

July 27, 2021

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.

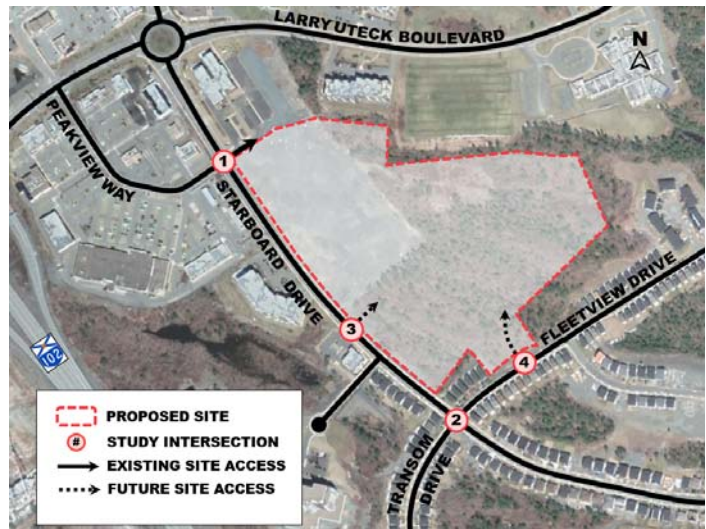


Figure 1 – Study Area

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.

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.



Photo 1 – Existing Site



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. HRM 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 posted 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 2. All approaches consist of single lanes.



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

TRAFFIC VOLUME DATA

Intersection turning movement counts were collected at the existing Study Intersections by WSP on Wednesday, April 28, 2021. The turning movement counts have been tabulated in Tables A-1 and A-2, Appendix A, with peak hour volumes indicated by shaded areas.

PROJECTED 2021 VOLUMES

It should be noted that traffic volumes were collected amidst the COVID-19 pandemic. We reviewed available historical traffic volume data for the Study Area to compare with the traffic counts collected for this analysis. We reviewed a turning movement count collected in 2015 at the signalized Peakview Way intersection as well as a two-way volume count completed on Starboard Drive in October 2017. When the 2015 turning movement count was collected, there was no through street connection on Starboard Drive south of Peakview Way. Starboard Drive was connected as a through street when the 2017 count was completed.

To project typical volumes that would be expected in the Study Area for the side street approaches at the Starboard Drive / Peakview Way signalized intersection, it was assumed that the existing office space fronting Larry Uteck Boulevard was operating at 25% capacity during data collection. WSP applied a 75% growth factor to trips in/out of the existing Shannex Driveway to account for reduced operations of the office buildings during the count period as a result of the pandemic.

WSP compared the observed 2021 turning movements to/from Peakview Way to the HRM count from 2015. Based on this review, WSP applied a 25% growth factor to trips to/from Peakview Way to account for reduced traffic to the shopping plaza as a result of the pandemic.

The morning and afternoon peak hour volume estimates for through traffic on Starboard Drive were projected with a factor to account for reduced traffic volumes observed during the count period as a result of the pandemic. Based on traffic volumes counted on the Macdonald and MacKay bridges, March 2021 volumes were 12% less than pre-pandemic March 2019 traffic volumes during the morning peak period and 9% less during the afternoon peak period (*COVID-19 Mobility Indicators, Summary Report, HRM Strategic Transportation Planning, April 16, 2021*). WSP applied a 10% growth factor to through volumes on Starboard Drive and to all movements at the Starboard Drive and Fleetview Drive / Transom Drive intersection to account for reduced traffic as a result of the pandemic. We compared the projected volumes to the available historical count data and found that the factors applied provide volumes that are comparable to the through volumes expected on Starboard Drive.

FUTURE BACKGROUND 2031 VOLUMES

To account for future potential development in the Study Area, other than the proposed Shannex Parkland site, an annual growth rate was applied to the projected 2021 through volumes on Starboard Drive. Since the surrounding area is considered to be nearly built out, we have considered an annual growth rate of 1% for this analysis. 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. Future background (2031) 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 driveways. Starboard Drive and Fleetview Drive have generally consistent grade and a straight alignment at the proposed site access locations. No sight distance concerns were identified at the proposed driveways. The approximate sightlines from the proposed driveway on Starboard Drive are provided in Photo 4 and 5. The approximate sightlines from the proposed driveway on Fleetview Drive are provided in Photo 6 and 7.



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, 10th Edition (Institute of Transportation Engineers, Washington, 2017)* the transportation engineer’s objective should be to provide a realistic estimate of the number of trips that will be generated.

As discussed previously, 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 in order 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 for the AM and PM peak hours of weekday traffic by the number of residential units. Trips generated by Nursing Home (Land Use 620) are estimated for the AM and PM peak hours of weekday traffic by the number of beds.

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

- 102 two-way vehicle trips (56 entering and 46 exiting) during the AM peak hour; and,
- 131 two-way vehicle trips (57 entering and 74 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: $\text{Ln}(T) = 0.98 * \text{Ln}(X) - 0.98$ PM: $\text{Ln}(T) = 0.96 * \text{Ln}(X) - 0.63$				10	28	30	19
Nursing Home (Land Use 620)	375 Units	0.12	0.05	0.07	0.15	46	18	27	55
Trip Generation Estimates for Approved Development Potential						56	46	57	74

NOTES: 1. Land Use Code 221 and 620 are from Trip Generation, 10th Edition, (Institute of Transportation Engineers, Washington, 2017).
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 1,486 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 417, Land Use 255, Trip Generation Manual, 10th Edition). A CCRC may also contain special services such as medical, dining, recreational, and limited supporting retail facilities. The rates/equations for a CCRC (Land Use 255) are based on studies with an average of 1,600 units. These rates 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:

- 219 two-way vehicle trips (142 entering and 77 exiting) during the AM peak hour; and,
- 247 two-way vehicle trips (96 entering and 151 exiting) during the PM peak hour.

When trips generation estimates from the approved development potential are considered, it is estimated that the latest development plans for the Shannex Parkland site will generate in addition to the current approved land use:

- **117 more** two-way vehicle trips (86 entering and 31 exiting) during the AM peak hour; and,
- **116 more** two-way vehicle trips (39 entering and 77 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
Continuing Care Retirement Community (Land Use 255)	1486 Units	AM: $\text{Ln}(T) = 0.85 * \text{Ln}(X) - 0.82$ PM: $\text{Ln}(T) = 0.89 * \text{Ln}(X) - 0.99$				142	77	96	151
Trip Generation Estimates for Shannex Site						142	77	96	151

NOTES: 1. Land Use Code 255 is from Trip Generation, 10th Edition, (Institute of Transportation Engineers, Washington, 2017).
2. '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.

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) based on projected future background and full build-out traffic volumes. It was determined that:

- Traffic signals are **not warranted** with Future Background traffic volumes without site (24 Warrant Points with less than 75 vph side street approach volumes, Table B-1, Appendix B).
- Traffic signals are **not warranted** with Full Build-Out traffic volumes with site (31 Warrant Points with less than 75 vph side street approach volumes, Table B-2, Appendix B).

Traffic signals are not expected to be warranted at the intersection of Starboard Drive at Fleetview Drive / Transom Drive with full build-out of the proposed Shannex Parkland Development.

In addition, traffic signals are not expected to be warranted at the proposed driveway on Starboard Drive since the approaching driveway volume is less than an average of 75 vehicles per hour.

With review of projected volumes using the driveways and through volumes projected along the streets, it is not expected that left-turn lanes will be warranted at the proposed driveways on Starboard Drive or on Fleetview Drive.

INTERSECTION LEVEL OF SERVICE ANALYSIS

The level or quality of performance of an intersection in terms of traffic movement is determined by a level of service (LOS) analysis. LOS for intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and increased travel time. LOS criteria (see Table 3) are stated in terms of average control delay per vehicle which includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

Synchro 11.0 software was used to evaluate the performance of the Study Intersections for the following scenarios:

- A. Future Background (2031) *without* the proposed Shannex Parkland Development; and,
- B. Full Build-Out (2031) *with* the proposed Shannex Parkland Development.

Detailed analysis results are included in Appendix C.

Table 3 – Level of Service Criteria for Intersections

Signalized Intersections Control Delay (Seconds per Vehicle)	LOS Description	Two Way Stop Controlled (TWSC) Intersections Control Delay (Seconds per Vehicle)
Less than 10.0	Very low delay; most vehicles do not stop (Excellent)	Less than 10.0
Between 10.0 and 20.0	Higher delay; most vehicles stop (Very Good)	Between 10.0 and 15.0
Between 20.0 and 35.0	Higher level of congestion; number of vehicles stopping is significant, although many still pass through intersection without stopping (Good)	Between 15.0 and 25.0
Between 35.0 and 55.0	Congestion becomes noticeable; vehicles must sometimes wait through more than one red light; many vehicles stop (Satisfactory)	Between 25.0 and 35.0
Between 55.0 and 80.0	Vehicles must often wait through more than one red light; considered by many agencies to be the limit of acceptable delay	Between 35.0 and 50.0
Greater than 80.0	This level is considered to be unacceptable to most drivers; occurs when arrival flow rates exceed the capacity of the intersection (Unacceptable)	Greater than 50.0

Intersection #1: Starboard Drive at Peakview Way / Shannex Driveway (Table 4) – 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 acceptable limits.

