



TRANSPORTATION IMPACT STUDY

AUGUST 23, 2024



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HRM Apartments
10 Cumberland Drive
Cole Harbour, Nova Scotia

TRANS4M RESIDENTIAL DEVELOPMENT

This Transportation Impact Assessment was prepared to evaluate the potential impacts of new or changing development on the existing transportation network. The “Transportation Network” includes roadways, driveways, trails, sidewalks, parking facilities, transit infrastructure, trucks, and other infrastructure associated with moving people and goods from one place to another. This infrastructure connects an unlimited number of origins and destinations including residential, commercial, industrial, institutional and public land uses.

The users of these networks are many and can include a wide range of private and commercial vehicles, trucks, buses, pedestrians, cyclists and other vulnerable road users.

This report was prepared using industry standard guidelines for such studies and utilizes the most recent information that is considered reasonable and practical for the study, at the time the study was prepared. Things change with time, therefore any recommendations, conclusions or findings contained in this report should be reevaluated as elements of the surrounding environment change.

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EXECUTIVE SUMMARY

The proposed new residential development creates additional density on a property currently primarily covered with asphalt parking lots. The higher density proposal meets with HRM’s goals to finding solutions to the ongoing housing crisis, and is consistent with integrated mobility initiatives as the development is located in close proximity to transit and active transportation infrastructure.

The Trans4m Development Group is pleased to submit this Transportation Impact Study for the construction of a new multi-story building on an existing residential site located along the Cole Harbour Road / Portland Street, and Forest Hills Parkway Transportation corridors.

The proposed development includes up to 146 residential units with new underground and surface parking areas, and a new driveway to Cumberland Drive. The development also includes the expansion of the lower parking lot to accommodate vehicles displaced by the new building and associated parking area.

The development is located near the corner of Cole Harbour Road and the Forest Hills Parkway meaning residents have access to major connective transportation routes. The development is also well situated to give residents the opportunity to use adjacent transit and active transportation infrastructure. In this context, this intersection is subject to the ongoing Portland Street / Cole Harbour Road Functional Design Study. It is anticipated that the study will make various recommendations for this section of the Cole Harbour Road corridor. As shown in this study, the new development traffic volumes have minimal impact on the adjacent roadways and intersections, therefore it is assumed the future roadway and intersections will similarly have negligible impact from the new development.

Overall, this development can be accommodated within the existing road network with minimal impact to existing operations. Should there be any questions, comments or additional information required, please contact the undersigned at Roger@Trans4m.ca.

Best regards,

Roger N. Boychuk, P. Eng.

SENIOR TRANSPORTATION ENGINEER
TRANS4M DEVELOPMENT GROUP



1. INTRODUCTION

HRM Apartments is pursuing the development of a multi-unit residential development complex at 10 Cumberland Drive, Dartmouth Nova Scotia.

The Trans4m Development Group was retained by HRM Apartments to prepare a Transportation Impact Study (TIS) for a proposed development located immediately south of Cole Harbour Road and east of Cumberland Drive in Cole Harbour, Nova Scotia. The proposed development is expected to contain about 146 units within a multi-storey residential building complete with a combination of underground and surface parking. The new residential building will be constructed just west of an existing residential building in an area that serves as an existing surface parking lots as shown in the figure below.

The areas surrounding the development are primarily residential in nature, composed of single-family dwelling units with some nearby multi-unit buildings. There are significant commercial establishments surrounding the intersection of Cumberland / Cole Harbour Road intersection as well as along Cole Harbour Road extending east and west of the site. The surrounding area also includes a number of institutional uses including a number of churches and schools.

Cole Harbour Road transitions to Portland Street west of the development at Caldwell Road and continues as a primary connector to Downtown Dartmouth, intersecting with a number of major roadways including the Forest Hills Parkway, Caldwell Road and the Circumferential Highway. East of the site, Cole Harbour Road continues as Route 207 / Marine Drive along the eastern shore connecting to Route 7 about 30 kilometres northeast of the site.

Cumberland Drive is lined with individual residences and continues south connecting to Colby Drive, providing access to the Colby Village.



1.1 EXISTING ROADWAYS

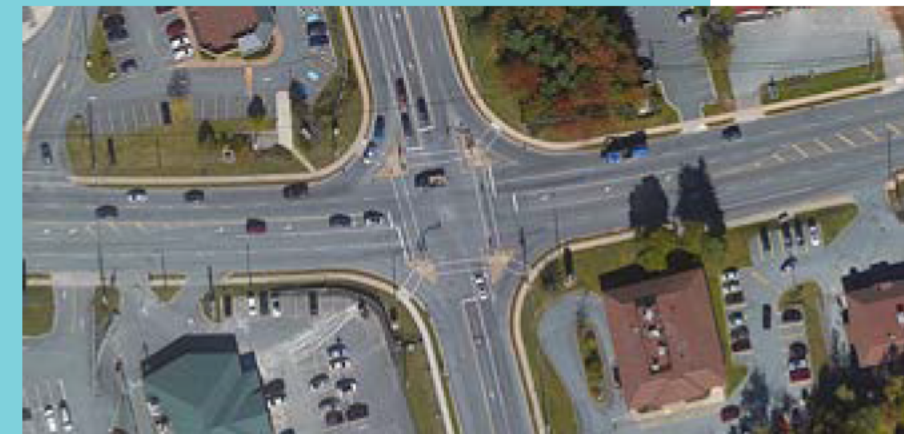
Cole Harbour Road (image taken east of Cumberland Drive facing west) has a 5-lane cross section, including 2-lanes in each direction, a center left turn lane to Cumberland Drive and channelized right turn to Forest Hills Parkway. The eastbound approach (west side) has a similar configuration. Adjacent to the development along Cole Harbour Road is the RBC Royal Bank and a bus lay-by. Cole Harbour Road includes concrete curb and gutter and sidewalks separated by grassed boulevards.



Cumberland Drive (image taken south of Cole Harbour Road facing north) south of Cole Harbour Road has a three-lane asphalt cross section adjacent to the development just over 12 meters in width expanding to 16 meters near the intersection to accommodate the westbound to southbound right turn movement. There are two northbound lanes approaching Cole Harbour Road with a dedicated left turn lane and a shared through/right lane with right turn channelization. The cross-section includes concrete curb and gutter and concrete sidewalk with grassed boulevard on both sides of the road, transitioning to asphalt curb south of the existing developments driveway. A bus stop is located directly in front of the development on Cumberland Drive.



The figure to the right shows the signalized intersection of **Cole Harbour Road and Cumberland Drive**. It shows the southbound approach is composed of a 5 lane cross section with dedicated southbound left turn lane and right turn channelization. The westbound right turn movement includes a free-flowing receiving lane for the full 5 lane section. The intersection includes pedestrian crossings on all 4 legs of the intersection with pedestrian heads and actuated pedestrian push buttons.



Ambro Lane is located immediately east of the development and is a 9 meters wide, two-lane urban local roadway that includes asphalt curb on both sides of the road with no sidewalks. There is a driveway to the development's existing building located about 50 meters south of Cole Harbour Road as shown in the figure to the right.



1.2 ANALYSIS TIME HORIZON

This study addresses a 10-year time horizon for the full build-out of the development (build-out plus 5 years). Time horizons established for the analysis include:

- » 2024 baseline which includes existing traffic on the road network;
- » 2034 future conditions with background traffic and full development of the proposed seniors residential development.

1.3 PEAK HOURS

Cole Harbour Road and the Forest Hills Parkway are major commuter routes during the week and adjacent commercial land uses actively generate trips during the weekday peak periods. It is recognized that there may be some additional peak periods during weekends due to the commercial nature of the area, though such peaks are typically less concentrated than weekday commuter peaks. For these reasons, the peak hours for analysis were established as the AM and PM weekday peak hours.

2. EXISTING CONDITIONS

Existing Traffic Volumes

Recent and historical traffic counts were obtained from HRM for the study area with the most recent available data dated 2016 & 2017. Therefore, an new intersection turning movement count was conducted at the intersection at Cole Harbour Road and Forest Hills Parkway / Cumberland Drive. The counts were performed using the Miovision automated traffic count technologies and included site visits during the peak hours of counts. All Miovision counts included volumes of trucks, cyclists and pedestrians through the intersection and are included in Appendix A of this report.

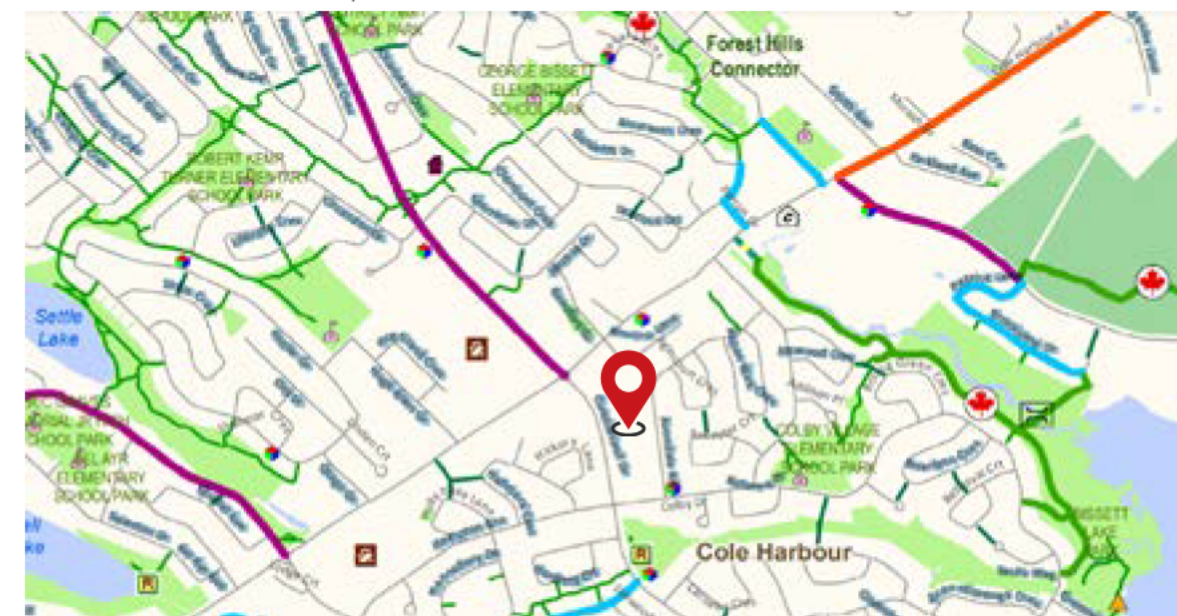
Background Traffic Growth

Traffic counts on Cole Harbour Road east of Bissett Road show a decline in traffic between 2005 and 2021 at the Nova Scotia Public Works count location, though traffic volumes have been increasing in many parts of HRM. It is assumed that the ongoing Portland Street / Cole Harbour Road corridor study will include greater detail on area traffic growth, but for the purposes of this study, a 2% annual growth rate has been assumed to represent the higher current level of development in the HRM area.



