Date: April 2, 2019 File: 7019-01

BY EMAIL

Goodrich Terminals c/o Rosa Shih, MCIP Pacific Land Group Ltd. Suite 212, 12992 – 76th Avenue Surrey, BC V3W 2V6

Dear Ms. Shih:

Re: 10880 Dyke Road (Goodrich Terminals), Surrey – DRAFT Operational Study

Creative Transportation Solutions Ltd. (CTS) is pleased to submit this DRAFT operational study for a proposed untreated lumber staging site (Goodrich Terminals) at 21480, 21832 and 21780 South Westminster Shore (Vancouver Fraser Port Authority) and 10880 Dyke Road (City of Surrey).

The objective of this DRAFT operational study is to assess and confirm that the road network servicing the proposed Goodrich Terminals site is sufficient for the proposed land use, to the satisfaction of the Vancouver Fraser Port Authority and City of Surrey.

1.0 BACKGROUND

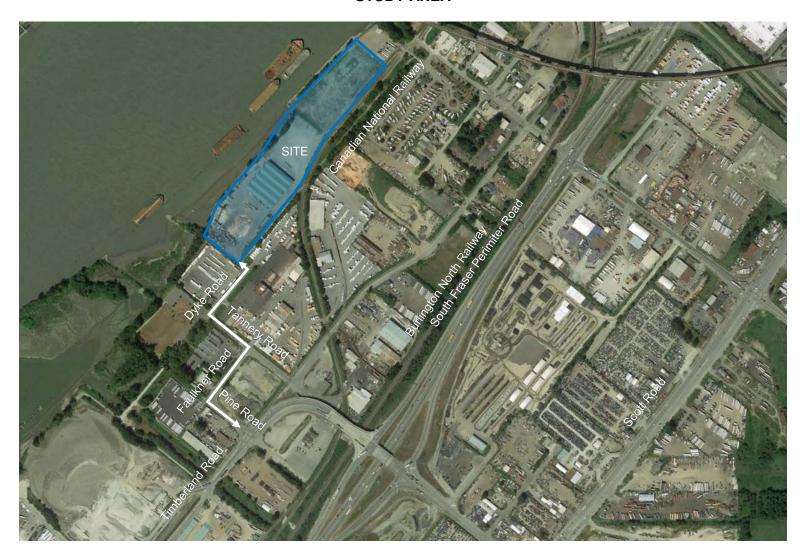
21480, 21832 and 21780 South Westminster Shore (Vancouver Fraser Port Authority) and 10880 Dyke Road (City of Surrey) are located along the shore of the Fraser River South Arm in the City of Surrey. The site zoning is IL-1 Light Impact Industrial 1 Zone.

The site was formerly a sawmill having a lease on the properties. The lease permitted sawmill, small wood recycling, lumber staging, loading and receiving.

Goodrich Terminals is proposing similar land uses including untreated lumber staging, loading and receiving.

The site and adjacent area is illustrated by **FIGURE 1**.

FIGURE 1 STUDY AREA



2.0 TRANSPORTATION NETWORK

As mentioned, the site is located within an industrialized area of Surrey as demonstrated by the zoning and adjacent land uses.

Access to the site is via the local road network i.e. Dyke Road, Tannery Road, Faulkner Road and Pine Road. Primary access is via the signalized intersection of Timberland Road and Pine Road which connects to the South Fraser Perimeter Road (Highway 17) and Scott Road (120th Street).

Note – The former land use i.e. sawmill, generated heavy vehicle traffic along the local road network. Also the adjacent land uses currently generate heavy vehicle traffic along the local road network.

3.0 TRAFFIC

A traffic turning movement count was undertaken by CTS for the intersection of Timberland Road and Pine Road for a period of seven hours i.e. 0700 to 0900, 1100 to 1300 and 1500 to 1800, on Thursday March 14th. The turning movement count data sheets are included as **APPENDIX A**.

The traffic volume for the seven hour period was 3,819 vehicles which is typical for a collector road. However, the percentage of heavy vehicles i.e. 3+ axles, was 37% whereas the percentage heavy vehicles is typically 3% to 5% for most collector roads in urban areas.