Intersection #2: Starboard Drive at Fleetview Drive / Transom Drive (Table 5) – 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 Future Driveway #1 (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.

Intersection #4: Fleetview Drive at Future Driveway #2 (Table 7) – 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 4 – Intersection Capacity Analysis for Starboard Drive at Peakview Way / Shannex Driveway

LOS Criteria	Control Delay (sec/veh), v/c Ratio, and 95 th %ile Queue (m) by Intersection Movement								Overall Intersection Delay
	Starboard Drive				Peakview Way		Existing Shannex Driveway		
	NB-L	NB-TR	SB-L	SB-TR	EB-L	EB-TR	WB-LT	WB-R	
2031 Future Background AM Peak Hour without Proposed Site (Page C-1)									
Delay	8.0	8.3	7.9	3.6	14.0	0.1	9.9	5.0	7.2
v/c	0.10	0.24	0.09	0.16	0.36	0.03	0.02	0.08	
Queue	6.9	21.4	6.9	7.2	17.3	0.0	2.6	4.1	
2031 Future Background PM Peak Hour without Proposed Site (Page C-3)									
Delay	11.6	12.7	10.4	6.5	18.8	0.2	8.8	3.0	10.6
v/c	0.14	0.39	0.04	0.39	0.65	0.08	0.01	0.04	
Queue	8.5	34.4	4.1	19.5	40.2	0.0	1.7	2.3	
2031 Full Build-Out AM Peak Hour with Proposed Site (Page C-5)									
Delay	8.2	8.7	9.1	4.2	14.0	0.1	10.2	4.4	7.5
v/c	0.10	0.30	0.20	0.19	0.36	0.03	0.05	0.14	
Queue	7.3	26.4	13.2	9.4	17.4	0.0	4.0	5.6	
2031 Full Build-Out PM Peak Hour with Proposed Site (Page C-9)									
Delay	11.9	13.9	11.5	7.0	20.0	0.2	10.1	3.7	11.1
v/c	0.14	0.48	0.14	0.41	0.66	0.09	0.06	0.14	
Queue	8.8	46.5	10.2	22.4	45.5	0.0	5.4	6.5	

Table 5 – Intersection Capacity Analysis for Starboard Drive at Fleetview Drive / Transom Drive

Criteria	Control Delay (sec/veh), v/c Ratio, and 95 th %ile Queue (m) by Intersection Movement				Overall Intersection Delay
	Starboard Drive		Transom Drive	Fleetview Drive	
	NB-LTR	SB-LTR	EB-LTR	WB-LTR	
2031 Future Background AM Peak Hour without Proposed Site (Page C-2)					
Delay	0.2	2.1	12.9	9.7	4.1
v/c	0.12	0.10	0.14	0.07	
Queue	0.1	0.7	4.0	1.7	
2031 Future Background PM Peak Hour without Proposed Site (Page C-4)					
Delay	0.2	2.0	17.8	10.0	4.3
v/c	0.15	0.26	0.24	0.09	
Queue	0.1	1.4	7.2	2.3	
2031 Full Build-Out AM Peak Hour with Proposed Site (Page C-6)					
Delay	0.2	2.8	15.0	10.1	4.4
v/c	0.15	0.14	0.17	0.09	
Queue	0.1	1.1	5.0	2.4	
2031 Full Build-Out PM Peak Hour with Proposed Site (Page C-10)					
Delay	0.2	1.8	20.1	10.8	4.5
v/c	0.17	0.29	0.27	0.14	
Queue	0.1	1.3	8.5	3.9	

Table 6 – Intersection Capacity Analysis for Starboard Drive at Future Driveway #1

Criteria	Control Delay (sec/veh), v/c Ratio, and 95 th %ile Queue (m) by Intersection Movement			Overall Intersection Delay
	Starboard Drive		Future Starboard Drive Access	
	NB-LT	SB-TR	WB-LR	
2031 Full Build-Out AM Peak Hour with Proposed Site (Page C-7)				
Delay	0.0	1.5	11.0	1.1
v/c	0.20	0.17	0.04	
Queue	0.0	0.7	1.0	
2031 Full Build-Out PM Peak Hour with Proposed Site (Page C-11)				
Delay	0.0	0.6	12.1	1.0
v/c	0.21	0.36	0.09	
Queue	0.0	0.5	2.3	

Table 7 – Intersection Capacity Analysis for Fleetview Drive at Future Driveway #2

Criteria	Control Delay (sec/veh), v/c Ratio, and 95 th %ile Queue (m) by Intersection Movement			Overall Intersection Delay
	Future Fleetview Drive Access	Fleetview Drive		
	SB-LR	EB-LT	WB-TR	
2031 Full Build-Out AM Peak Hour with Proposed Site (Page C-8)				
Delay	8.7	3.0	0.0	2.5
v/c	0.02	0.05	0.03	
Queue	0.4	0.4	0.0	
2031 Full Build-Out PM Peak Hour with Proposed Site (Page C-12)				
Delay	8.8	1.5	0.0	2.1
v/c	0.03	0.07	0.04	
Queue	0.8	0.3	0.0	

SUMMARY

1. Plans are being prepared for Shannex Parkland Development, a Continued Care Retirement Community consisting of approximately 1,486 units bound by Larry Uteck Boulevard, Starboard Drive and Fleetview Drive, in Bedford, NS.
2. Vehicular access to the site is planned via three full access driveways on Starboard Drive and Fleetview Drive. No sight distance concerns were identified at the proposed driveway locations. In addition, there may be future access across an adjacent site which would provide access to Larry Uteck Boulevard.
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, 10th Edition (Institute of Transportation Engineers, Washington 2017).
 - It was estimated that the approved development potential of the site would generate:
 - 102 two-way vehicle trips (56 entering and 46 exiting) during the AM peak hour; and,
 - 131 two-way vehicle trips (57 entering and 74 exiting) during the PM peak hour.
 - It was estimated that the latest development plans for the Shannex Parkland site will generate:
 - 219 two-way vehicle trips (142 entering and 77 exiting) during the AM peak hour; and,
 - 247 two-way vehicle trips (96 entering and 151 exiting) during the PM peak hour.
 - When trips generation estimates from the approved development potential are considered, it is estimated that the latest development plans for the Shannex Parkland site will generate in addition to the current approved land use:
 - 117 more two-way vehicle trips (86 entering and 31 exiting) during the AM peak hour; and,
 - 116 more two-way vehicle trips (39 entering and 77 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. 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

7. 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 greg.obrien@wsp.com or by telephone at 902-444-8347.

Sincerely,

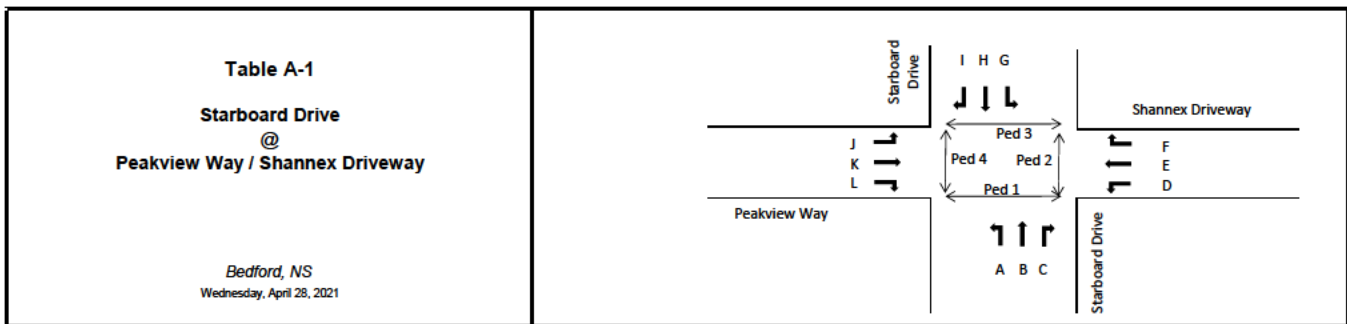


Greg O'Brien, P.Eng.
Atlantic Practice Manager
Traffic Engineering and Transportation Planning
WSP Canada Inc.