2.1 ACTIVE TRANSPORTATION

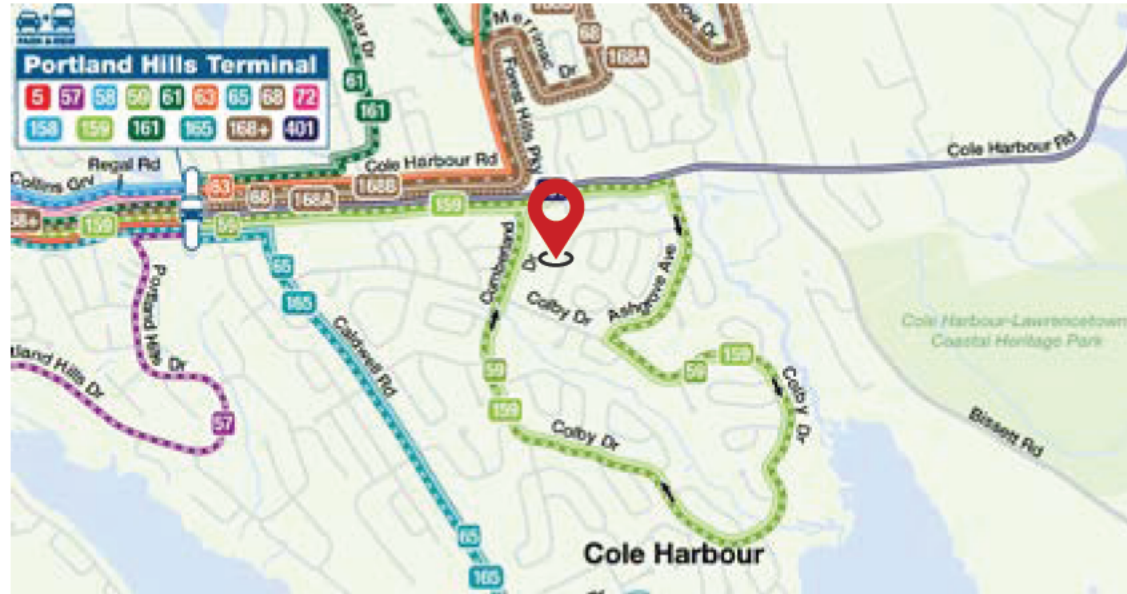
The proposed development (📍) is located near Cole Harbour Road and Cumberland Drive, major roads that includes sidewalk on both sides of the road providing access to nearby residential and commercial land uses. The development is also in close proximity to the Cole Harbour Elementary School Parks, Bissett Lake Park and the extensive trails system that interconnects these parks with the Trans Canada Trail, Bissett Lake Trail and the Salt Marsh Trail. As shown in the figure below taken from the HRM active transportation website, the desired bikeway lane ending at Cole Harbour Road (purple line) was constructed in 2022/2023 providing improved access to Cole Harbour Place and the various sports facilities associated with that development.



2.2 TRANSIT

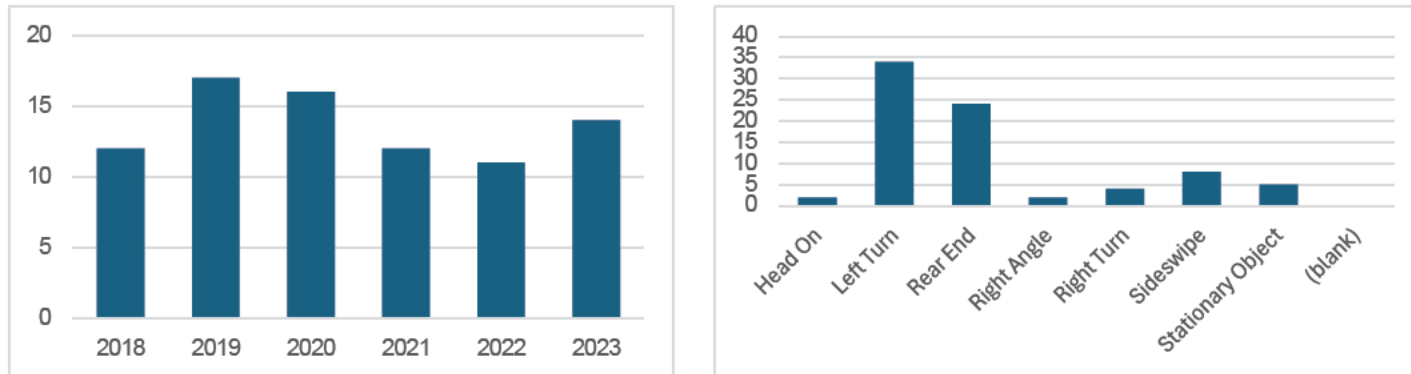
The proposed development is located near the east end of a robust transit network concentrated around the Portland Hills Transit Terminal located about 1.3 kilometres west of the proposed development. The development itself has direct access to Routes 59, 159, 401 on the south side of Cole Harbour Road with an additional 4 routes along Forrest Hills Parkway (Routes 63, 68, 168A and 168B). All routes stop at the Portland Hills Transit Terminal that in turn provide connections with up to 15 different routes including the Portland Street Bus Rapid Transit Link 5.

Existing bus stops are located directly in front of the development on Cumberland Drive, on Cole Harbour Road east of Cumberland (150m walk), and west of Cumberland (250 meter walk to the westbound stop and 300 meters to the eastbound stop).



2.3 COLLISION REVIEW

Available collision records in the vicinity of the Forest Hills Parkway and Cumberland intersection were reviewed (as provided on the HRM Open Data Portal) with a formatted data table included in Appendix B. Records included data between 2018 and 2023 and summary charts of the year and type of collision are provided below.



The collision records show about 82 collisions in the vicinity of the intersection with relatively even distribution over the 6 year time period (between 12 and 17 collisions each year). Collisions associated with left turn movements accounted for over 40% of the collisions followed by about 30% with for rear end collisions.

A further examination of the data shows that:

- 28% were associated with a young demographic.
- 55% suggested aggressive driving behaviours were a contributing factor.
- 20% identified distracted driving as a contributing factor.
- There were no identified bicycle collisions, and 2 of the 82 collisions involved a pedestrian.

3. FUTURE CONDITIONS

3.1 THE PROPOSED DEVELOPMENT

The existing site consists of a single 4 storey building supported by about 34 surface parking spaces in a single aisle parking lot on the lower end of the site near Ambro Lane, and a second upper looped parking lot close to Cumberland Drive with about 60 surface parking spaces.

The proposed development adds a second 8-storey building with up to 146 units within a multi-storey residential building adjacent to Cumberland Drive. The building includes 0111a parking podium as well as a rear surface parking lot with about 40 parking spaces, and an underground parkade. The proposed plan also expands the lower parking lot from 34 to about 74 surface parking spaces. Access to the new surface and underground parking areas is provided by a new driveway located near the south end of the site, about 35 meters south of the existing driveway, which is planned to be closed as part of the new development.

The grades across the site dictate that access to the lower building will remain dedicated off of Ambro Lane, which is expected to see a slight increase in traffic volumes due to the additional parking spaces being added. Access to the new upper building will be restricted to the Cumberland Driveway driveway with direct access to the signalized intersection at Cumberland Drive and Cole Harbour Road.



3.2 TRIP GENERATION

New trips generated by the development were based on guidance provided from the Institute of Transportation Engineers (ITE) Trip Generation Guide (11th Edition). The table below summarizes the trip generation estimates for the new site once full build out has been completed.

Land Use	Trip Code	# Units	Variable	AM Peak			PM Peak		
				Enter	Exit	TOTAL	Enter	Exit	TOTAL
New Mid-Rise Building	221	146	Units	12	41	53	35	22	57
New Trips to Network		146		12	41	53	35	22	57

Note that some existing movements are present to and from the existing driveway today that will be relocated to the lower parking lot to Ambro Lane. To remain conservative, these volumes have not been used to reduce the new trip projections. These volumes are very low and will have no noticeable impact to traffic operations at the Ambro Lane intersection or the Ambro Lane / Cole Harbour Road intersection and therefore have not been addressed further in this report.

Transit, Active Transportation and Transportation Demand Management

Given the proximity to the Portland Hills Transit Terminal and adjacent transit infrastructure, it is anticipated that there will be some reliance on transit services. Similarly, access to significant active transportation infrastructure is likely to increase modal share away from passenger cars. Some of these types of trips are accounted for in the trip generation assumptions made within the ITE Trip Generation Guide, and other trips may distribute themselves outside of typical peak hours given the overall levels of transportation congestion currently experienced in the greater HRM core areas. Nonetheless, for the purposes of this study, no reductions in generated trips have been applied in order to keep the analysis conservative.

3.3 TRIP DISTRIBUTION AND ASSIGNMENT

It is assumed that traffic will distribute itself through the network in a manner similar to the existing traffic patterns. This suggests that most traffic will approach and depart the development on the Cole Harbour Road west leg and the Forest Hills north leg as shown in the figure to the right.

All new traffic is expected to enter and exit the site from the new driveway to Cumberland Drive resulting in right and left turn entry movements from Cumberland Drive and right and left turn exit movements from the new driveway.



4. ANALYSIS

4.1 TRANSPORTATION MODELLING

A traffic model was prepared using the Synchro/SimTraffic (v.11) platform for the weekday AM and PM peak hours of analysis. The model was used to gain insight into traffic operations and capacity utilization at the main intersections potentially impacted by the proposed development under each traffic loading scenario. Results are provided for the following scenarios:

- 2024 baseline conditions (existing traffic),
- 2034 conditions with background traffic only added to the road network,
- 2034 conditions with background traffic and development traffic added.

Detailed output reports for each of the scenarios is provided in Appendix D of this report and are summarized in the figures and tables within this section of the report. The analysis results and discussion address the 2 primary intersections impacted by the development:

- Cole Harbour Road at the Cumberland / Forest Hills Parkway intersection, and
- New Driveway intersection with Cumberland Drive.

The primary information and measures of performance that are summarized in tabular form on the following pages at each intersection include:

- Volume (actual or expected turning movement volumes at the intersection for each time horizon and each peak period),
- Vehicle Control Delay (average seconds per vehicle),
- Volume to Capacity (V/C) ratio (1.0 = full capacity),
- Level of Service (A through F), and
- Queueing (95% queue length).