FIGURE 2 illustrates the AM and PM peak hour base traffic turning movements.

In terms of traffic to be generated by the proposed Goodrich Terminals site, CTS understood the following:

- There will be fifteen (15) staff employed on-site, potentially generating 15 inbound vehicle trips in the AM peak hour and 15 outbound trips in the PM peak hour.
- The will be sixty (60) heavy vehicles travelling to/from the site between 0600 and 1800 potentially generating 5 inbound/outbound heavy vehicle trips in the AM peak hour and 5 inbound/outbound heavy vehicle trips in the PM peak hour.

FIGURE 3 illustrates the AM and PM peak hour base + site traffic turning movements. The site generated traffic has been overlaid on the base traffic for the AM and PM peak hour.

Note – Traffic to be generated by the proposed Goodrich Terminals is offset by the traffic generated by the former land use i.e. sawmill.

FIGURE 2 – AM AND PM PEAK HOUR BASE TRAFFIC

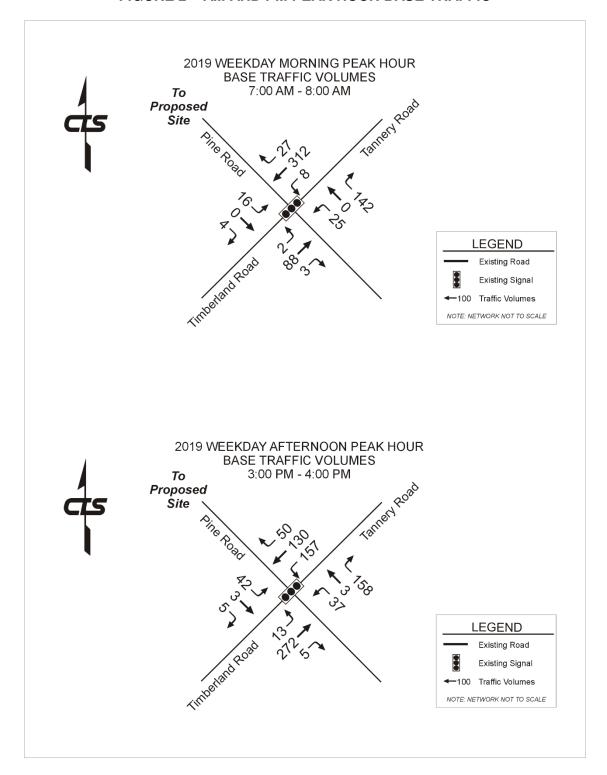
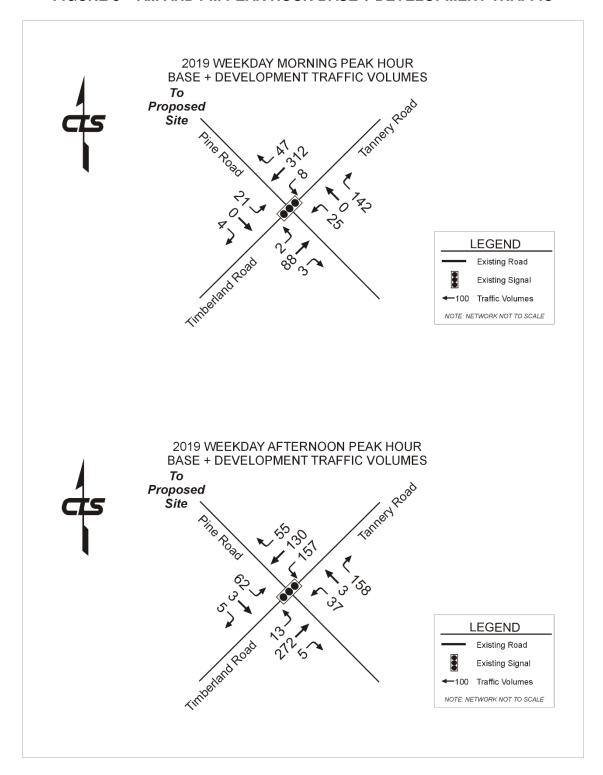


FIGURE 3 – AM AND PM PEAK HOUR BASE + DEVELOPMENT TRAFFIC



4.0 CAPACITY ANALYSIS

With reference to **FIGURE 2** and **FIGURE 3**, CTS performed capacity analysis for the intersection of Timberland Road and Pine Road for the weekday AM and PM peak hour.