**APPENDIX A
TRAFFIC VOLUME DATA**

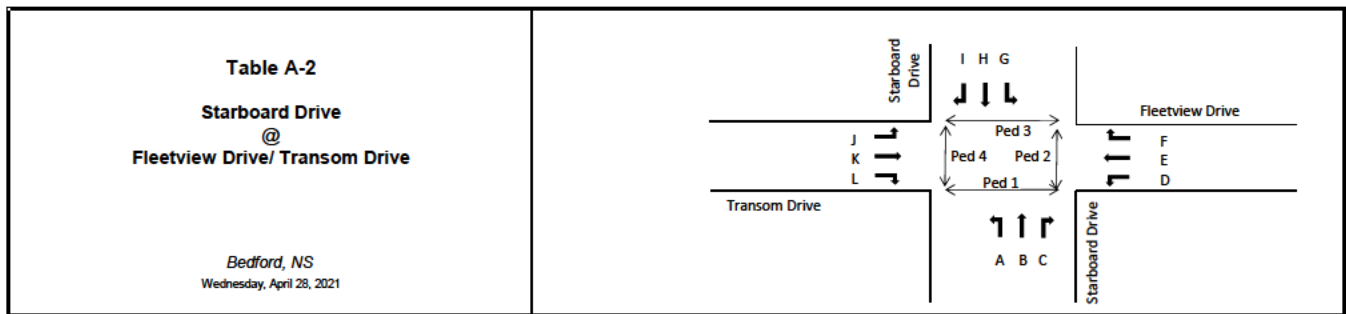


AM Peak Period Volume Data

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	28	0	0	1	2	1	10	19	18	0	1	88
07:15 - 07:30	6	24	0	0	0	0	3	14	16	15	0	4	82
07:30 - 07:45	7	41	0	0	0	0	3	20	26	15	1	6	119
07:45 - 08:00	3	41	0	0	0	2	8	24	26	17	0	6	127
08:00 - 08:15	11	35	0	1	0	3	3	14	28	26	0	10	131
08:15 - 08:30	8	54	1	0	0	2	6	25	25	22	0	6	149
08:30 - 08:45	14	45	0	0	1	1	2	16	33	29	0	3	144
08:45 - 09:00	8	34	1	0	0	3	1	28	41	25	0	5	146
AM Peak Hour	41	168	2	1	1	9	12	83	127	102	0	24	570
07:00 - 08:00	24	134	0	0	1	4	15	68	87	65	1	17	416
08:00 - 09:00	41	168	2	1	1	9	12	83	127	102	0	24	570
	Ped 1			Ped 2			Ped 3			Ped 4			Total Peds
07:00 - 08:00	2			21			1			11			35
08:00 - 09:00	1			10			2			11			24

PM Peak Period Volume Data

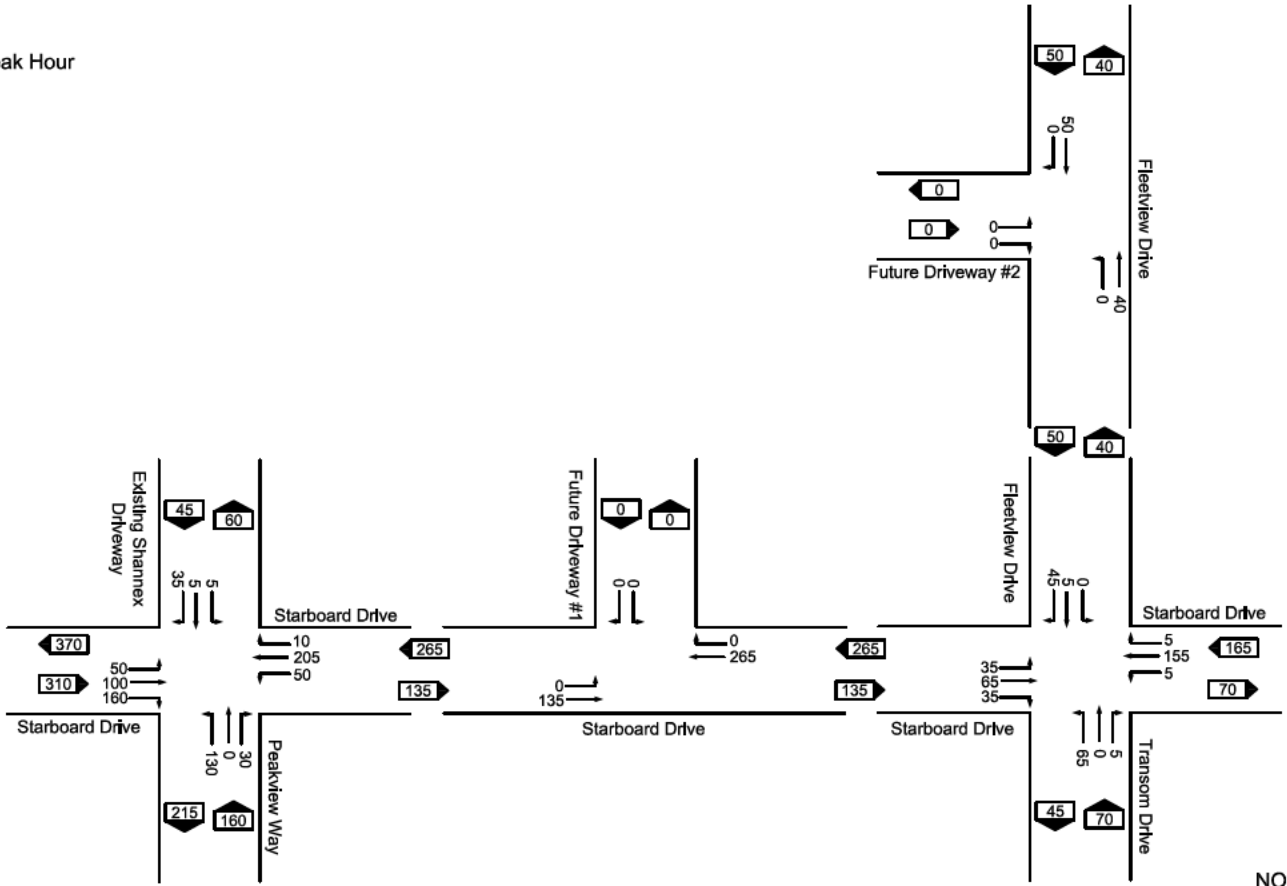
Time	Starboard Drive Northbound Approach			Shannex Driveway Westbound Approach			Starboard Drive Southbound Approach			Peakview Way Eastbound Approach			Total Vehicles
	A	B	C	D	E	F	G	H	I	J	K	L	
15:30 - 15:45	5	52	0	0	0	0	0	45	35	50	0	6	193
15:45 - 16:00	5	48	1	0	0	1	0	57	39	63	0	10	224
16:00 - 16:15	9	50	1	1	0	1	2	53	37	65	0	21	240
16:15 - 16:30	6	57	0	0	0	1	2	51	42	48	0	8	215
16:30 - 16:45	7	37	0	0	0	2	0	51	60	60	0	14	231
16:45 - 17:00	10	56	0	0	0	1	0	65	43	56	0	11	242
17:00 - 17:15	2	51	0	0	0	4	0	54	35	48	0	8	202
17:15 - 17:30	4	31	0	0	0	0	0	53	48	61	0	10	207
PM Peak Hour	32	200	1	1	0	5	4	220	182	229	0	54	928
15:30 - 16:30	25	207	2	1	0	3	4	206	153	226	0	45	872
16:30 - 17:30	23	175	0	0	0	7	0	223	186	225	0	43	882
	Ped 1			Ped 2			Ped 3			Ped 4			Total Peds
15:30 - 16:30	13			42			15			18			88
16:30 - 17:30	6			39			4			9			58



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	1	10	2	1	0	6	4	6	3	12	0	0	45
07:15	07:30	0	10	1	0	0	6	4	6	8	8	0	1	44
07:30	07:45	1	17	1	2	1	7	9	16	3	18	1	0	76
07:45	08:00	1	19	1	0	0	10	8	8	8	8	0	3	66
08:00	08:15	0	22	1	0	1	6	7	11	7	13	0	1	69
08:15	08:30	0	21	0	0	0	10	12	10	6	23	0	1	83
08:30	08:45	0	20	1	0	0	14	4	8	6	16	0	0	69
08:45	09:00	2	19	0	0	1	13	7	16	11	9	0	3	81
AM Peak Hour		2	82	2	0	2	43	30	45	30	61	0	5	302
07:00	08:00	3	56	5	3	1	29	25	36	22	46	1	4	231
08:00	09:00	2	82	2	0	2	43	30	45	30	61	0	5	302
		Ped 1			Ped 2			Ped 3			Ped 4			Total Peds
07:00	08:00	2			5			1			4			12
08:00	09:00	5			10			5			11			31
Midday 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		
11:30	11:45	0	29	1	1	1	9	11	30	10	8	1	1	102
11:45	12:00	1	14	1	1	1	14	8	22	9	12	0	2	85
12:00	12:15	1	28	0	2	0	8	16	32	15	17	0	0	119
12:15	12:30	2	16	0	0	1	14	6	21	9	17	0	1	87
12:30	12:45	1	15	1	0	0	8	12	22	16	14	0	1	90
12:45	13:00	1	22	1	1	0	12	20	30	15	9	1	0	112
13:00	13:15	5	19	1	0	1	8	12	23	12	12	0	1	94
13:15	13:30	0	13	2	1	0	14	8	18	18	13	1	6	94
Midday Peak Hour		5	81	2	3	1	42	54	105	55	57	1	2	408
11:30	12:30	4	87	2	4	3	45	41	105	43	54	1	4	393
12:30	13:30	7	69	5	2	1	42	52	93	61	48	2	8	390
		Ped 1			Ped 2			Ped 3			Ped 4			Total Peds
11:30	12:30	3			35			6			20			64
12:30	13:30	3			33			15			35			86
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		
15:30	15:45	0	25	1	0	1	12	8	23	11	11	0	1	93
15:45	16:00	5	24	0	0	0	7	12	25	22	17	0	1	113
16:00	16:15	1	27	3	0	0	11	17	32	19	13	0	1	124
16:15	16:30	1	34	0	1	0	12	13	28	17	15	1	3	125
16:30	16:45	2	13	1	2	0	18	13	32	21	10	0	1	113
16:45	17:00	1	26	1	0	0	12	21	34	23	23	1	3	145
17:00	17:15	0	19	2	1	1	18	15	29	18	18	0	0	121
17:15	17:30	2	13	0	0	0	7	17	21	21	10	0	4	95
PM Peak Hour		5	100	5	3	0	53	64	126	80	61	2	8	507
15:30	16:30	7	110	4	1	1	42	50	108	69	56	1	6	455
16:30	17:30	5	71	4	3	1	55	66	116	83	61	1	8	474
		Ped 1			Ped 2			Ped 3			Ped 4			Total Peds
15:30	16:30	13			38			6			25			82
16:30	17:30	27			37			6			50			120