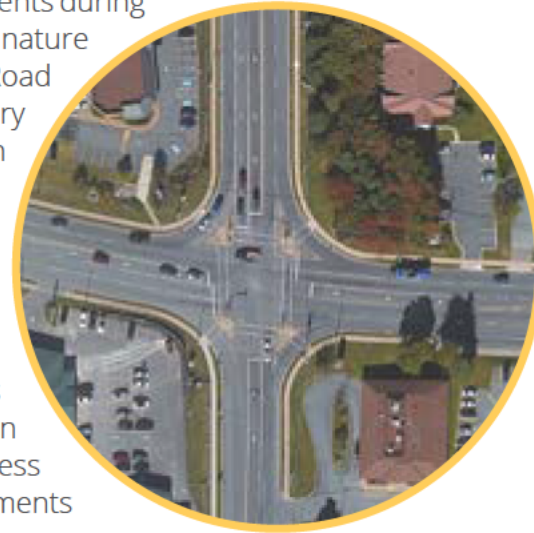
For each intersection, AM and PM peak summary tables are presented and include the volumes at that horizon followed by the estimated delay, volume to capacity ratios and queues at each time horizon. The tables are grouped by directional approach and results for shared lanes are grouped together. The tables are accompanied by a discussion of key findings for each horizon during each peak time period.

4.3 COLE HARBOUR ROAD / CUMBERLAND / FOREST HILLS

The tables below show the modelling results at this intersection for all movements during the AM and PM peak hours of traffic. Traffic patterns reflect the commuter nature of the intersection with the highest volumes occurring on Cole Harbour Road inbound during the AM peak and outbound during the PM peak. Secondary peak volumes can also be observed on Forest Hills Parkway with higher turn movements for the westbound and southbound right turns during the AM peak, and generally all southbound movements on Forest Hills during the PM peak.

Modelling results show that the relatively aggressive background traffic growth rate has the largest impact on operations at the intersection with only minor changes to measures of performance when the development traffic is added to the network. The highest volume to capacity ratios can be found on the peak direction through movements on Cole Harbour Road, though excess capacity is available at the intersection to accommodate green time adjustments as necessary to serve peak movements.

Based on the analysis, no improvements are required at this intersection to accommodate the proposed development.



4.4 CUMBERLAND DRIVE AND NEW DRIVEWAY

The new driveway to the development operates with a single exit lane serving both left and right turning traffic. During both peak hours, volumes on Cumberland Drive are not high enough to create any significant delays for the driveway movements. Both peak operate with LOS B with average delays of less than 15 seconds.

Northbound movements on Cumberland are both free flow through and right turn movements which do not experience delays. This is further supported by the presence of two northbound lanes minimizing impacts to through movements at the driveway.

The so found left turn movements from Cumberland drive to the driveway our model from a single lane with volumes being low enough cell phone left turn operates with minimal delay. Post driveway is located to the South of an existing driveway to the commercial area on the West side of Cumberland Dr. The arrangement of the offset eliminates conflicting left turn movements from each driveway and the open nature of the roadside environment provides for a good level of visibility in all directions.

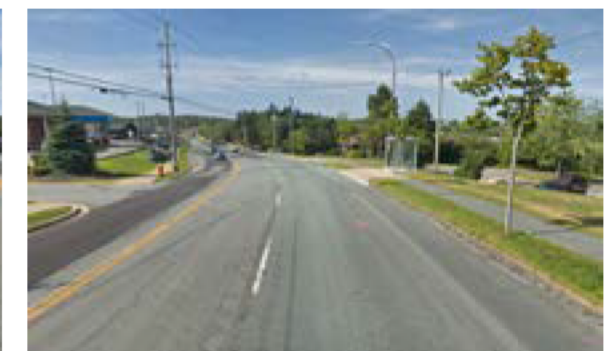
The proposed location of the driveway suggests that the existing bus stop on the east side of Cumberland Drive may need to be relocated immediately to the north of the existing stop location. There appears to be adequate space for such a relocation with no roadside obstacles noted.

Sight Distances

The images below show the approximate site distances from the new proposed driveway and indicate that sight lines from the driveway are clear in both directions and required intersection and stopping sight distances can be met.



Sight lines from Driveway to the South



Sight lines from Driveway to the North

AM PEAK		Cole Harbour Road EB			Cole Harbour Road WB			Cumberland Drive NB			Forest Hills Prkwy SB		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
2024 Existing Volumes	Vol veh/hr	118	223	47	50	685	236	166	210	48	154	111	264
	V/C Ratio	0.56	0.22		0.11	0.82		0.36	0.54		0.44	0.23	0.45
	Delay sec/veh	22.1	14.5		11.25	26.6		17.8	26.6		19.5	23.1	6.8
	LOS	C	B		B	C		B	C		B	C	A
	95% Q m	19.7	21.5		9.3	84.2		29.7	55.4		27.8	26.1	19.6
2034 Background Traffic	Vol veh/hr	144	272	56	61	835	283	202	256	58	188	135	322
	V/C Ratio	0.72	0.27		0.14	0.97		0.48	0.70		0.70	0.30	0.60
	Delay sec/veh	33.5	15.7		11.4	42.9		20.9	33.1		31.9	24.1	13.4
	LOS	C	B		B	D		C	C		C	C	B
	95% Q m	34.2	26.3		10.8	127.5		36.0	71.5		40.0	31.0	38.4
2034 Background Development	Vol veh/hr	144	272	61	62	835	283	228	275	62	188	141	322
	V/C Ratio	0.72	0.27		0.14	0.97		0.55	0.75		0.76	0.31	0.60
	Delay sec/veh	33.5	15.5		11.5	42.9		22.7	36.1		37.2	24.	14.0
	LOS	C	B		B	D		C	D		D	C	B
	95% Q m	34.2	26.5		10.9	127.5		40.4	83.6		37.9	32.1	39.8

PM PEAK		Cole Harbour Road EB			Cole Harbour Road WB			Cumberland Drive NB			Forest Hills Prkwy SB		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
2024 Existing Volumes	Vol veh/hr	224	652	121	41	414	132	133	186	60	298	261	272
	V/C Ratio	0.70	0.70		0.22	0.79		0.33	0.53		0.63	0.42	0.38
	Delay sec/veh	30.1	28.5		19.3	38.8		16.9	31.5		20.6	24.0	4.2
	LOS	C	C		B	D		B	C		C	C	A
	95% Q m	48.3	87.5		10.7	64.9		24.5	63.7		53.8	58.6	15.9
2034 Background Traffic	Vol veh/hr	273	795	145	50	505	158	162	227	72	363	318	332
	V/C Ratio	0.85	0.86		0.30	0.91		0.45	0.72		0.85	0.52	0.45
	Delay sec/veh	44.6	36.7		21.1	48.7		20.2	40.8		36.2	26.6	4.4
	LOS	D	D		C	D		C	D		D	C	A
	95% Q m	77.3	124.7		12.1	92.9		29.2	87.0		88.1	72.5	17.3
2034 Background Development	Vol veh/hr	273	795	159	55	505	158	176	238	74	363	335	332
	V/C Ratio	0.85	0.88		0.33	0.91		0.51	0.76		0.88	0.55	0.45
	Delay sec/veh	44.7	38.4		21.8	48.7		21.7	43.3		40.1	27.2	4.5
	LOS	D	D		C	D		C	D		D	C	A
	95% Q m	77.1	129.6		13.3	92.9		31.5	93.7		93.1	76.5	17.4

AM PEAK		New Driveway EB		Cumberland NB		Cumberland SB	
		Left	Right	Left	Thru	Thru	Right
2034 Background + Development	Vol veh/hr	11	56	456	7	21	510
	V/C Ratio	0.14		0.19	0.10	0.02	
	Delay sec/veh	13.2		0.0	0.0	0.6	
	LOS	B		A	A	A	
	95% Q m	3.8		0.0	0.0	0.6	

PM PEAK		New Driveway EB		Cumberland NB		Cumberland SB	
		Left	Right	Left	Thru	Thru	Right
2034 Background + Development	Vol veh/hr	9	33	456	11	50	510
	V/C Ratio	0.11		0.19	0.10	0.05	
	Delay sec/veh	14.6		0.0	0.0	1.4	
	LOS	B		A	A	A	
	95% Q m	2.8		0.0	0.0	1.2	

5. CONCLUSIONS

This study addresses the proposed development at 10 Cumberland Drive that includes a new multi-unit residential building with about 146 units. The new Building is adjacent to an existing multi unit building and the proposed development includes the reconfiguration of an existing lower parking lot to include additional spaces, and a new upper parking lot with access to underground and surface parking. The development will be serviced by a new two lane driveway connecting to Cumberland Drive about 120 meters south of Cole Harbour Road.

The study shows that the development is located in close proximity to a variety of significant active transportation routes, including adjacent sidewalks, and is directly adjacent to numerous transit routes that connect directly to the Portland hills transit terminal. This development is well positioned to direct residence towards these

alternate travel modes helping reduce reliance on passenger cars.

Volumes generated by the new development represent less than 2% of the total traffic through the Cole Harbour Road intersection with Cumberland Drive and the Forest Hills Parkway. Impacts to intersection operations are therefore negligible. The analysis also shows that the new driveway to Cumberland Drive operates at very good levels of service with minimal delay or queuing.

The location of the new driveway can be accommodated with good site distances in all directions and does not require upgrades to Cumberland Drive. Similarly, the relatively low volumes through the Cole Harbour Road intersection indicate that no upgrades are required to accommodate this development.



APPENDIX A

Appendix A: TRAFFIC COUNTS

Cole Harbour and Cumberland - AM - TMC

Wed Feb 28, 2024

Full Length (7 AM-9 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians)

All Movements

ID: 1160885, Location: 44.671623, -63.490065



Provided by: Trans4m Development Group
59 Craighburn Drive, Dartmouth, NS, B2X 3E6, CA

