30
Volume Right	16	10	0
cSH	406	1700	944
Volume to Capacity	0.05	0.36	0.03
Queue Length 95th (m)	1.3	0.0	0.8
Control Delay (s)	14.3	0.0	1.2
Lane LOS	B		A
Approach Delay (s)	14.3	0.0	1.2
Approach LOS	B		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	45	105	6	3	17
Future Volume (Veh/h)	30	45	105	6	3	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	49	114	7	3	18
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	121				232	118
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	121				232	118
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	98
cM capacity (veh/h)	1467				739	934

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	82	121	21
Volume Left	33	0	3
Volume Right	0	7	18
cSH	1467	1700	900
Volume to Capacity	0.02	0.07	0.02
Queue Length 95th (m)	0.6	0.0	0.6
Control Delay (s)	3.1	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	3.1	0.0	9.1
Approach LOS			A

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	20.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	315	0	65	43	5	279	30	248	14	85	358	200
Future Volume (vph)	315	0	65	43	5	279	30	248	14	85	358	200
Satd. Flow (prot)	1770	1514	0	1770	1425	0	1770	1841	0	1770	3261	0
Flt Permitted	0.573			0.711			0.335			0.513		
Satd. Flow (perm)	1017	1514	0	1286	1425	0	611	1841	0	922	3261	0
Satd. Flow (RTOR)		384			303			5			186	
Lane Group Flow (vph)	342	71	0	47	308	0	33	285	0	92	606	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	35.0	35.0		35.0	35.0		55.0	55.0		55.0	55.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Act Effct Green (s)	29.0	29.0		29.0	29.0		13.4	13.4		13.4	13.4	
Actuated g/C Ratio	0.53	0.53		0.53	0.53		0.25	0.25		0.25	0.25	
v/c Ratio	0.63	0.07		0.07	0.34		0.22	0.63		0.41	0.65	
Control Delay	17.4	0.1		7.7	2.5		19.9	24.5		22.9	15.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	17.4	0.1		7.7	2.5		19.9	24.5		22.9	15.8	
LOS	B	A		A	A		B	C		C	B	
Approach Delay		14.4			3.2			24.1			16.8	
Approach LOS		B			A			C			B	
Queue Length 50th (m)	22.4	0.0		2.1	0.2		2.7	25.8		8.0	19.8	
Queue Length 95th (m)	#67.6	0.0		7.4	11.1		8.8	46.0		19.2	33.6	
Internal Link Dist (m)		160.6			105.4			98.3			148.1	
Turn Bay Length (m)	13.0			15.0			46.0			40.0		
Base Capacity (vph)	540	983		682	898		549	1654		828	2948	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.63	0.07		0.07	0.34		0.06	0.17		0.11	0.21	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 54.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 14.8 Intersection LOS: B
Intersection Capacity Utilization 80.1% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Starboard Drive & Peakview Way/Shannex

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	0	5	28	0	89	5	185	17	104	223	90
Future Volume (Veh/h)	55	0	5	28	0	89	5	185	17	104	223	90
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	0	5	30	0	97	5	201	18	113	242	98
Pedestrians		35			20			20			5	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		3			2			2			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	874	801	346	782	841	235	375			239		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	874	801	346	782	841	235	375			239		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	71	100	99	89	100	88	100			91		
cM capacity (veh/h)	206	276	665	269	261	787	1149			1306		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	65	127	224	453
Volume Left	60	30	5	113
Volume Right	5	97	18	98
cSH	217	541	1149	1306
Volume to Capacity	0.30	0.23	0.00	0.09
Queue Length 95th (m)	9.6	7.2	0.1	2.3
Control Delay (s)	28.5	13.7	0.2	2.7
Lane LOS	D	B	A	A
Approach Delay (s)	28.5	13.7	0.2	2.7
Approach LOS	D	B		

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	29	263	6	19	447
Future Volume (Veh/h)	10	29	263	6	19	447
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	32	286	7	21	486
Pedestrians	10					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						347
pX, platoon unblocked	0.84					
vC, conflicting volume	828	300			303	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	699	300			303	
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	96			98	
cM capacity (veh/h)	332	734			1247	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	43	293	507
Volume Left	11	0	21
Volume Right	32	7	0
cSH	561	1700	1247
Volume to Capacity	0.08	0.17	0.02
Queue Length 95th (m)	2.0	0.0	0.4
Control Delay (s)	12.0	0.0	0.5
Lane LOS	B		A
Approach Delay (s)	12.0	0.0	0.5
Approach LOS	B		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	21	100	85	4	6	32
Future Volume (Veh/h)	21	100	85	4	6	32
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	109	92	4	7	35
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	96				249	94
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	96				249	94
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				99	96
cM capacity (veh/h)	1498				728	963

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	132	96	42
Volume Left	23	0	7
Volume Right	0	4	35
cSH	1498	1700	914
Volume to Capacity	0.02	0.06	0.05
Queue Length 95th (m)	0.4	0.0	1.2
Control Delay (s)	1.4	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	1.4	0.0	9.1
Approach LOS			A

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		