A

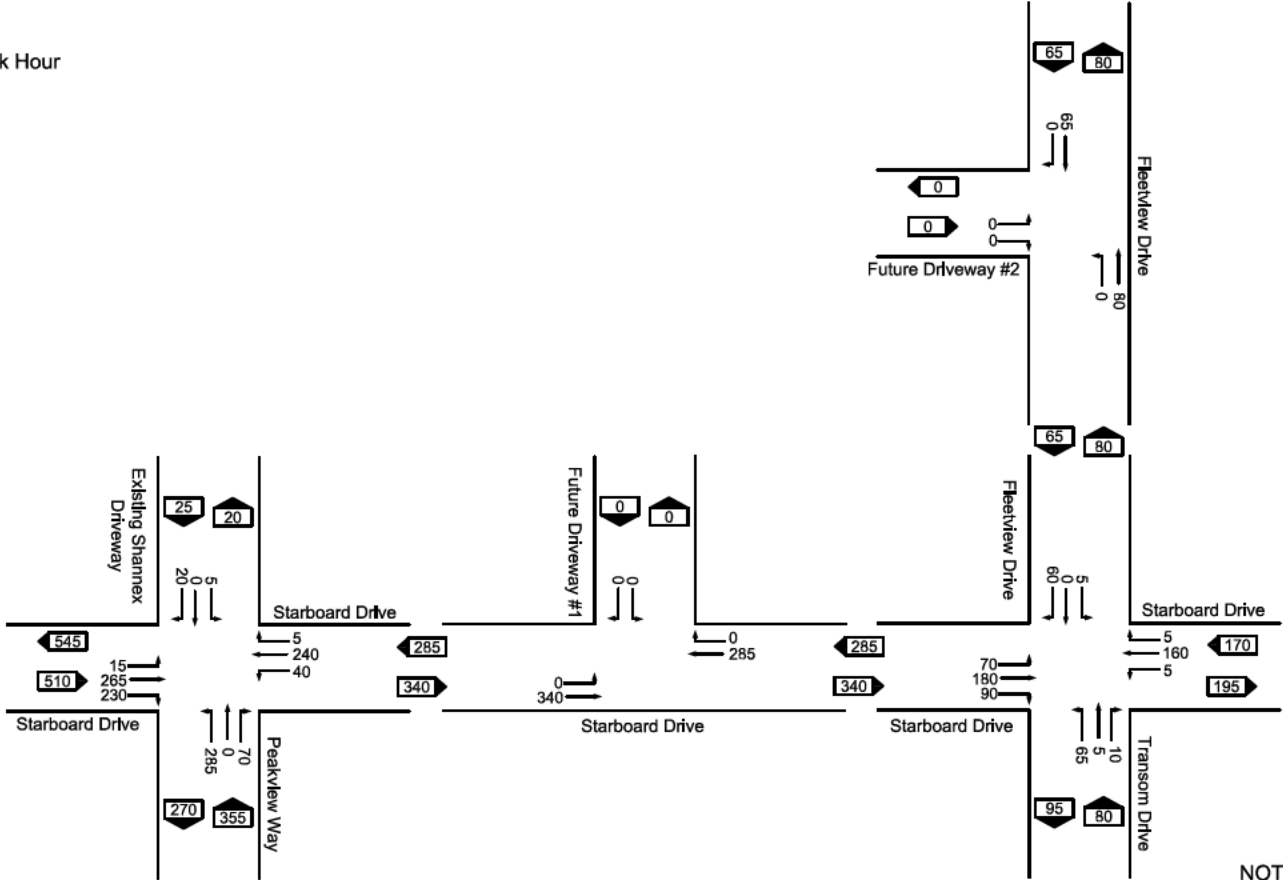
AM Peak Hour



NOT TO SCALE

B

PM Peak Hour



NOT TO SCALE



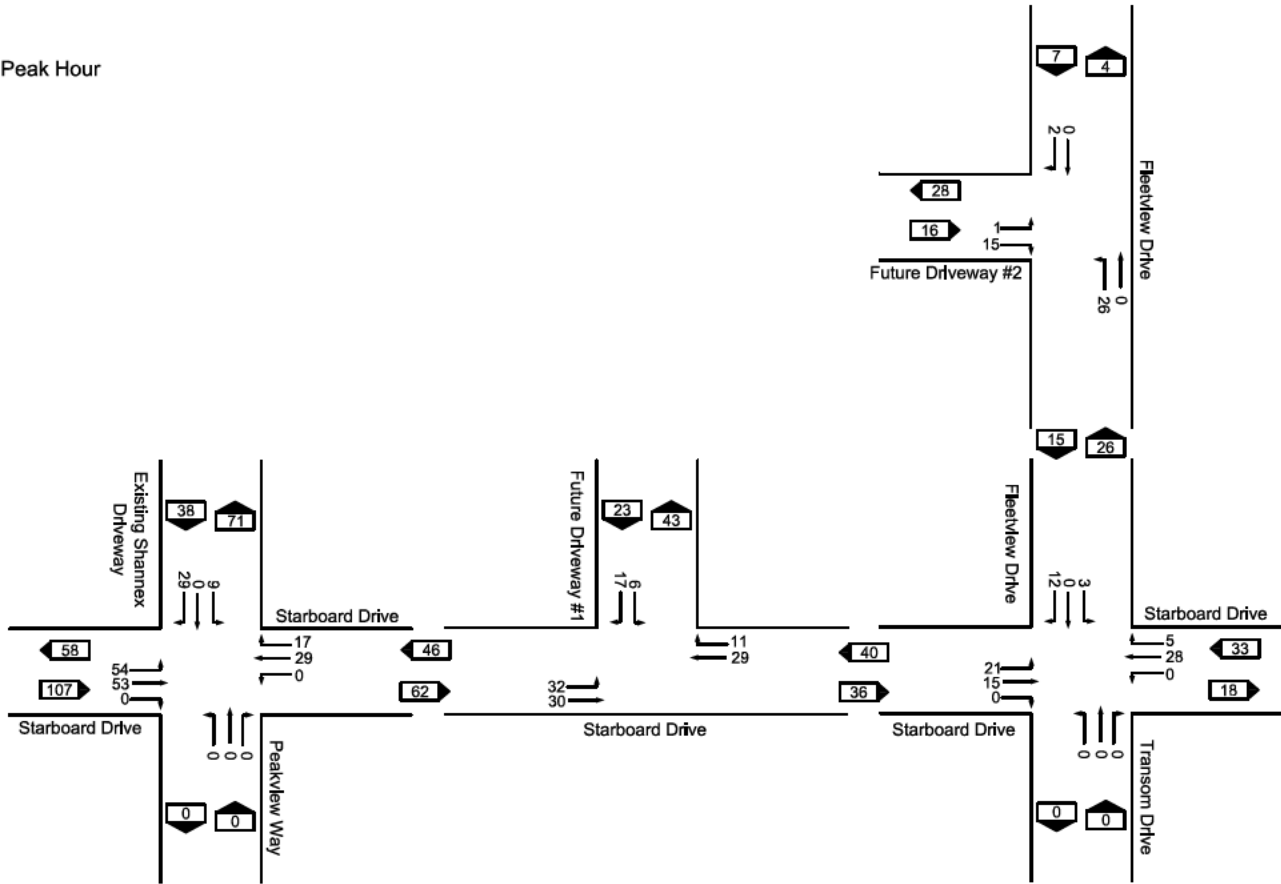
Traffic Impact Analysis - Shannex Parkland Development
South Bedford, Nova Scotia