Leg Direction	Cole Harbour Rd EB Eastbound						Cole Harbour Rd WB Westbound						Cumberland Dr NB Northbound						Forest Hills Prkwy SB Southbound						
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int
2024-02-28																									
7:00AM	18	24	4	0	46	2	7	146	41	0	194	0	21	41	6	0	68	0	13	13	45	0	71	0	379
7:15AM	29	27	6	0	62	2	9	149	50	0	208	1	32	53	4	0	89	0	11	11	56	0	78	0	437
7:30AM	31	40	3	0	74	1	11	188	66	0	265	2	37	49	5	0	91	0	17	19	69	0	105	0	535
7:45AM	28	55	6	0	89	1	12	176	78	0	266	5	29	46	10	0	85	0	42	23	83	0	148	7	588
Hourly Total	106	146	19	0	271	6	39	659	235	0	933	8	119	189	25	0	333	0	83	66	253	0	402	7	1939
8:00AM	39	54	18	0	111	0	12	172	58	0	242	2	36	48	11	0	95	0	37	28	48	0	113	2	561
8:15AM	27	54	13	0	94	2	16	177	49	0	242	3	43	59	11	0	113	2	35	28	62	0	125	3	574
8:30AM	24	60	10	0	94	1	10	160	51	0	221	1	58	57	16	0	131	0	40	32	71	0	143	2	589
8:45AM	40	60	19	0	119	1	8	119	41	0	168	0	42	32	11	0	85	0	31	25	50	0	106	2	478
Hourly Total	130	228	60	0	418	4	46	628	199	0	873	6	179	196	49	0	424	2	143	113	231	0	487	9	2202
Total	236	374	79	0	689	10	85	1287	434	0	1806	14	298	385	74	0	757	2	226	179	484	0	889	16	4141
% Approach	34.3%	54.3%	11.5%	0%	-	-	4.7%	71.3%	24.0%	0%	-	-	39.4%	50.9%	9.8%	0%	-	-	25.4%	20.1%	54.4%	0%	-	-	-
% Total	5.7%	9.0%	1.9%	0%	16.6%	-	2.1%	31.1%	10.5%	0%	43.6%	-	7.2%	9.3%	1.8%	0%	18.3%	-	5.5%	4.3%	11.7%	0%	21.5%	-	-
Lights	219	360	77	0	656	-	84	1269	417	0	1770	-	289	381	72	0	742	-	219	170	453	0	842	-	4010
% Lights	92.8%	96.3%	97.5%	0%	95.2%	-	98.8%	98.6%	96.1%	0%	98.0%	-	97.0%	99.0%	97.3%	0%	98.0%	-	96.9%	95.0%	93.6%	0%	94.7%	-	96.8%
Articulated Trucks	3	0	0	0	3	-	0	1	0	0	1	-	0	1	0	0	1	-	0	1	4	0	5	-	10
% Articulated Trucks	1.3%	0%	0%	0%	0.4%	-	0%	0.1%	0%	0%	0.1%	-	0%	0.3%	0%	0%	0.1%	-	0%	0.6%	0.8%	0%	0.6%	-	0.2%
Buses and Single-Unit Trucks	14	14	2	0	30	-	1	17	17	0	35	-	9	3	2	0	14	-	7	8	27	0	42	-	121
% Buses and Single-Unit Trucks	5.9%	3.7%	2.5%	0%	4.4%	-	1.2%	1.3%	3.9%	0%	1.9%	-	3.0%	0.8%	2.7%	0%	1.8%	-	3.1%	4.5%	5.6%	0%	4.7%	-	2.9%
Pedestrians	-	-	-	-	-	10	-	-	-	-	-	14	-	-	-	-	-	2	-	-	-	-	-	16	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	100%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Cole Harbour and Cumberland - AM - TMC

Wed Feb 28, 2024

Full Length (7 AM-9 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians)

All Movements

ID: 1160885, Location: 44.671623, -63.490065



Trans4m.ca

Provided by: Trans4m Development Group
59 Craighburn Drive, Dartmouth, NS, B2X 3E6, CA

[N] Forest Hills Prkwy SB

Total: 1944

In: 889 Out: 1055

484

179

226

11

5

[W] Cole Harbour Rd EB

Total: 2758
In: 689 Out: 2069

6

236
374
79

4

2

298
385
74

Out: 343 In: 757
Total: 1100

[S] Cumberland Dr NB

4

434

1287

85

10

Out: 674 In: 1806

Total: 2480

[E] Cole Harbour Rd WB

Cole Harbour and Cumberland - AM - TMC

Wed Feb 28, 2024

AM Peak (7:45 AM - 8:45 AM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians)

All Movements

ID: 1160885, Location: 44.671623, -63.490065



Provided by: Trans4m Development Group
59 Craighburn Drive, Dartmouth, NS, B2X 3E6, CA

Leg Direction	Cole Harbour Rd EB Eastbound						Cole Harbour Rd WB Westbound						Cumberland Dr NB Northbound						Forest Hills Prkwy SB Southbound						
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int
2024-02-28																									
7:45AM	28	55	6	0	89	1	12	176	78	0	266	5	29	46	10	0	85	0	42	23	83	0	148	7	588
8:00AM	39	54	18	0	111	0	12	172	58	0	242	2	36	48	11	0	95	0	37	28	48	0	113	2	561
8:15AM	27	54	13	0	94	2	16	177	49	0	242	3	43	59	11	0	113	2	35	28	62	0	125	3	574
8:30AM	24	60	10	0	94	1	10	160	51	0	221	1	58	57	16	0	131	0	40	32	71	0	143	2	589
Total	118	223	47	0	388	4	50	685	236	0	971	11	166	210	48	0	424	2	154	111	264	0	529	14	2312
% Approach	30.4%	57.5%	12.1%	0%	-	-	5.1%	70.5%	24.3%	0%	-	-	39.2%	49.5%	11.3%	0%	-	-	29.1%	21.0%	49.9%	0%	-	-	-
% Total	5.1%	9.6%	2.0%	0%	16.8%	-	2.2%	29.6%	10.2%	0%	42.0%	-	7.2%	9.1%	2.1%	0%	18.3%	-	6.7%	4.8%	11.4%	0%	22.9%	-	-
PHF	0.756	0.929	0.653	-	0.874	-	0.781	0.968	0.756	-	0.913	-	0.716	0.890	0.750	-	0.809	-	0.917	0.867	0.795	-	0.894	-	0.981
Lights	111	214	45	0	370	-	49	676	228	0	953	-	162	208	47	0	417	-	149	105	249	0	503	-	2243
% Lights	94.1%	96.0%	95.7%	0%	95.4%	-	98.0%	98.7%	96.6%	0%	98.1%	-	97.6%	99.0%	97.9%	0%	98.3%	-	96.8%	94.6%	94.3%	0%	95.1%	-	97.0%
Articulated Trucks	2	0	0	0	2	-	0	0	0	0	0	-	0	1	0	0	1	-	0	1	2	0	3	-	6
% Articulated Trucks	1.7%	0%	0%	0%	0.5%	-	0%	0%	0%	0%	0%	-	0%	0.5%	0%	0%	0.2%	-	0%	0.9%	0.8%	0%	0.6%	-	0.3%
Buses and Single-Unit Trucks	5	9	2	0	16	-	1	9	8	0	18	-	4	1	1	0	6	-	5	5	13	0	23	-	63
% Buses and Single-Unit Trucks	4.2%	4.0%	4.3%	0%	4.1%	-	2.0%	1.3%	3.4%	0%	1.9%	-	2.4%	0.5%	2.1%	0%	1.4%	-	3.2%	4.5%	4.9%	0%	4.3%	-	2.7%
Pedestrians	-	-	-	-	-	4	-	-	-	-	-	11	-	-	-	-	-	2	-	-	-	-	-	14	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	100%	

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Cole Harbour and Cumberland - AM - TMC

Wed Feb 28, 2024

AM Peak (7:45 AM - 8:45 AM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians)

All Movements

ID: 1160885, Location: 44.671623, -63.490065



Trans4m.ca

Provided by: Trans4m Development Group
59 Craigmur Drive, Dartmouth, NS, B2X 3E6, CA

[N] Forest Hills Prkwy SB

Total: 1093

In: 529 Out: 564

264

111

154

9

5

[W] Cole Harbour Rd EB

Total: 1503
In: 388 Out: 1115

118
223
47

2

2

2

166

210

48

Out: 208 In: 424
Total: 632

[S] Cumberland Dr NB

2

236

685

50

Out: 425 In: 971

Total: 1396

[E] Cole Harbour Rd WB

9

Cole Harbour and Cumberland - PM - TMC

Wed Feb 28, 2024

Full Length (4 PM-6 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians)

All Movements

ID: 1160886, Location: 44.671623, -63.490065



Provided by: Trans4m Development Group
59 Craighburn Drive, Dartmouth, NS, B2X 3E6, CA

Leg Direction	Cole Harbour Rd EB Eastbound						Cole Harbour Rd WB Westbound						Cumberland Dr NB Northbound						Forest Hills Prkwy SB Southbound						
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int
2024-02-28																									
4:00PM	61	138	15	0	214	3	21	93	53	0	167	0	38	38	16	0	92	2	70	47	66	0	183	3	656
4:15PM	56	173	24	0	253	3	11	95	40	0	146	4	30	45	23	0	98	1	71	68	63	0	202	3	699
4:30PM	66	163	21	0	250	3	7	99	29	0	135	1	31	48	24	0	103	1	71	64	67	0	202	0	690
4:45PM	46	192	28	0	266	0	8	127	37	0	172	1	25	37	16	0	78	0	71	59	52	0	182	5	698
Hourly Total	229	666	88	0	983	9	47	414	159	0	620	6	124	168	79	0	371	4	283	238	248	0	769	11	2743
5:00PM	64	138	33	0	235	2	13	106	36	0	155	0	45	41	7	0	93	2	73	57	78	0	208	3	691
5:15PM	48	159	39	0	246	4	13	82	30	0	125	6	32	60	13	0	105	3	83	81	75	0	239	10	715
5:30PM	57	178	28	0	263	2	14	97	36	0	147	0	28	33	13	0	74	3	65	69	72	0	206	0	690
5:45PM	63	143	23	0	229	0	5	98	36	0	139	1	39	56	18	0	113	2	57	43	86	0	186	1	667
Hourly Total	232	618	123	0	973	8	45	383	138	0	566	7	144	190	51	0	385	10	278	250	311	0	839	14	2763
Total	461	1284	211	0	1956	17	92	797	297	0	1186	13	268	358	130	0	756	14	561	488	559	0	1608	25	5506
% Approach	23.6%	65.6%	10.8%	0%	-	-	7.8%	67.2%	25.0%	0%	-	-	35.4%	47.4%	17.2%	0%	-	-	34.9%	30.3%	34.8%	0%	-	-	-
% Total	8.4%	23.3%	3.8%	0%	35.5%	-	1.7%	14.5%	5.4%	0%	21.5%	-	4.9%	6.5%	2.4%	0%	13.7%	-	10.2%	8.9%	10.2%	0%	29.2%	-	-
Lights	446	1273	211	0	1930	-	91	791	297	0	1179	-	260	355	127	0	742	-	559	488	550	0	1597	-	5448
% Lights	96.7%	99.1%	100%	0%	98.7%	-	98.9%	99.2%	100%	0%	99.4%	-	97.0%	99.2%	97.7%	0%	98.1%	-	99.6%	100%	98.4%	0%	99.3%	-	98.9%
Articulated Trucks	0	0	0	0	0	-	0	0	0	0	0	-	0	1	0	0	1	-	0	0	0	0	0	-	1
% Articulated Trucks	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0.3%	0%	0%	0.1%	-	0%	0%	0%	0%	0%	-	0%
Buses and Single-Unit Trucks	15	11	0	0	26	-	1	6	0	0	7	-	8	2	3	0	13	-	2	0	9	0	11	-	57
% Buses and Single-Unit Trucks	3.3%	0.9%	0%	0%	1.3%	-	1.1%	0.8%	0%	0%	0.6%	-	3.0%	0.6%	2.3%	0%	1.7%	-	0.4%	0%	1.6%	0%	0.7%	-	1.0%
Pedestrians	-	-	-	-	-	17	-	-	-	-	-	13	-	-	-	-	-	14	-	-	-	-	-	25	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	100%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Cole Harbour and Cumberland - PM - TMC