Synchro 8 was used to analyze the signalized intersection. The following assumptions were made with respect to the intersection capacity analysis:

- Saturation flow rate → 1,800 passenger cars/hour of green time/lane (pcphgpl), based on study area characteristics.
- Peak hour factor (PHF) → 0.67 (weekday morning peak) and 0.82 (weekday afternoon peak) based on collected turning movement count data.
- Heavy vehicle percentage for roads → ~40% (weekday morning peak) and 25% (weekday afternoon peak) based on collected turning movement count data.
- No pedestrian phasing.

TABLE 1 summarizes the analysis. The capacity analysis worksheets with level of service for each individual movement are included as **APPENDIX B**.

TABLE 1
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMMARY

Intersection	Time of Day	Scenario	Performance	E	astbour	ıd	W	estbour/	nd	N	lorthbou	nd	S	outhbou	nd	LOS	Notes							
intersection	Time of Day	Scenario	Measure	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	105	Notes							
			Volumes	2	88	3	8	312	27	25	0	142	16	0	4									
		2019 Base	V/C	0.02	0.	18	0.03	0.91	0.08		0.50		0.	11	0.05	С	Optimized Signal Timing							
	Weekday		95% Queue (m)	1.8	9	.2	2.6	52.1	0.0		8.1		5	.0	2.7									
	Morning Peak Hour		Volumes	2	88	3	8	312	47	25 0 142		21 0		4										
Dina Dand (N/C) at		2019 Base + Site	V/C	0.02	0.	18	0.03	0.88	0.13		0.60		0.	14	0.04	С	Optimized Signal Timing							
Pine Road (N/S) at Timberland			95% Queue (m)	1.9	9	.9	2.6	54.4	0.0	8.1			6.2		2.7									
Road/Tannery Road (E/W)			Volumes	13	272	5	157	130	50	37 3		158	42 3		5									
(E/W)		2019 Base	V/C	0.10	0.10 0.46		0.75	0.35	0.12	2 0.52		0.18		0.03	В	Optimized Signal Timing								
	Weekday		95% Queue (m)	6.1	30	3.9	35.6	22.8	0.0		14.7		10	10.1										
Afternoon Peak Hour		Volumes	13	272	5	157	130	55	37	3	158	62 3 5		5										
		2019 Base + Site	V/C 0.1		10 0.46		0.75	0.35	0.13	0.52			0.27		0.27		0.27		0.27 0.03		0.03	В	Optimized Signal Timing	
		2.40	95% Queue (m)	6.1	30	3.9	35.6	22.8	0.0	.0 14.7		13.6		3.0										

Intersection approaching capacity (LOS 'D' or E'); or approach demand near capacity (vlc 0.85 to 0.99)

Intersection equals or exceeds capacity (LOS 'F'); or approach demand exceeds capacity (vlc ≥ 1.00)

95% Queue length exceeds the capacity of existing storage bay.

Based on the capacity analysis as summarized by **TABLE 1**, the following can be stated:

Tannery Road/Timberland Road and Pine Road

- In the weekday AM peak hour this intersection is forecast to operate at a LOS C (Good) for the base and base + development scenarios.
- In the weekday PM peak hour this intersection is forecast to operate at a LOS B (Very Good) for the base and base + development scenarios.

Note - No operational and/or geometric improvements are recommended for this intersection.

5.0 SWEPT PATH ANALYSIS

CTS undertook swept path analysis for the local road network demonstrating the manoeuverability of a heavy vehicle i.e. WB 20, along the local roads. The analysis is included as **APPENDIX C**.

Note - No operational and/or geometric improvements are recommended for the local road network.