Figure A-1

2031 Weekday AM and PM Peak Hour
Future Background without Shannex Parkland Development

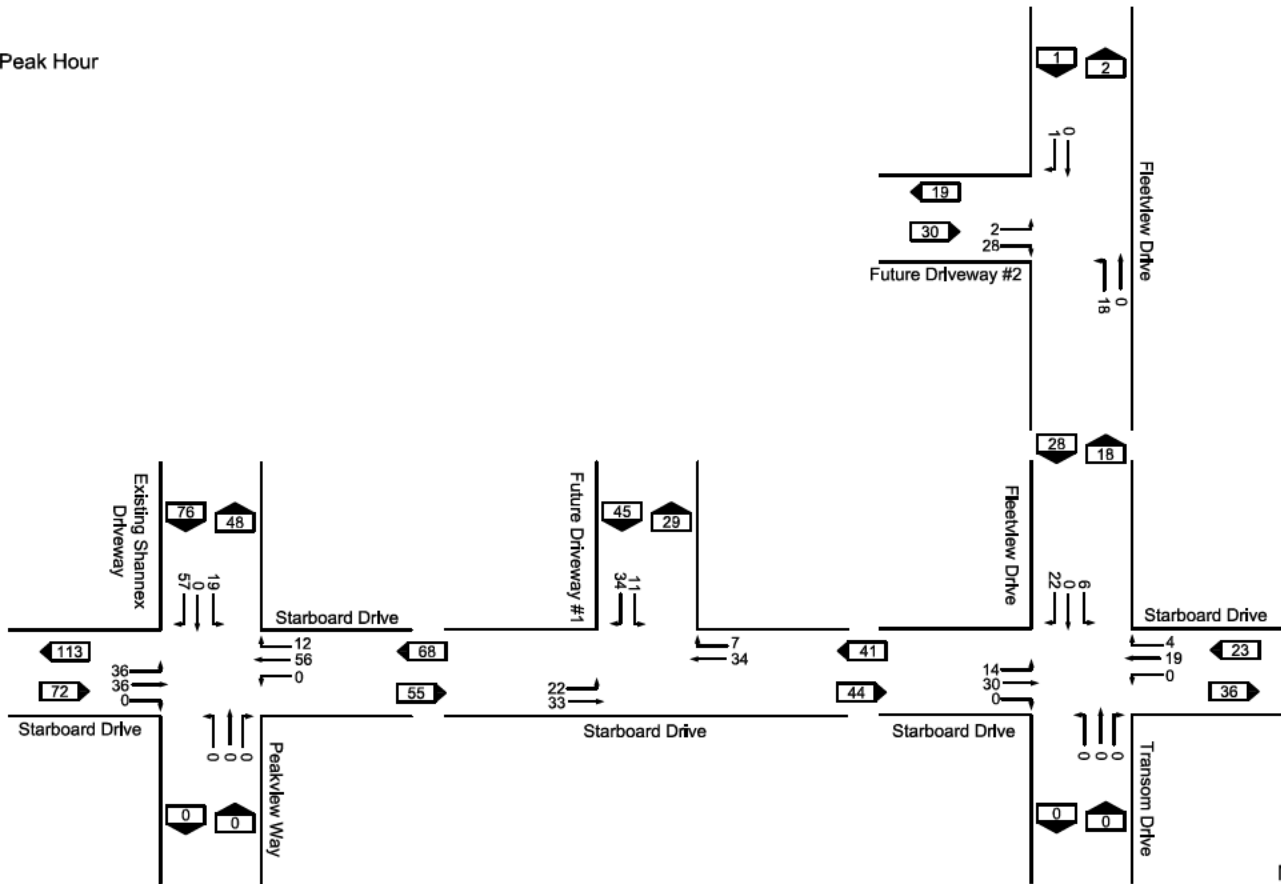
July 2021

A
AM Peak Hour



NOT TO SCALE

B
PM Peak Hour



NOT TO SCALE



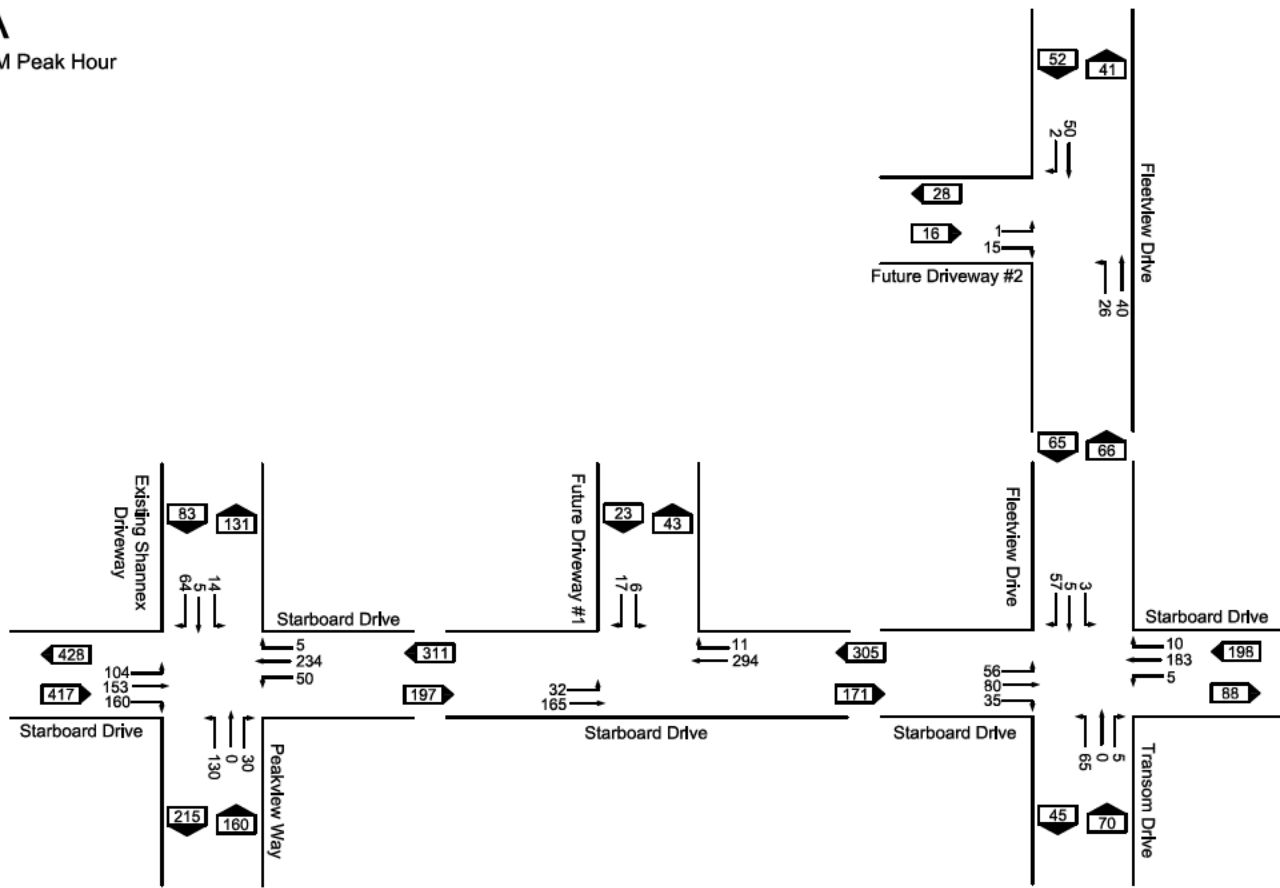
Traffic Impact Analysis - Shannex Parkland Development
South Bedford, Nova Scotia

Weekday AM and PM Peak Hour
Trip Generation Estimate

Figure A-2

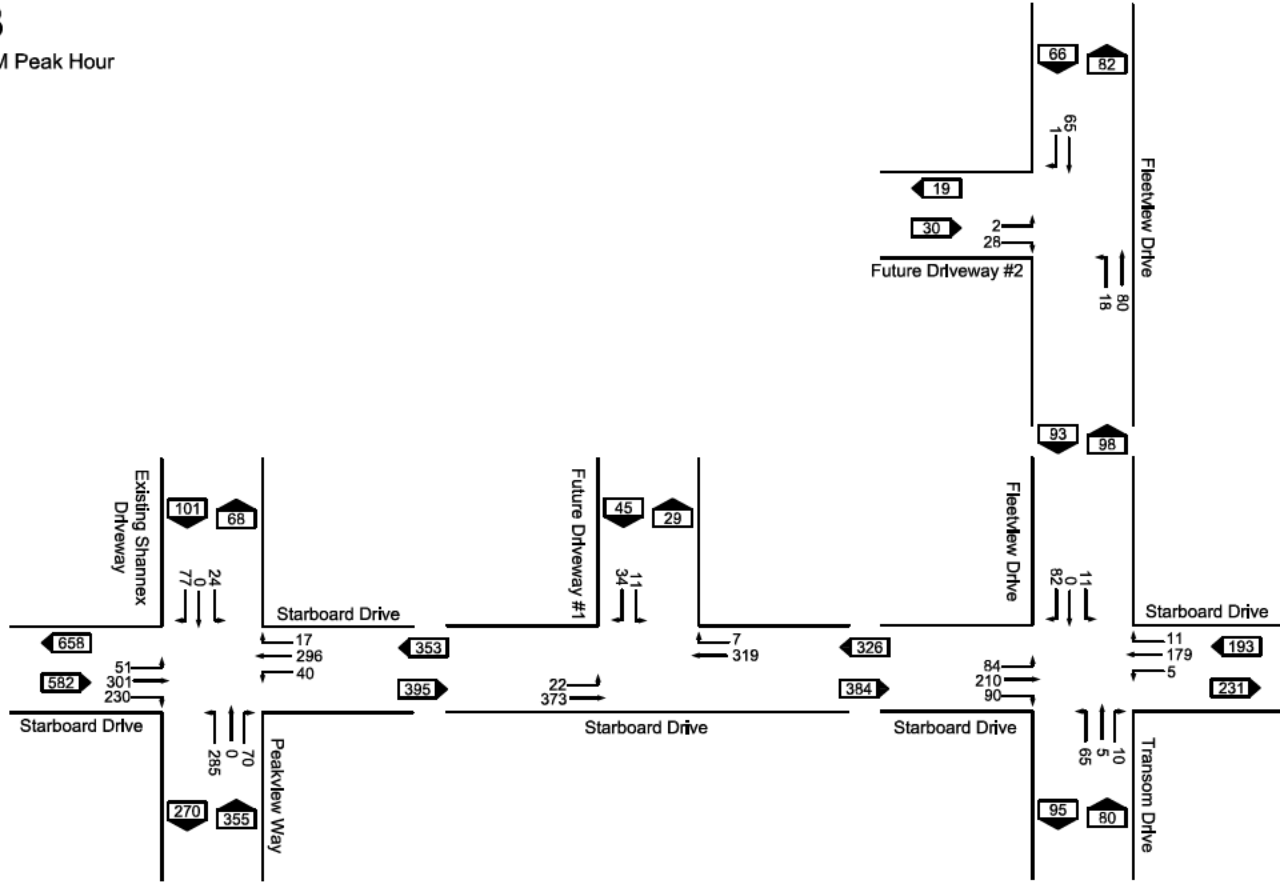
July 2021

A
AM Peak Hour



NOT TO SCALE

B
PM Peak Hour



NOT TO SCALE



Traffic Impact Analysis - Shannex Parkland Development
South Bedford, Nova Scotia