Wed Feb 28, 2024

Full Length (4 PM-6 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians)

All Movements

ID: 1160886, Location: 44.671623, -63.490065



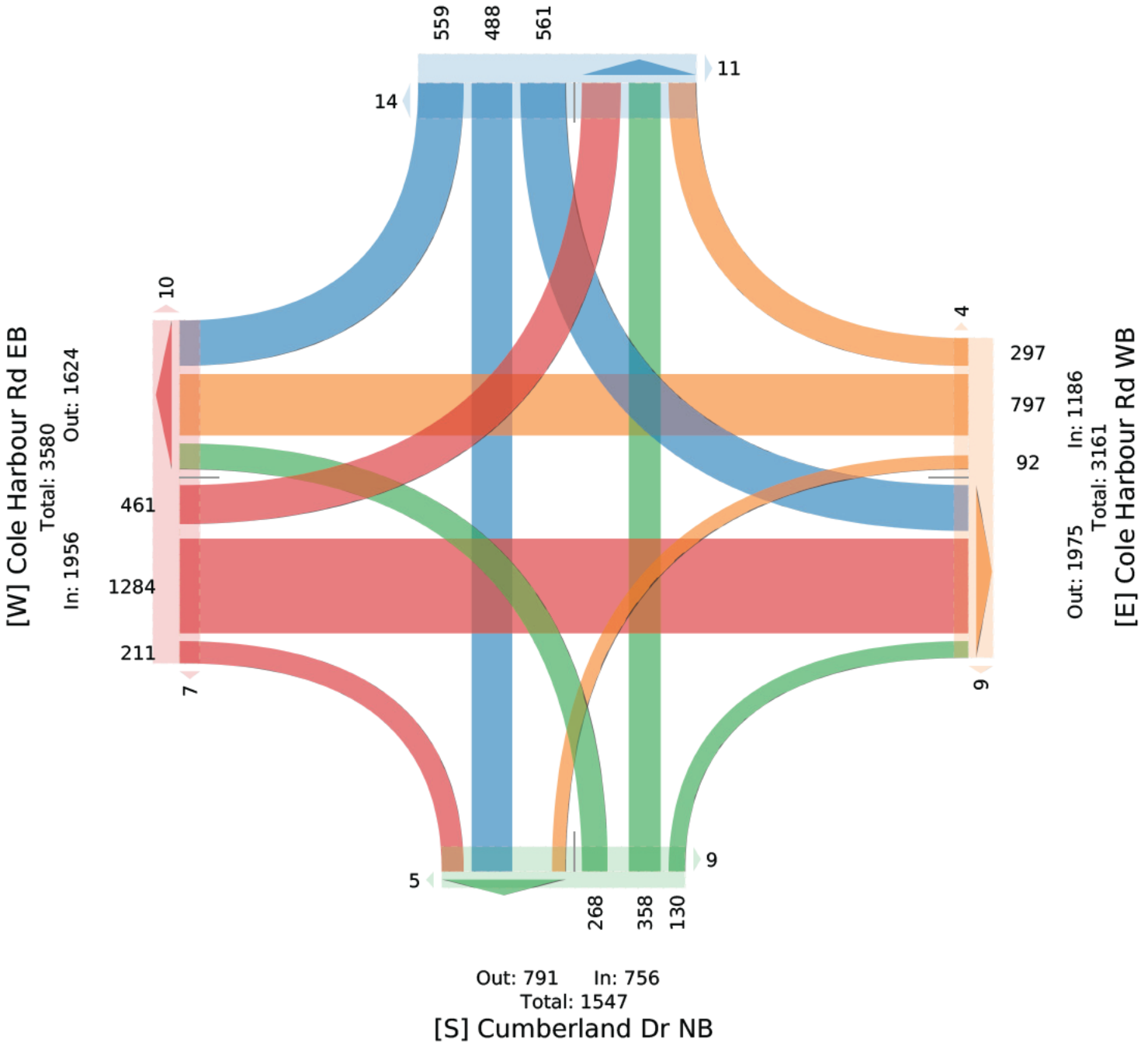
Trans4m.ca

Provided by: Trans4m Development Group
59 Craighurn Drive, Dartmouth, NS, B2X 3E6, CA

[N] Forest Hills Prkwy SB

Total: 2724

In: 1608 Out: 1116



Cole Harbour and Cumberland - PM - TMC

Wed Feb 28, 2024

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians)

All Movements

ID: 1160886, Location: 44.671623, -63.490065



Provided by: Trans4m Development Group
59 Craighburn Drive, Dartmouth, NS, B2X 3E6, CA

Leg Direction	Cole Harbour Rd EB Eastbound							Cole Harbour Rd WB Westbound							Cumberland Dr NB Northbound							Forest Hills Prkwy SB Southbound							
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int				
2024-02-28																													
4:30PM	66	163	21	0	250	3	7	99	29	0	135	1	31	48	24	0	103	1	71	64	67	0	202	0	690				
4:45PM	46	192	28	0	266	0	8	127	37	0	172	1	25	37	16	0	78	0	71	59	52	0	182	5	698				
5:00PM	64	138	33	0	235	2	13	106	36	0	155	0	45	41	7	0	93	2	73	57	78	0	208	3	691				
5:15PM	48	159	39	0	246	4	13	82	30	0	125	6	32	60	13	0	105	3	83	81	75	0	239	10	715				
Total	224	652	121	0	997	9	41	414	132	0	587	8	133	186	60	0	379	6	298	261	272	0	831	18	2794				
% Approach	22.5%	65.4%	12.1%	0%	-	-	7.0%	70.5%	22.5%	0%	-	-	35.1%	49.1%	15.8%	0%	-	-	35.9%	31.4%	32.7%	0%	-	-	-				
% Total	8.0%	23.3%	4.3%	0%	35.7%	-	1.5%	14.8%	4.7%	0%	21.0%	-	4.8%	6.7%	2.1%	0%	13.6%	-	10.7%	9.3%	9.7%	0%	29.7%	-	-				
PHF	0.848	0.849	0.776	-	0.937	-	0.788	0.815	0.892	-	0.853	-	0.739	0.775	0.625	-	0.902	-	0.898	0.806	0.872	-	0.869	-	0.977				
Lights	218	646	121	0	985	-	41	412	132	0	585	-	131	184	59	0	374	-	298	261	266	0	825	-	2769				
% Lights	97.3%	99.1%	100%	0%	98.8%	-	100%	99.5%	100%	0%	99.7%	-	98.5%	98.9%	98.3%	0%	98.7%	-	100%	100%	97.8%	0%	99.3%	-	99.1%				
Articulated Trucks	0	0	0	0	0	-	0	0	0	0	0	-	0	1	0	0	1	-	0	0	0	0	0	-	1				
% Articulated Trucks	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0.5%	0%	0%	0.3%	-	0%	0%	0%	0%	0%	-	0%				
Buses and Single-Unit Trucks	6	6	0	0	12	-	0	2	0	0	2	-	2	1	1	0	4	-	0	0	6	0	6	-	24				
% Buses and Single-Unit Trucks	2.7%	0.9%	0%	0%	1.2%	-	0%	0.5%	0%	0%	0.3%	-	1.5%	0.5%	1.7%	0%	1.1%	-	0%	0%	2.2%	0%	0.7%	-	0.9%				
Pedestrians	-	-	-	-	-	9	-	-	-	-	-	8	-	-	-	-	-	6	-	-	-	-	-	18					
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	100%					

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Cole Harbour and Cumberland - PM - TMC

Wed Feb 28, 2024

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians)

All Movements

ID: 1160886, Location: 44.671623, -63.490065



Trans4m.ca

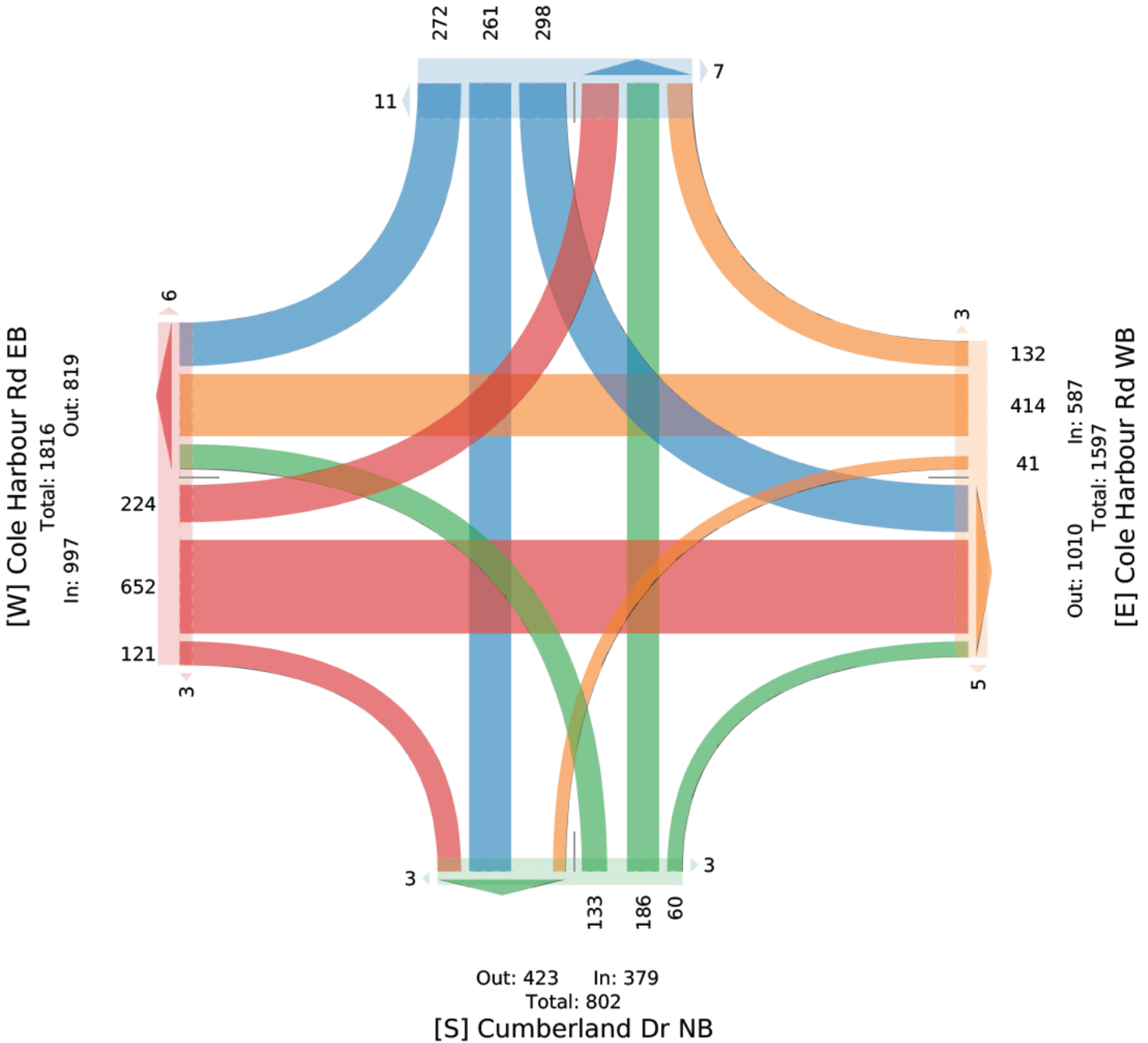
Provided by: Trans4m Development Group
59 Craighurn Drive, Dartmouth, NS, B2X 3E6, CA