4.0 CONCLUSIONS

Based on the findings of this DRAFT operational study the road network servicing the proposed Goodrich Terminals site is sufficient for the proposed land use. No operational and/or geometric improvements are recommended for the intersection of Timberland Road/Tannery Road and Pine Road or local road network.

In closing, CTS would like to thank Goodrich Terminals for the opportunity to assist with the permitting of the proposed land use by the provision of this DRAFT operational study.

Please call the undersigned should you have any questions or comments regarding this DRAFT operational study.

Yours truly,

CREATIVE TRANSPORTATION SOLUTIONS LTD.

Brent A. Dozzi, P. Eng. Senior Traffic Engineer

Phone: 604.936.6190 x237 Email: bdozzi@cts-bc.com

Appendices

APPENDIX A

Turning Movement Count Data Sheets







Vehicle Classification Summary

Project: #7019: 10880 Dyke Road Traffic Impact Study

Municipality: Surrey Weather: Cloudy

			Ve	hicle Classification	
Time Period	Entering Intersection	Passenger Cars	Heavy Vehicles (3 or more axles)		Total
Morning	Volume	615	403		1,018
(07:00 - 09:00)	%	60.4%	39.6%		100.0%
Midday	Volume	414	544		958
(11:00 - 13:00)	%	43.2%	56.8%		100.0%
Afternoon	Volume	1,376	467		1,843
(15:00 - 18:00)	%	74.7%	25.3%		100.0%
Total	Volume	2,405	1,414		3,819
(7 Hours)	%	63.0%	37.0%		100.0%