2031 Weekday AM and PM Peak Hour
Full Build-Out with Shannex Parkland Development

Figure A-3

July 2021



**APPENDIX B
WARRANTS**

2005 Canadian Traffic Signal Warrant Matrix Analysis

Table B-1 - Starboard Drive at Fleetview Drive / Transom Drive
2031 Future Background

Main Street (name)	Starboard Drive	Direction (EW or NS)	NS	Date:	July 2021
Side Street (name)	Fleetview Drive	Direction (EW or NS)	EW	City:	Halifax, 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			500	1
Transom Drive	EB			1				
Fleetview Drive	WB			1				

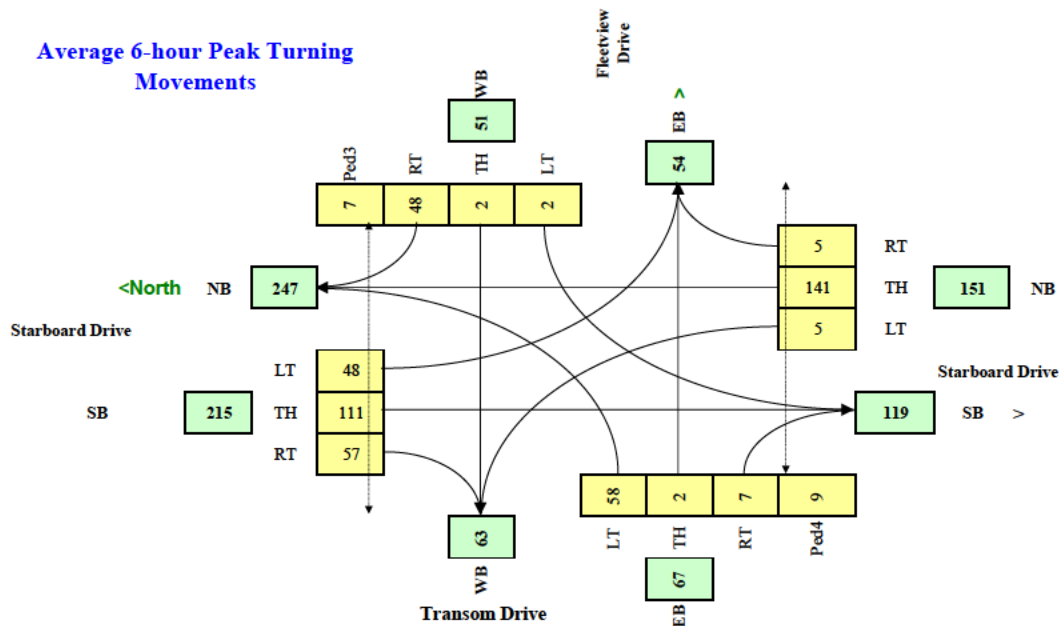
Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Starboard Drive	NS	50	2.0%	n	0.0
Fleetview Drive	EW	50	2.0%	n	

	Ped1 NS W Side	Ped2 NS E Side	Ped3 EW N Side	Ped4 EW S side
7:00 - 8:00	4	5	1	2
8:00 - 9:00	11	10	5	5
11:30 - 12:30	20	35	6	3
12:30 - 13:30	35	33	15	3
15:30 - 16:30	25	38	6	13
16:30 - 17:30	50	37	6	27
Total (6-hour peak)	145	158	39	53
Average (6-hour peak)	24	26	7	9

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	155	5	35	65	35	0	5	45	65	0	5
8:00 - 9:00	5	115	5	25	50	25	0	5	35	50	0	5
11:30 - 12:30	5	135	5	45	105	55	0	0	45	55	0	5
12:30 - 13:30	5	135	5	45	105	55	0	0	45	55	0	5
15:30 - 16:30	5	145	5	65	160	80	5	0	55	60	5	10
16:30 - 17:30	5	160	5	70	180	90	5	0	60	65	5	10
Total (6-hour peak)	30	845	30	285	665	340	10	10	285	350	10	40
Average (6-hour peak)	5	141	5	48	111	57	2	2	48	58	2	7

Average 6-hour Peak Turning Movements



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

W =	24	18	6
		Veh	Ped
Not Warranted - $V_s < 75$			

2005 Canadian Traffic Signal Warrant Matrix Analysis

Table B-2 - Starboard Drive at Fleetview Drive / Transom Drive
2031 Full Buildout

Main Street (name)	Starboard Drive	Direction (EW or NS)	NS	Date:	July 2021
Side Street (name)	Fleetview Drive	Direction (EW or NS)	EW	City:	Halifax, 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			500	1
Transom Drive	EB			1				
Fleetview Drive	WB			1				

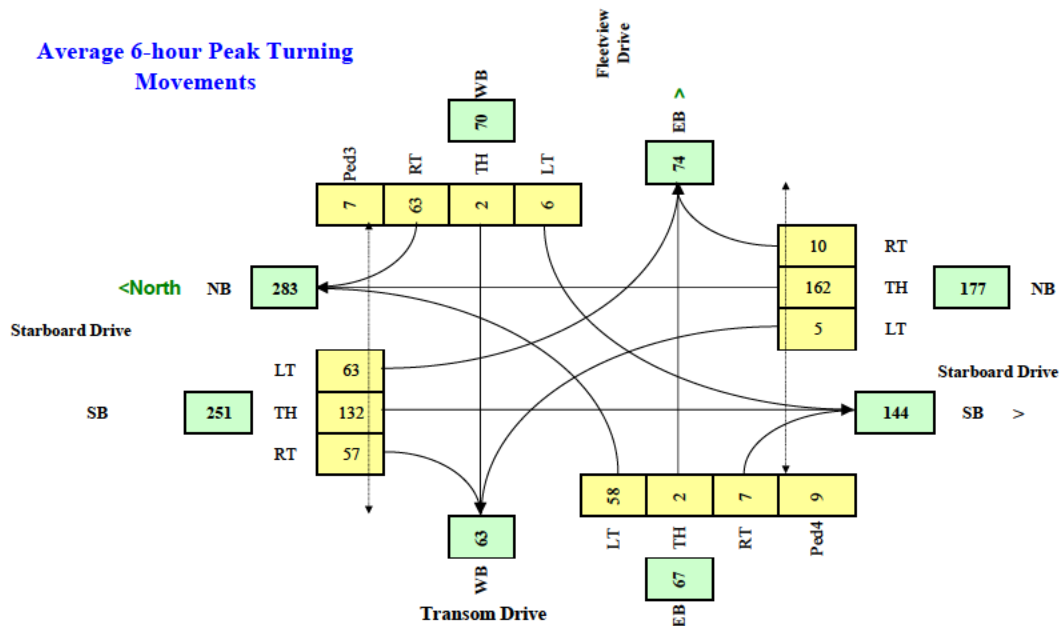
Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Starboard Drive	NS	50	2.0%	n	0.0
Fleetview Drive	EW	50	2.0%	n	

	Ped1 NS W Side	Ped2 NS E Side	Ped3 EW N Side	Ped4 EW S side
7:00 - 8:00	4	5	1	2
8:00 - 9:00	11	10	5	5
11:30 - 12:30	20	35	6	3
12:30 - 13:30	35	33	15	3
15:30 - 16:30	25	38	6	13
16:30 - 17:30	50	37	6	27
Total (6-hour peak)	145	158	39	53
Average (6-hour peak)	24	26	7	9

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	185	10	55	80	35	5	5	55	65	0	5
8:00 - 9:00	5	135	10	40	60	25	0	5	45	50	0	5
11:30 - 12:30	5	155	10	60	125	55	5	0	60	55	0	5
12:30 - 13:30	5	155	10	60	125	55	5	0	60	55	0	5
15:30 - 16:30	5	160	10	75	190	80	10	0	75	60	5	10
16:30 - 17:30	5	180	10	85	210	90	10	0	80	65	5	10
Total (6-hour peak)	30	970	60	375	790	340	35	10	375	350	10	40
Average (6-hour peak)	5	162	10	63	132	57	6	2	63	58	2	7

Average 6-hour Peak Turning Movements



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

W =	31	24	7
		Veh	Ped
Not Warranted - Vs < 75			



APPENDIX C

INTERSECTION PERFORMANCE DATA

Shannex Parkland Traffic Impact Analysis
 1: Starboard Dr & Peakview Wy/Existing Driveway