[N] Forest Hills Prkwy SB

Total: 1373

In: 831

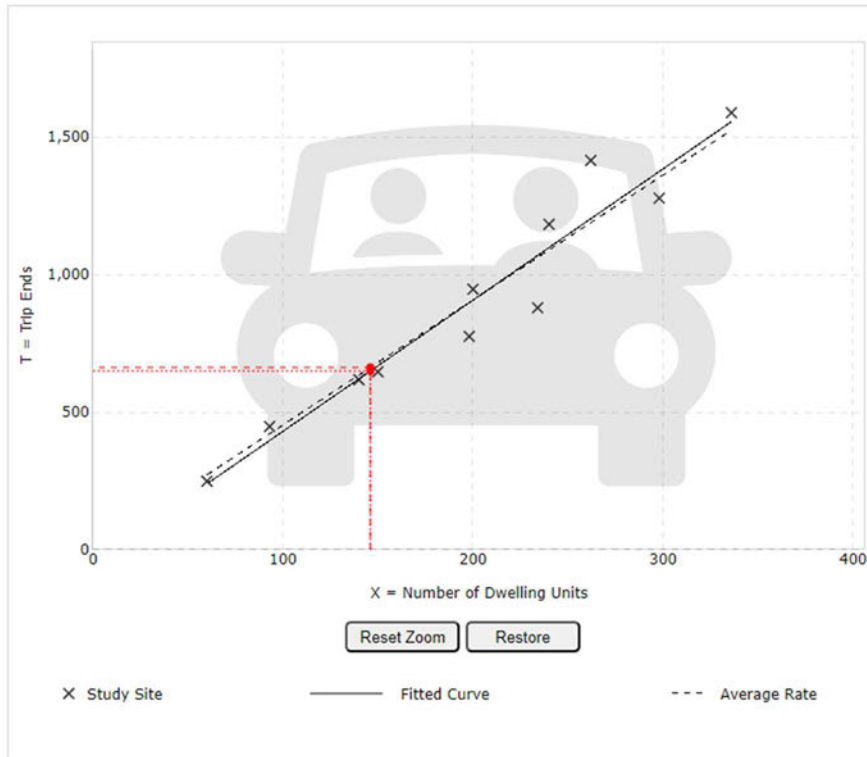
Out: 542



APPENDIX B

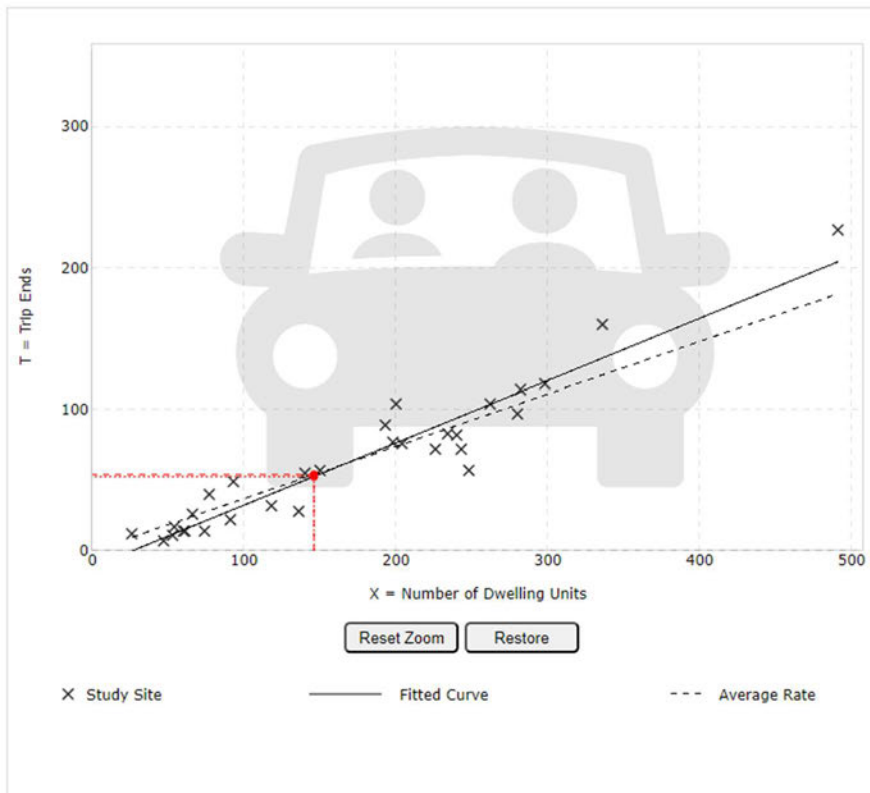
Appendix B: TRIP GENERATION

Data Plot and Equation



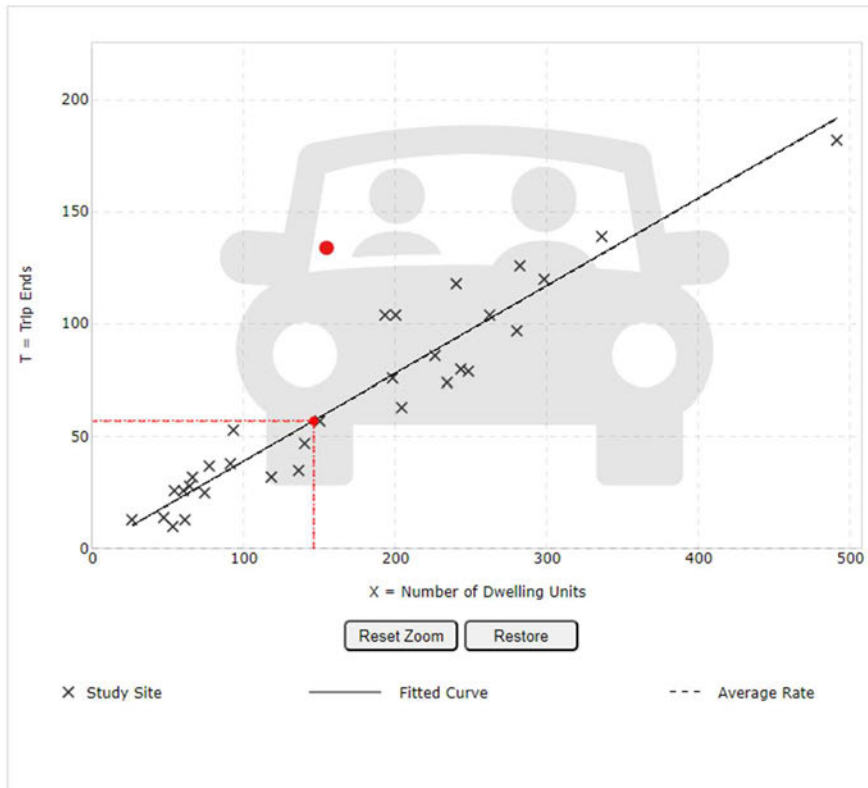
DATA STATISTICS	
Land Use:	Multifamily Housing (Mid-Rise) - Not Close to Rail Transit (221) Click for Description and Data Plots
Independent Variable:	Dwelling Units
Time Period:	Weekday
Setting/Location:	General Urban/Suburban
Trip Type:	Vehicle
Number of Studies:	11
Avg. Num. of Dwelling Units:	201
Average Rate:	4.54
Range of Rates:	3.76 - 5.40
Standard Deviation:	0.51
Fitted Curve Equation:	$T = 4.77(X) - 46.46$
R²:	0.93
Directional Distribution:	50% entering, 50% exiting
Calculated Trip Ends:	Average Rate: 663 (Total), 331 (Entry), 332 (Exit) Fitted Curve: 650 (Total), 325 (Entry), 325 (Exit)

Data Plot and Equation



DATA STATISTICS	
Land Use:	Multifamily Housing (Mid-Rise) - Not Close to Rail Transit (221) Click for Description and Data Plots
Independent Variable:	Dwelling Units
Time Period:	Weekday Peak Hour of Adjacent Street Traffic One Hour Between 7 and 9 a.m.
Setting/Location:	General Urban/Suburban
Trip Type:	Vehicle
Number of Studies:	30
Avg. Num. of Dwelling Units:	173
Average Rate:	0.37
Range of Rates:	0.15 - 0.53
Standard Deviation:	0.09
Fitted Curve Equation:	$T = 0.44(X) - 11.61$
R²:	0.91
Directional Distribution:	23% entering, 77% exiting
Calculated Trip Ends:	Average Rate: 54 (Total), 12 (Entry), 42 (Exit) Fitted Curve: 53 (Total), 12 (Entry), 41 (Exit)

Data Plot and Equation



DATA STATISTICS

Land Use:	Multifamily Housing (Mid-Rise) - Not Close to Rail Transit (221) Click for Description and Data Plots
Independent Variable:	Dwelling Units
Time Period:	Weekday Peak Hour of Adjacent Street Traffic One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Trip Type:	Vehicle
Number of Studies:	31
Avg. Num. of Dwelling Units:	169
Average Rate:	0.39
Range of Rates:	0.19 - 0.57
Standard Deviation:	0.08
Fitted Curve Equation:	$T = 0.39(X) + 0.34$
R²:	0.91
Directional Distribution:	61% entering, 39% exiting
Calculated Trip Ends:	Average Rate: 57 (Total), 35 (Entry), 22 (Exit) Fitted Curve: 57 (Total), 35 (Entry), 22 (Exit)

APPENDIX C

Appendix C: TRIP DISTRIBUTION AND ASSIGNMENT

Development: 10 Cumberland

Driveway: 1 Driveway 1

Origin #	Route	To		From	
		Distribution %	Trips	Distribution %	Trips
1	Driveway 1 to Cumberland South	10.00	1	10.00	4
2	Driveway 1 to Cole Harbour West	50.00	6	50.00	21
3	Driveway 1 to Cole Harbour East	10.00	1	10.00	4
4	Driveway 1 to Forest Hills North	40.00	5	40.00	16

Development: 10 Cumberland

Driveway: 1 Driveway 1

Origin #	Route	To		From	
		Distribution %	Trips	Distribution %	Trips
1	Driveway 1 to Cumberland South	10.00	4	10.00	2
2	Driveway 1 to Cole Harbour West	50.00	18	50.00	11
3	Driveway 1 to Cole Harbour East	10.00	4	10.00	2
4	Driveway 1 to Forest Hills North	40.00	14	40.00	9