Morning Peak Period

Project: #7019: 10880 Dyke Road Traffic Impact Study

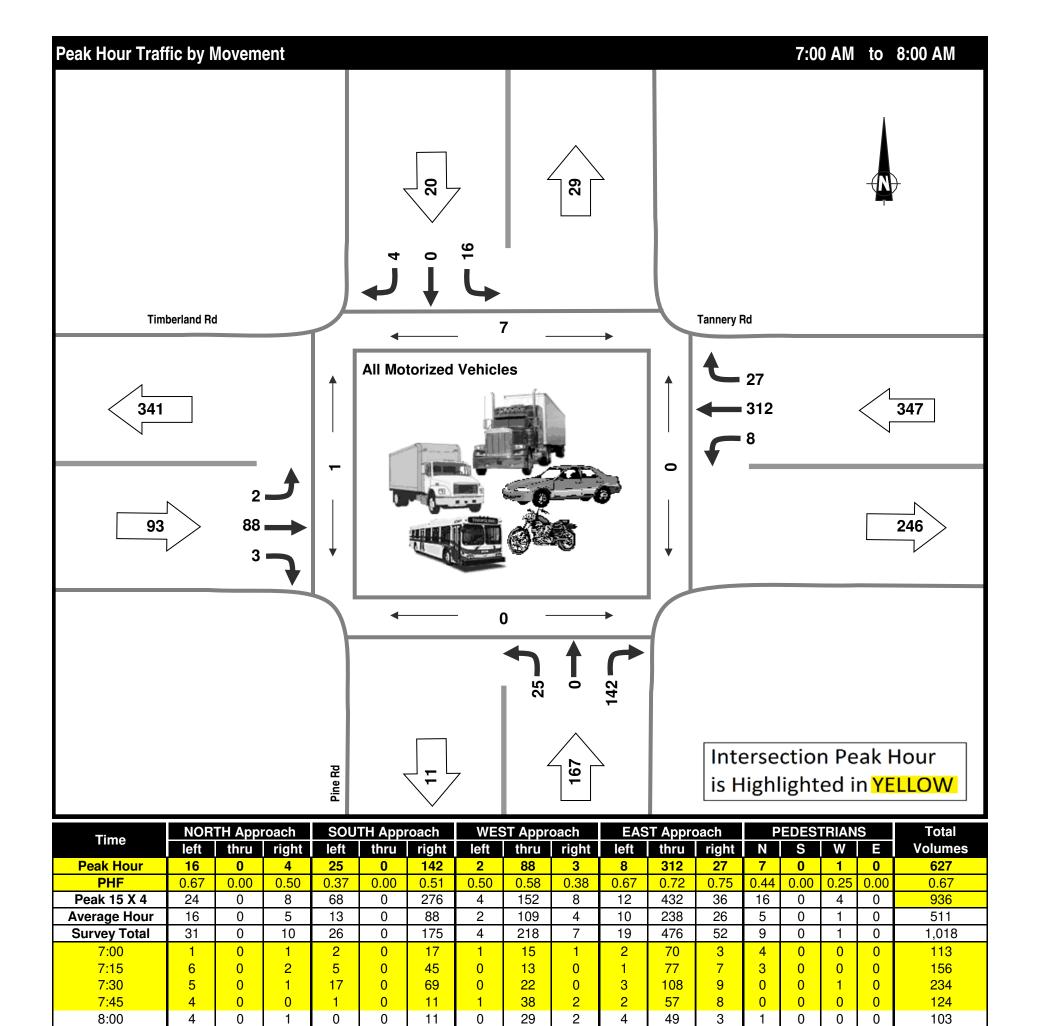
Municipality: Surrey Weather: Cloudy

Vehicle Class: All Motorized Vehicles

8:15

8:30

8:45

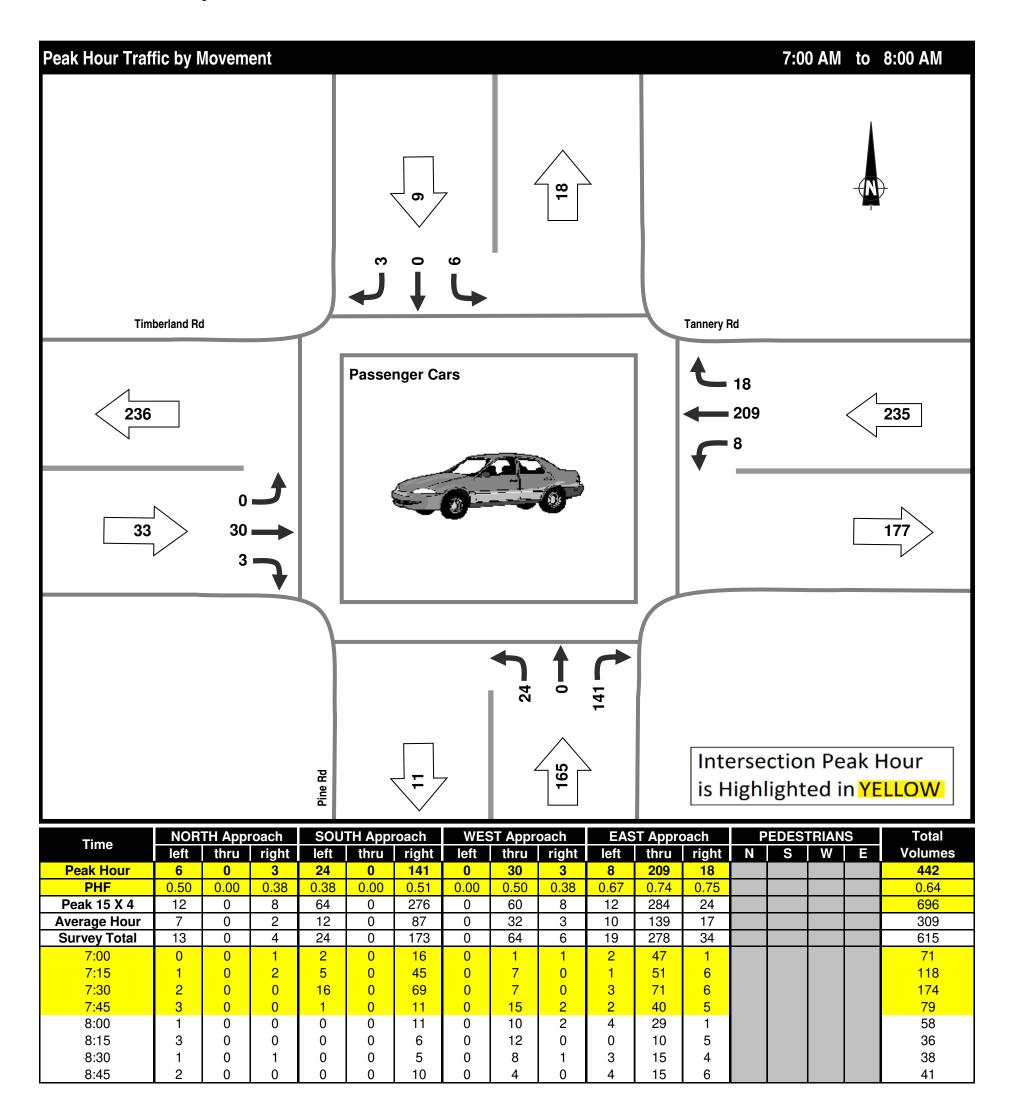




Morning Peak Period

Project: #7019: 10880 Dyke Road Traffic Impact Study

Municipality: Surrey
Weather: Cloudy
Vehicle Class: Passenger Cars





Morning Peak Period

Project: #7019: 10880 Dyke Road Traffic Impact Study