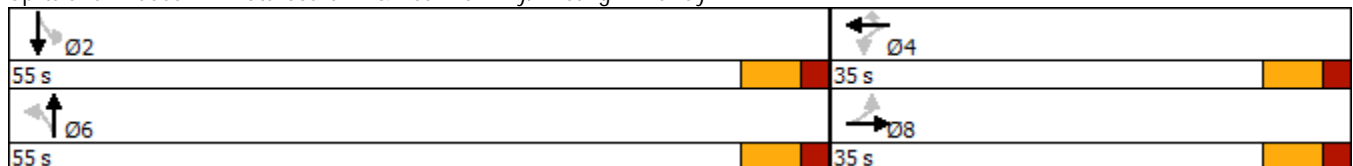
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	0	30	5	5	35	50	205	10	50	100	160
Future Volume (vph)	130	0	30	5	5	35	50	205	10	50	100	160
Satd. Flow (prot)	1770	1583	0	0	1818	1583	1770	1850	0	1770	3214	0
Flt Permitted	0.751				0.851		0.578			0.613		
Satd. Flow (perm)	1399	1583	0	0	1585	1583	1077	1850	0	1142	3214	0
Satd. Flow (RTOR)		846				38		4			174	
Lane Group Flow (vph)	141	33	0	0	10	38	54	234	0	54	283	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6			2		
Total Split (s)	35.0	35.0		35.0	35.0	35.0	55.0	55.0		55.0	55.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Act Effct Green (s)	10.3	10.3			10.3	10.3	19.3	19.3		19.3	19.3	
Actuated g/C Ratio	0.28	0.28			0.28	0.28	0.52	0.52		0.52	0.52	
v/c Ratio	0.36	0.03			0.02	0.08	0.10	0.24		0.09	0.16	
Control Delay	14.0	0.1			9.9	5.0	8.0	8.3		7.9	3.6	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	14.0	0.1			9.9	5.0	8.0	8.3		7.9	3.6	
LOS	B	A			A	A	A	A		A	A	
Approach Delay		11.4			6.0			8.3			4.3	
Approach LOS		B			A			A			A	
Queue Length 50th (m)	7.3	0.0			0.5	0.0	2.0	9.4		2.0	2.1	
Queue Length 95th (m)	17.3	0.0			2.6	4.1	6.9	21.4		6.9	7.2	
Internal Link Dist (m)		126.3			146.1			276.2			153.4	
Turn Bay Length (m)	15.0					15.0	60.0			50.0		
Base Capacity (vph)	1093	1421			1238	1245	1077	1850		1142	3214	
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	0.13	0.02			0.01	0.03	0.05	0.13		0.05	0.09	

















Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 37.1
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.36
 Intersection Signal Delay: 7.2
 Intersection Capacity Utilization 53.9%
 Analysis Period (min) 15

Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 1: Starboard Dr & Peakview Wy/Existing Driveway



												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	0	5	0	5	45	5	155	5	35	65	35
Future Volume (Veh/h)	65	0	5	0	5	45	5	155	5	35	65	35
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)	71	0	5	0	5	49	5	168	5	38	71	38
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	398	349	90	352	366	170	109			173		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	398	349	90	352	366	170	109			173		
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 %	86	100	99	100	99	94	100			97		
cM capacity (veh/h)	515	557	968	586	546	873	1481			1404		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	76	54	178	147								
Volume Left	71	0	5	38								
Volume Right	5	49	5	38								
cSH	531	827	1481	1404								
Volume to Capacity	0.14	0.07	0.00	0.03								
Queue Length 95th (m)	4.0	1.7	0.1	0.7								
Control Delay (s)	12.9	9.7	0.2	2.1								
Lane LOS	B	A	A	A								
Approach Delay (s)	12.9	9.7	0.2	2.1								
Approach LOS	B	A										
Intersection Summary												
Average Delay			4.1									
Intersection Capacity Utilization			36.8%		ICU Level of Service				A			
Analysis Period (min)			15									

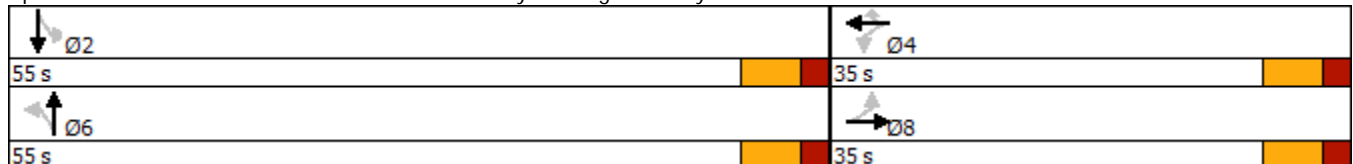
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	285	0	70	5	0	20	40	240	5	15	265	230
Future Volume (vph)	285	0	70	5	0	20	40	240	5	15	265	230
Satd. Flow (prot)	1770	1583	0	0	1770	1583	1770	1857	0	1770	3291	0
Flt Permitted	0.754				0.708		0.452			0.595		
Satd. Flow (perm)	1405	1583	0	0	1319	1583	842	1857	0	1108	3291	0
Satd. Flow (RTOR)		554				36		2			250	
Lane Group Flow (vph)	310	76	0	0	5	22	43	266	0	16	538	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6			2		
Total Split (s)	35.0	35.0		35.0	35.0	35.0	55.0	55.0		55.0	55.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Act Effct Green (s)	14.2	14.2			14.2	14.2	15.5	15.5		15.5	15.5	
Actuated g/C Ratio	0.34	0.34			0.34	0.34	0.37	0.37		0.37	0.37	
v/c Ratio	0.65	0.08			0.01	0.04	0.14	0.39		0.04	0.39	
Control Delay	18.8	0.2			8.8	3.0	11.6	12.7		10.4	6.5	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	18.8	0.2			8.8	3.0	11.6	12.7		10.4	6.5	
LOS	B	A			A	A	B	B		B	A	
Approach Delay		15.1			4.1			12.5			6.6	
Approach LOS		B			A			B			A	
Queue Length 50th (m)	18.6	0.0			0.3	0.0	2.0	13.5		0.7	7.3	
Queue Length 95th (m)	40.2	0.0			1.7	2.3	8.5	34.4		4.1	19.5	
Internal Link Dist (m)		126.3			146.1			276.2			153.4	
Turn Bay Length (m)	15.0					15.0	60.0			50.0		
Base Capacity (vph)	982	1273			922	1118	839	1850		1104	3280	
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	0.32	0.06			0.01	0.02	0.05	0.14		0.01	0.16	

















Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 41.9
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.65
 Intersection Signal Delay: 10.6
 Intersection Capacity Utilization 64.7%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 1: Starboard Dr & Peakview Wy/Existing Driveway



												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	5	10	5	0	60	5	160	5	70	180	90
Future Volume (Veh/h)	65	5	10	5	0	60	5	160	5	70	180	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)	71	5	11	5	0	65	5	174	5	76	196	98
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	648	586	245	597	632	176	294			179		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	648	586	245	597	632	176	294			179		
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 %	79	99	99	99	100	92	100			95		
cM capacity (veh/h)	339	398	794	387	374	867	1268			1397		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	87	70	184	370								
Volume Left	71	5	5	76								
Volume Right	11	65	5	98								
cSH	369	796	1268	1397								
Volume to Capacity	0.24	0.09	0.00	0.05								
Queue Length 95th (m)	7.2	2.3	0.1	1.4								
Control Delay (s)	17.8	10.0	0.2	2.0								
Lane LOS	C	A	A	A								
Approach Delay (s)	17.8	10.0	0.2	2.0								
Approach LOS	C	A										
Intersection Summary												
Average Delay			4.3									
Intersection Capacity Utilization			49.0%		ICU Level of Service				A			
Analysis Period (min)			15									

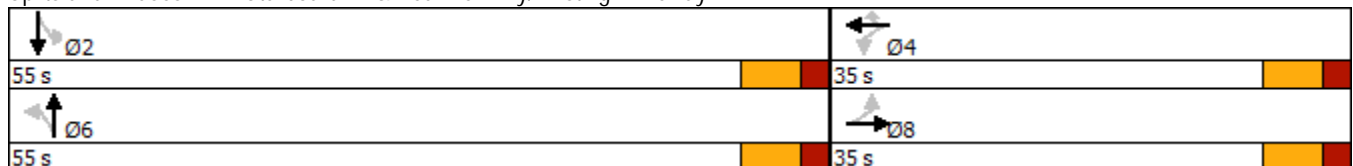
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	0	30	14	5	64	50	234	27	104	153	160
Future Volume (vph)	130	0	30	14	5	64	50	234	27	104	153	160
Satd. Flow (prot)	1770	1583	0	0	1796	1583	1770	1835	0	1770	3267	0
Flt Permitted	0.744				0.770		0.547			0.586		
Satd. Flow (perm)	1386	1583	0	0	1434	1583	1019	1835	0	1092	3267	0
Satd. Flow (RTOR)		740						10			174	
Lane Group Flow (vph)	141	33	0	0	20	70	54	283	0	113	340	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		8			4			6				2
Permitted Phases	8			4		4	6			2		
Total Split (s)	35.0	35.0		35.0	35.0	35.0	55.0	55.0		55.0	55.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Act Effct Green (s)	10.4	10.4			10.4	10.4	19.3	19.3		19.3	19.3	
Actuated g/C Ratio	0.28	0.28			0.28	0.28	0.52	0.52		0.52	0.52	
v/c Ratio	0.36	0.03			0.05	0.14	0.10	0.30		0.20	0.19	
Control Delay	14.0	0.1			10.2	4.4	8.2	8.7		9.1	4.2	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	14.0	0.1			10.2	4.4	8.2	8.7		9.1	4.2	
LOS	B	A			B	A	A	A		A	A	
Approach Delay		11.3			5.7			8.6			5.5	
Approach LOS		B			A			A			A	
Queue Length 50th (m)	7.3	0.0			0.9	0.0	2.0	11.4		4.5	3.2	
Queue Length 95th (m)	17.4	0.0			4.0	5.6	7.3	26.4		13.2	9.4	
Internal Link Dist (m)		126.3			146.1			276.2			153.4	
Turn Bay Length (m)	15.0					15.0	60.0			50.0		
Base Capacity (vph)	1080	1396			1117	1248	1019	1835		1092	3267	
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	0.13	0.02			0.02	0.06	0.05	0.15		0.10	0.10	

















Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 37.2
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.36
 Intersection Signal Delay: 7.5
 Intersection Capacity Utilization 55.3%
 Analysis Period (min) 15










Intersection LOS: A
 ICU Level of Service B










Splits and Phases: 1: Starboard Dr & Peakview Wy/Existing Driveway



												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	0	5	3	5	57	5	183	10	56	80	35
Future Volume (Veh/h)	65	0	5	3	5	57	5	183	10	56	80	35
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)	71	0	5	3	5	62	5	199	11	61	87	38
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	507	448	106	448	462	204	125			210		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	507	448	106	448	462	204	125			210		
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 %	83	100	99	99	99	93	100			96		
cM capacity (veh/h)	421	481	948	500	473	836	1462			1361		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	76	70	215	186								
Volume Left	71	3	5	61								
Volume Right	5	62	11	38								
cSH	437	772	1462	1361								
Volume to Capacity	0.17	0.09	0.00	0.04								
Queue Length 95th (m)	5.0	2.4	0.1	1.1								
Control Delay (s)	15.0	10.1	0.2	2.8								
Lane LOS	B	B	A	A								
Approach Delay (s)	15.0	10.1	0.2	2.8								
Approach LOS	B	B										
Intersection Summary												
Average Delay			4.4									
Intersection Capacity Utilization			40.5%		ICU Level of Service				A			
Analysis Period (min)			15									

Shannex Parkland Traffic Impact Analysis
3: Starboard Dr & Future Driveway #1

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	17	294	11	32	165
Future Volume (Veh/h)	6	17	294	11	32	165
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	18	320	12	35	179
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						300
pX, platoon unblocked						
vC, conflicting volume	575	326			332	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	575	326			332	
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)	466	715			1227	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	25	332	214			
Volume Left	7	0	35			
Volume Right	18	12	0			
cSH	622	1700	1227			
Volume to Capacity	0.04	0.20	0.03			
Queue Length 95th (m)	1.0	0.0	0.7			
Control Delay (s)	11.0	0.0	1.5			
Lane LOS	B		A			
Approach Delay (s)	11.0	0.0	1.5			
Approach LOS	B					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			39.9%		ICU Level of Service	A
Analysis Period (min)			15			

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	26	40	50	2	1	15
Future Volume (Veh/h)	26	40	50	2	1	15
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)	28	43	54	2	1	16
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	56				154	55
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	56				154	55
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)	1549				822	1012
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	71	56	17			
Volume Left	28	0	1			
Volume Right	0	2	16			
cSH	1549	1700	998			
Volume to Capacity	0.02	0.03	0.02			
Queue Length 95th (m)	0.4	0.0	0.4			
Control Delay (s)	3.0	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	3.0	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			2.5			
Intersection Capacity Utilization			20.2%		ICU Level of Service	A
Analysis Period (min)			15			

Shannex Parkland Traffic Impact Analysis
 1: Starboard Dr & Peakview Wy/Existing Driveway

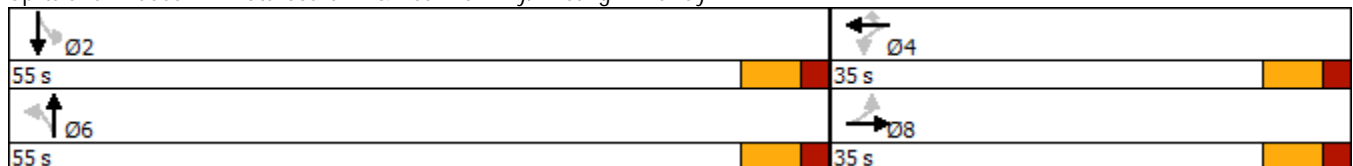
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	285	0	70	24	0	77	40	296	17	51	301	230
Future Volume (vph)	285	0	70	24	0	77	40	296	17	51	301	230
Satd. Flow (prot)	1770	1583	0	0	1770	1583	1770	1848	0	1770	3309	0
Flt Permitted	0.740				0.708		0.435			0.547		
Satd. Flow (perm)	1378	1583	0	0	1319	1583	810	1848	0	1019	3309	0
Satd. Flow (RTOR)		504				84		5			250	
Lane Group Flow (vph)	310	76	0	0	26	84	43	340	0	55	577	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6			2		
Total Split (s)	35.0	35.0		35.0	35.0	35.0	55.0	55.0		55.0	55.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Act Effct Green (s)	15.0	15.0			15.0	15.0	16.7	16.7		16.7	16.7	
Actuated g/C Ratio	0.34	0.34			0.34	0.34	0.38	0.38		0.38	0.38	
v/c Ratio	0.66	0.09			0.06	0.14	0.14	0.48		0.14	0.41	
Control Delay	20.0	0.2			10.1	3.7	11.9	13.9		11.5	7.0	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	20.0	0.2			10.1	3.7	11.9	13.9		11.5	7.0	
LOS	C	A			B	A	B	B		B	A	
Approach Delay		16.1			5.2			13.7			7.4	
Approach LOS		B			A			B			A	
Queue Length 50th (m)	18.7	0.0			1.3	0.0	2.1	18.4		2.6	8.5	
Queue Length 95th (m)	45.5	0.0			5.4	6.5	8.8	46.5		10.2	22.4	
Internal Link Dist (m)		126.3			146.1			276.2			153.4	
Turn Bay Length (m)	15.0					15.0	60.0			50.0		
Base Capacity (vph)	928	1231			888	1094	790	1803		994	3234	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.33	0.06			0.03	0.08	0.05	0.19		0.06	0.18	

Intersection Summary

















Cycle Length: 90
 Actuated Cycle Length: 44
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.66
 Intersection Signal Delay: 11.1
 Intersection Capacity Utilization 66.6%
 Analysis Period (min) 15










Intersection LOS: B
 ICU Level of Service C










Splits and Phases: 1: Starboard Dr & Peakview Wy/Existing Driveway



Shannex Parkland Traffic Impact Analysis
 2: Starboard Dr & Transom Dr/Fleetview Dr

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	5	10	11	0	82	5	179	10	64	210	90
Future Volume (Veh/h)	65	5	10	11	0	82	5	179	10	64	210	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)	71	5	11	12	0	89	5	195	11	70	228	98
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	716	633	277	641	676	200	326			206		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	716	633	277	641	676	200	326			206		
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	99	99	97	100	89	100			95		
cM capacity (veh/h)	295	375	762	362	354	840	1234			1365		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	87	101	211	396								
Volume Left	71	12	5	70								
Volume Right	11	89	11	98								
cSH	325	726	1234	1365								
Volume to Capacity	0.27	0.14	0.00	0.05								
Queue Length 95th (m)	8.5	3.9	0.1	1.3								
Control Delay (s)	20.1	10.8	0.2	1.8								
Lane LOS	C	B	A	A								
Approach Delay (s)	20.1	10.8	0.2	1.8								
Approach LOS	C	B										
Intersection Summary												
Average Delay			4.5									
Intersection Capacity Utilization			51.5%		ICU Level of Service				A			
Analysis Period (min)			15									

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	34	319	7	22	373
Future Volume (Veh/h)	11	34	319	7	22	373
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)	12	37	347	8	24	405
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						300
pX, platoon unblocked	0.97					
vC, conflicting volume	804	351			355	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	782	351			355	
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	95			98	
cM capacity (veh/h)	345	692			1204	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	49	355	429			
Volume Left	12	0	24			
Volume Right	37	8	0			
cSH	555	1700	1204			
Volume to Capacity	0.09	0.21	0.02			
Queue Length 95th (m)	2.3	0.0	0.5			
Control Delay (s)	12.1	0.0	0.6			
Lane LOS	B		A			
Approach Delay (s)	12.1	0.0	0.6			
Approach LOS	B					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			47.6%		ICU Level of Service	A
Analysis Period (min)			15			

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	18	80	65	1	2	28
Future Volume (Veh/h)	18	80	65	1	2	28
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)	20	87	71	1	2	30
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	72				198	72
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	72				198	72
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	97
cM capacity (veh/h)	1528				780	991
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	107	72	32			
Volume Left	20	0	2			
Volume Right	0	1	30			
cSH	1528	1700	974			
Volume to Capacity	0.01	0.04	0.03			
Queue Length 95th (m)	0.3	0.0	0.8			
Control Delay (s)	1.5	0.0	8.8			
Lane LOS	A		A			
Approach Delay (s)	1.5	0.0	8.8			
Approach LOS			A			
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			21.9%		ICU Level of Service	A
Analysis Period (min)			15			