APPENDIX D

Appendix D: SYNCHRO REPORTS

10 Cumberland Drive
2: Cumberland/Forest Hills & Cole Harbour

2024 - Baseline
Timing Plan: AM Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	118	223	50	685	166	210	154	111	264
Future Volume (vph)	118	223	50	685	166	210	154	111	264
Lane Group Flow (vph)	128	293	54	1002	180	280	167	121	287
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	7	4	3	8	5	2	1	6	
Permitted Phases	4		8		2		6		6
Detector Phase	7	4	3	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	22.5	22.5
Total Split (s)	9.6	31.0	9.6	31.0	10.2	24.0	10.4	24.2	24.2
Total Split (%)	12.8%	41.3%	12.8%	41.3%	13.6%	32.0%	13.9%	32.3%	32.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max	Max
Act Effct Green (s)	29.0	26.1	28.2	24.3	25.5	19.8	25.9	20.0	20.0
Actuated g/C Ratio	0.41	0.37	0.40	0.34	0.36	0.28	0.36	0.28	0.28
v/c Ratio	0.56	0.22	0.11	0.82	0.36	0.54	0.44	0.23	0.45
Control Delay	22.1	14.5	11.2	26.6	17.8	26.6	19.5	23.1	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.1	14.5	11.2	26.6	17.8	26.6	19.5	23.1	6.8
LOS	C	B	B	C	B	C	B	C	A
Approach Delay		16.8		25.8		23.2		13.9	
Approach LOS		B		C		C		B	
Queue Length 50th (m)	9.6	13.0	3.9	61.3	16.5	32.4	15.2	13.5	2.4
Queue Length 95th (m)	#19.7	21.5	9.3	84.2	29.7	55.4	27.8	26.1	19.6
Internal Link Dist (m)		207.7		236.6		96.0		167.6	
Turn Bay Length (m)	40.0		50.0						
Base Capacity (vph)	227	1416	479	1346	501	520	376	529	640
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.21	0.11	0.74	0.36	0.54	0.44	0.23	0.45

Intersection Summary

Cycle Length: 75

Actuated Cycle Length: 71

Natural Cycle: 65

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 21.1

Intersection LOS: C

Intersection Capacity Utilization 70.5%

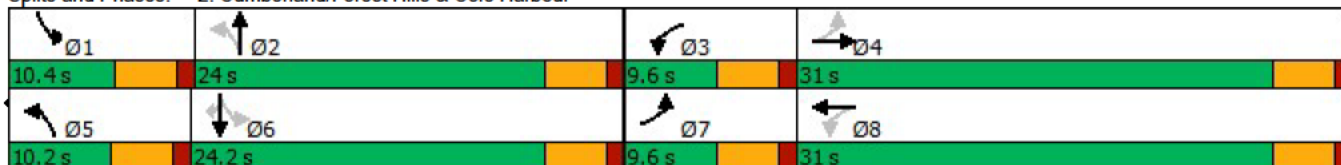
ICU Level of Service C

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Cumberland/Forest Hills & Cole Harbour



10 Cumberland Drive
6: Driveway & Cumberland

2024 - Baseline
Timing Plan: AM Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	5	374	5	5	418
Future Volume (Veh/h)	5	5	374	5	5	418
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	5	407	5	5	454
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						120
pX, platoon unblocked	0.97					
vC, conflicting volume	874	206			412	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	851	206			412	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			100	
cM capacity (veh/h)	287	800			1143	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1		
Volume Total	10	271	141	459		
Volume Left	5	0	0	5		
Volume Right	5	0	5	0		
cSH	423	1700	1700	1143		
Volume to Capacity	0.02	0.16	0.08	0.00		
Queue Length 95th (m)	0.6	0.0	0.0	0.1		
Control Delay (s)	13.7	0.0	0.0	0.1		
Lane LOS	B			A		
Approach Delay (s)	13.7	0.0		0.1		
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			36.0%		ICU Level of Service	A
Analysis Period (min)			15			

10 Cumberland Drive
2: Cumberland/Forest Hills & Cole Harbour



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	118	223	50	685	166	210	154	111	264
Future Volume (vph)	144	272	61	835	202	256	188	135	322
Lane Group Flow (vph)	157	358	66	1221	220	342	204	147	350
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	7	4	3	8	5	2	1	6	
Permitted Phases	4		8		2		6		6
Detector Phase	7	4	3	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	22.5	22.5
Total Split (s)	9.6	31.0	9.6	31.0	10.2	24.0	10.4	24.2	24.2
Total Split (%)	12.8%	41.3%	12.8%	41.3%	13.6%	32.0%	13.9%	32.3%	32.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max	Max
Act Effct Green (s)	32.5	28.4	31.6	26.5	25.2	19.5	25.6	19.7	19.7
Actuated g/C Ratio	0.43	0.38	0.42	0.35	0.34	0.26	0.34	0.26	0.26
v/c Ratio	0.72	0.27	0.14	0.97	0.48	0.70	0.70	0.30	0.60
Control Delay	33.5	15.7	11.4	42.9	20.9	33.1	31.9	24.1	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.5	15.7	11.4	42.9	20.9	33.1	31.9	24.1	13.4
LOS	C	B	B	D	C	C	C	C	B
Approach Delay		21.1		41.3		28.3		21.0	
Approach LOS		C		D		C		C	
Queue Length 50th (m)	12.0	16.6	4.8	83.5	20.7	41.7	19.0	16.6	13.7
Queue Length 95th (m)	#34.2	26.3	10.8	#127.5	36.0	#71.5	#40.0	31.0	38.4
Internal Link Dist (m)		207.7		236.6		96.0		167.6	
Turn Bay Length (m)	40.0		50.0						
Base Capacity (vph)	218	1343	478	1261	455	487	291	494	588
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.27	0.14	0.97	0.48	0.70	0.70	0.30	0.60

Intersection Summary

Cycle Length: 75
 Actuated Cycle Length: 75
 Natural Cycle: 80
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 30.9
 Intersection LOS: C
 Intersection Capacity Utilization 70.5%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Cumberland/Forest Hills & Cole Harbour

Ø1	Ø2	Ø3	Ø4
10.4 s	24 s	9.6 s	31 s
Ø5	Ø6	Ø7	Ø8
10.2 s	24.2 s	9.6 s	31 s

10 Cumberland Drive
6: Driveway & Cumberland

2034 - Background
Timing Plan: AM Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	5	374	5	5	418
Future Volume (Veh/h)	6	6	456	6	6	510
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	7	496	7	7	554
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						120
pX, platoon unblocked	0.95					
vC, conflicting volume	1068	252			503	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1043	252			503	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			99	
cM capacity (veh/h)	211	748			1058	
Direction, Lane #						
	WB 1	NB 1	NB 2	SB 1		
Volume Total	14	331	172	561		
Volume Left	7	0	0	7		
Volume Right	7	0	7	0		
cSH	330	1700	1700	1058		
Volume to Capacity	0.04	0.19	0.10	0.01		
Queue Length 95th (m)	1.0	0.0	0.0	0.2		
Control Delay (s)	16.4	0.0	0.0	0.2		
Lane LOS	C			A		
Approach Delay (s)	16.4	0.0		0.2		
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			36.0%		ICU Level of Service	A
Analysis Period (min)			15			

10 Cumberland Drive
2: Cumberland/Forest Hills & Cole Harbour

2034 - Development
Timing Plan: AM Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	118	223	50	685	166	210	154	111	264
Future Volume (vph)	144	272	62	835	228	275	188	141	322
Lane Group Flow (vph)	157	367	67	1221	248	367	204	153	350
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	7	4	3	8	5	2	1	6	
Permitted Phases	4		8		2		6		6
Detector Phase	7	4	3	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	22.5	22.5
Total Split (s)	9.6	31.0	9.6	31.0	10.2	24.0	10.4	24.2	24.2
Total Split (%)	12.8%	41.3%	12.8%	41.3%	13.6%	32.0%	13.9%	32.3%	32.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max	Max
Act Effct Green (s)	32.5	28.4	31.6	26.5	25.2	19.5	25.6	19.7	19.7
Actuated g/C Ratio	0.43	0.38	0.42	0.35	0.34	0.26	0.34	0.26	0.26
v/c Ratio	0.72	0.27	0.14	0.97	0.55	0.75	0.76	0.31	0.60
Control Delay	33.5	15.5	11.5	42.9	22.7	36.1	37.2	24.3	14.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.5	15.5	11.5	42.9	22.7	36.1	37.2	24.3	14.0
LOS	C	B	B	D	C	D	D	C	B
Approach Delay		20.9		41.3		30.7		22.9	
Approach LOS		C		D		C		C	
Queue Length 50th (m)	12.0	16.8	4.8	83.5	23.8	45.8	19.0	17.3	14.7
Queue Length 95th (m)	#34.2	26.5	10.9	#127.5	40.4	#83.6	#37.9	32.1	39.8
Internal Link Dist (m)		207.7		236.6		96.0		167.6	
Turn Bay Length (m)	40.0		50.0						
Base Capacity (vph)	218	1343	473	1261	450	487	270	494	582
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.27	0.14	0.97	0.55	0.75	0.76	0.31	0.60

Intersection Summary

Cycle Length: 75
 Actuated Cycle Length: 75
 Natural Cycle: 75
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 31.7
 Intersection LOS: C
 Intersection Capacity Utilization 70.5%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Cumberland/Forest Hills & Cole Harbour

Ø1 10.4 s	Ø2 24 s	Ø3 9.6 s	Ø4 31 s
Ø5 10.2 s	Ø6 24.2 s	Ø7 9.6 s	Ø8 31 s

10 Cumberland Drive
6: Driveway & Cumberland

2034 - Development
Timing Plan: AM Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	5	374	5	5	418
Future Volume (Veh/h)	11	56	456	7	21	510
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	61	496	8	23	554
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						120
pX, platoon unblocked	0.94					
vC, conflicting volume	1100	252			504	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1076	252			504	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	92			98	
cM capacity (veh/h)	198	748			1057	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1		
Volume Total	73	331	173	577		
Volume Left	12	0	0	23		
Volume Right	61	0	8	0		
cSH	513	1700	1700	1057		
Volume to Capacity	0.14	0.19	0.10	0.02		
Queue Length 95th (m)	3.8	0.0	0.0	0.5		
Control Delay (s)	13.2	0.0	0.0	0.6		
Lane LOS	B			A		
Approach Delay (s)	13.2	0.0		0.6		
Approach LOS	B					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			36.0%		ICU Level of Service	A
Analysis Period (min)			15			

10 Cumberland Drive
2: Cumberland/Forest Hills & Cole Harbour

2024 - Baseline
Timing Plan: PM Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	224	652	41	414	133	186	298	261	272
Future Volume (vph)	224	652	41	414	133	186	298	261	272
Lane Group Flow (vph)	243	841	45	593	145	267	324	284	296
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	7	4	3	8	5	2	1	6	
Permitted Phases	4		8		2		6		6
Detector Phase	7	4	3	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	22.5	22.5
Total Split (s)	18.0	33.0	9.6	24.6	11.3	25.4	22.0	36.1	36.1
Total Split (%)	20.0%	36.7%	10.7%	27.3%	12.6%	28.2%	24.4%	40.1%	40.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max	Max
Act Effct Green (s)	35.4	29.8	23.3	18.2	30.7	23.9	42.6	31.7	31.7
Actuated g/C Ratio	0.41	0.34	0.27	0.21	0.35	0.27	0.49	0.36	0.36
v/c Ratio	0.70	0.70	0.22	0.79	0.33	0.53	0.63	0.42	0.38
Control Delay	30.1	28.5	19.3	38.8	16.9	31.5	20.6	24.0	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.1	28.5	19.3	38.8	16.9	31.5	20.6	24.0	4.2
LOS	C	C	B	D	B	C	C	C	A
Approach Delay		28.9		37.4		26.4		16.3	
Approach LOS		C		D		C		B	
Queue Length 50th (m)	27.3	66.1	4.5	46.7	13.7	37.9	34.4	37.0	0.0
Queue Length 95th (m)	#48.3	87.5	10.7	64.9	24.5	63.7	53.8	58.6	15.9
Internal Link Dist (m)		207.7		236.6		96.0		167.6	
Turn Bay Length (m)	40.0		50.0						
Base Capacity (vph)	359	1214	202	828	441	508	554	682	769
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.69	0.22	0.72	0.33	0.53	0.58	0.42	0.38

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 87.4

Natural Cycle: 65

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 26.6

Intersection LOS: C

Intersection Capacity Utilization 73.0%

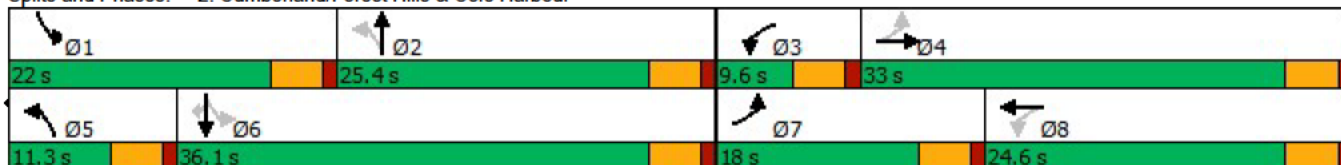
ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Cumberland/Forest Hills & Cole Harbour



10 Cumberland Drive
6: Driveway & Cumberland

2024 - Baseline
Timing Plan: PM Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	5	374	5	5	418
Future Volume (Veh/h)	5	5	374	5	5	418
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	5	407	5	5	454
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						120
pX, platoon unblocked	0.89					
vC, conflicting volume	874	206			412	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	792	206			412	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			100	
cM capacity (veh/h)	287	800			1143	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1		
Volume Total	10	271	141	459		
Volume Left	5	0	0	5		
Volume Right	5	0	5	0		
cSH	423	1700	1700	1143		
Volume to Capacity	0.02	0.16	0.08	0.00		
Queue Length 95th (m)	0.6	0.0	0.0	0.1		
Control Delay (s)	13.7	0.0	0.0	0.1		
Lane LOS	B			A		
Approach Delay (s)	13.7	0.0		0.1		
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			36.0%		ICU Level of Service	A
Analysis Period (min)			15			

10 Cumberland Drive
2: Cumberland/Forest Hills & Cole Harbour

2034 - Background
Timing Plan: PM Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	224	652	41	414	133	186	298	261	272
Future Volume (vph)	273	795	50	505	162	227	363	318	332
Lane Group Flow (vph)	297	1024	54	724	176	326	395	346	361
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	7	4	3	8	5	2	1	6	
Permitted Phases	4		8		2		6		6
Detector Phase	7	4	3	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	22.5	22.5
Total Split (s)	18.0	33.0	9.6	24.6	11.3	25.4	22.0	36.1	36.1
Total Split (%)	20.0%	36.7%	10.7%	27.3%	12.6%	28.2%	24.4%	40.1%	40.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max	Max
Act Effct Green (s)	37.8	30.2	25.0	19.9	28.4	21.6	42.9	31.6	31.6
Actuated g/C Ratio	0.42	0.34	0.28	0.22	0.32	0.24	0.48	0.35	0.35
v/c Ratio	0.85	0.86	0.30	0.91	0.45	0.72	0.85	0.52	0.45
Control Delay	44.6	36.7	21.1	48.7	20.2	40.8	36.2	26.6	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.6	36.7	21.1	48.7	20.2	40.8	36.2	26.6	4.4
LOS	D	D	C	D	C	D	D	C	A
Approach Delay		38.5		46.8		33.6		22.8	
Approach LOS		D		D		C		C	
Queue Length 50th (m)	34.6	86.8	5.4	60.7	17.0	49.9	44.0	46.9	0.0
Queue Length 95th (m)	#77.3	#124.7	12.1	#92.9	29.2	#87.0	#88.1	72.5	17.3
Internal Link Dist (m)		207.7		236.6		96.0		167.6	
Turn Bay Length (m)	40.0		50.0						
Base Capacity (vph)	349	1192	181	806	387	450	473	663	797
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.86	0.30	0.90	0.45	0.72	0.84	0.52	0.45

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 89.7

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 34.9

Intersection LOS: C

Intersection Capacity Utilization 73.0%

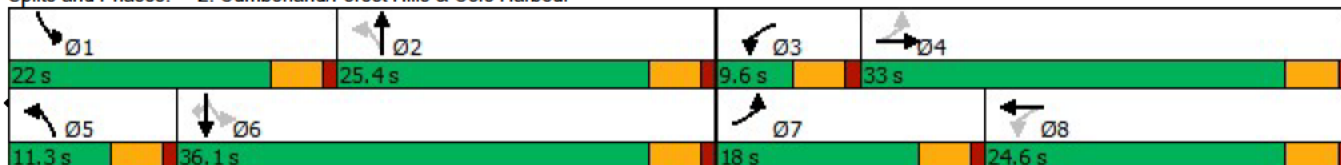
ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Cumberland/Forest Hills & Cole Harbour



10 Cumberland Drive
6: Driveway & Cumberland

2034 - Background
Timing Plan: PM Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	5	374	5	5	418
Future Volume (Veh/h)	6	6	456	6	6	510
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	7	496	7	7	554
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						120
pX, platoon unblocked	0.85					
vC, conflicting volume	1068	252			503	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	992	252			503	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			99	
cM capacity (veh/h)	205	748			1058	
Direction, Lane #						
	WB 1	NB 1	NB 2	SB 1		
Volume Total	14	331	172	561		
Volume Left	7	0	0	7		
Volume Right	7	0	7	0		
cSH	322	1700	1700	1058		
Volume to Capacity	0.04	0.19	0.10	0.01		
Queue Length 95th (m)	1.0	0.0	0.0	0.2		
Control Delay (s)	16.7	0.0	0.0	0.2		
Lane LOS	C			A		
Approach Delay (s)	16.7	0.0		0.2		
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			36.0%		ICU Level of Service	A
Analysis Period (min)			15			

10 Cumberland Drive
2: Cumberland/Forest Hills & Cole Harbour

2034 With Development
Timing Plan: PM Peak



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	224	652	41	414	133	186	298	261	272
Future Volume (vph)	273	795	55	505	176	238	363	335	332
Lane Group Flow (vph)	297	1048	60	724	191	342	395	364	361
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	7	4	3	8	5	2	1	6	
Permitted Phases	4		8		2		6		6
Detector Phase	7	4	3	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	22.5	22.5
Total Split (s)	18.0	33.0	9.6	24.6	11.3	25.4	22.0	36.1	36.1
Total Split (%)	20.0%	36.7%	10.7%	27.3%	12.6%	28.2%	24.4%	40.1%	40.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max	Max
Act Effct Green (s)	37.8	30.1	25.0	19.9	28.3	21.5	42.9	31.6	31.6
Actuated g/C Ratio	0.42	0.34	0.28	0.22	0.32	0.24	0.48	0.35	0.35
v/c Ratio	0.85	0.88	0.33	0.91	0.51	0.76	0.88	0.55	0.45
Control Delay	44.7	38.4	21.8	48.7	21.7	43.3	40.1	27.2	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.7	38.4	21.8	48.7	21.7	43.3	40.1	27.2	4.5
LOS	D	D	C	D	C	D	D	C	A
Approach Delay		39.8		46.6		35.6		24.5	
Approach LOS		D		D		D		C	
Queue Length 50th (m)	34.5	89.5	6.0	60.7	18.6	53.1	44.0	49.9	0.3
Queue Length 95th (m)	#77.1	#129.6	13.3	#92.9	31.5	#93.7	#93.1	76.5	17.7
Internal Link Dist (m)		207.7		236.6		96.0		167.6	
Turn Bay Length (m)	40.0		50.0						
Base Capacity (vph)	349	1190	182	807	377	448	460	663	795
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.88	0.33	0.90	0.51	0.76	0.86	0.55	0.45

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 89.7

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 36.1

Intersection LOS: D

Intersection Capacity Utilization 73.0%

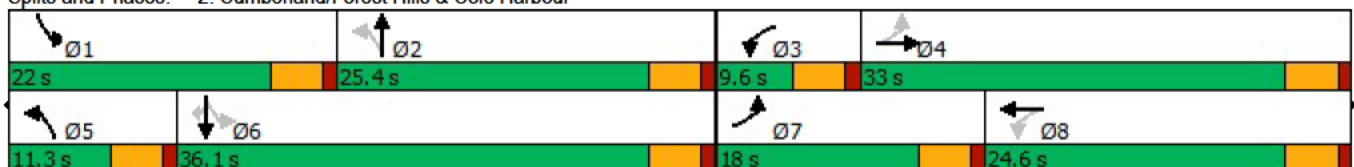
ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Cumberland/Forest Hills & Cole Harbour



10 Cumberland Drive
6: Driveway & Cumberland

2034 With Development
Timing Plan: PM Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	5	374	5	5	418
Future Volume (Veh/h)	9	33	456	11	50	510
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)	10	36	496	12	54	554
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						120
pX, platoon unblocked	0.84					
vC, conflicting volume	1164	254			508	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1099	254			508	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	95			95	
cM capacity (veh/h)	164	745			1053	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1		
Volume Total	46	331	177	608		
Volume Left	10	0	0	54		
Volume Right	36	0	12	0		
cSH	422	1700	1700	1053		
Volume to Capacity	0.11	0.19	0.10	0.05		
Queue Length 95th (m)	2.8	0.0	0.0	1.2		
Control Delay (s)	14.6	0.0	0.0	1.4		
Lane LOS	B			A		
Approach Delay (s)	14.6	0.0		1.4		
Approach LOS	B					
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			36.0%		ICU Level of Service	A
Analysis Period (min)			15			