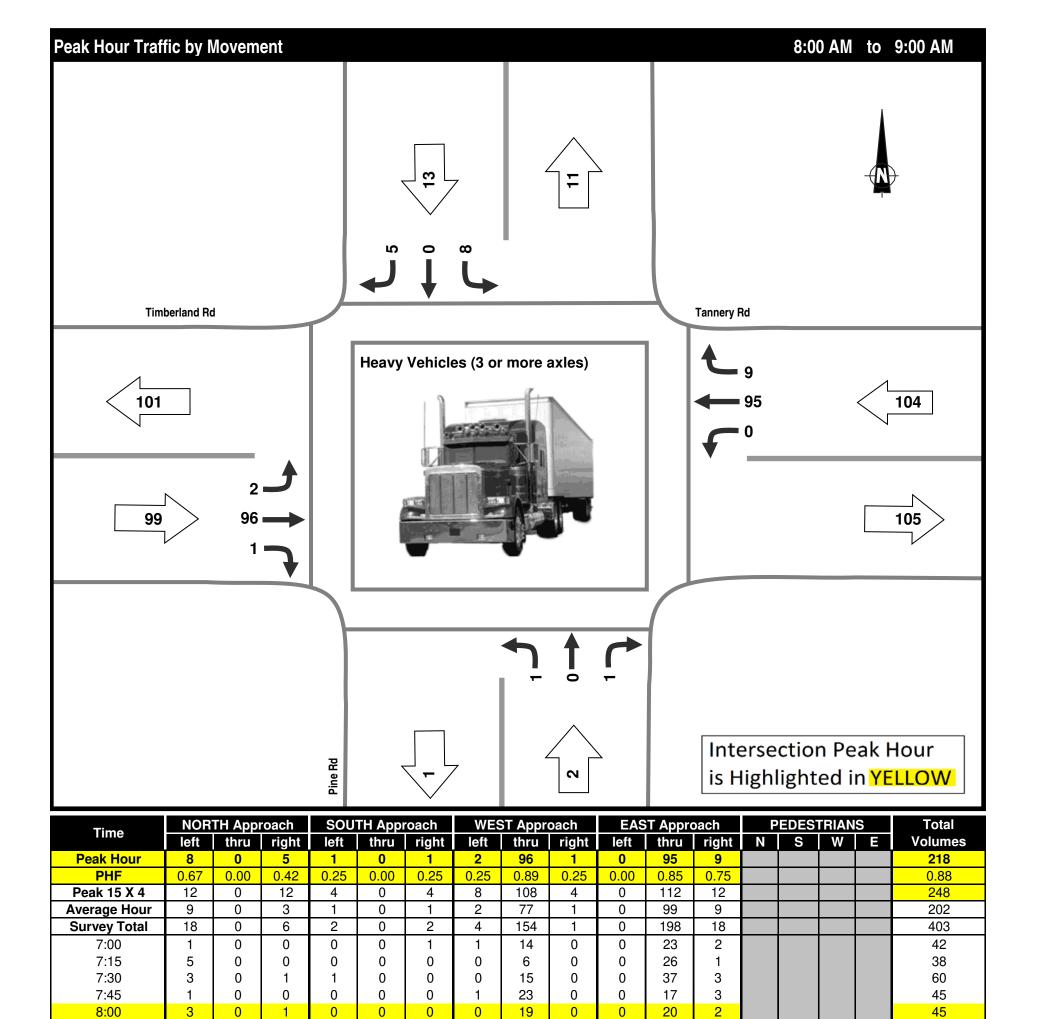
8:15

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8:45

Municipality: Surrey Weather: Cloudy

Vehicle Class: Heavy Vehicles (3 or more axles)

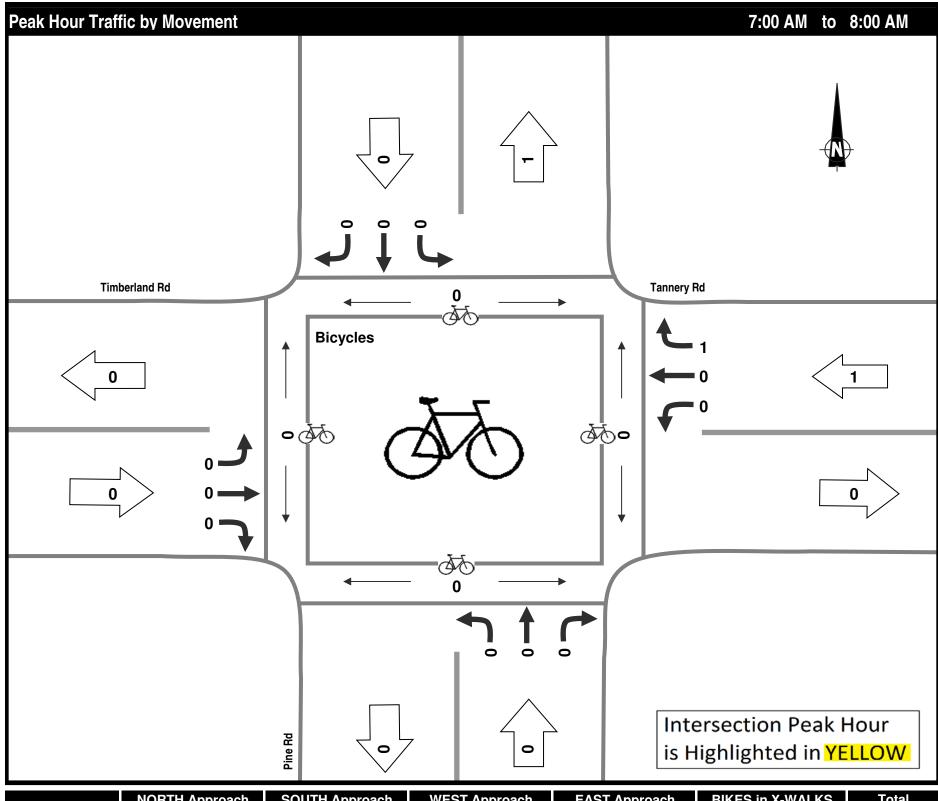




Municipality: Surrey Weather: Cloudy Vehicle Class: Bicycles

Note: Crosswalk bike volumes shown are cyclists who rode their bike across the crosswalk and are not included in the pedestrian volume totals

Morning Peak Period



Time	NOR	ТН Аррі	roach	SOU	ТН Аррі	roach								ES in	X-WAI	LKS	Total
Time	left	thru	right	left	thru	right	left	thru	right	left	thru	right	Ν	S	W	E	Volumes
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
PHF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.25
Peak 15 X 4	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4
Average Hour	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Survey Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Average Hour

Survey Total

11:00

11:15

11:30

11:45

12:00

12:15

12:30

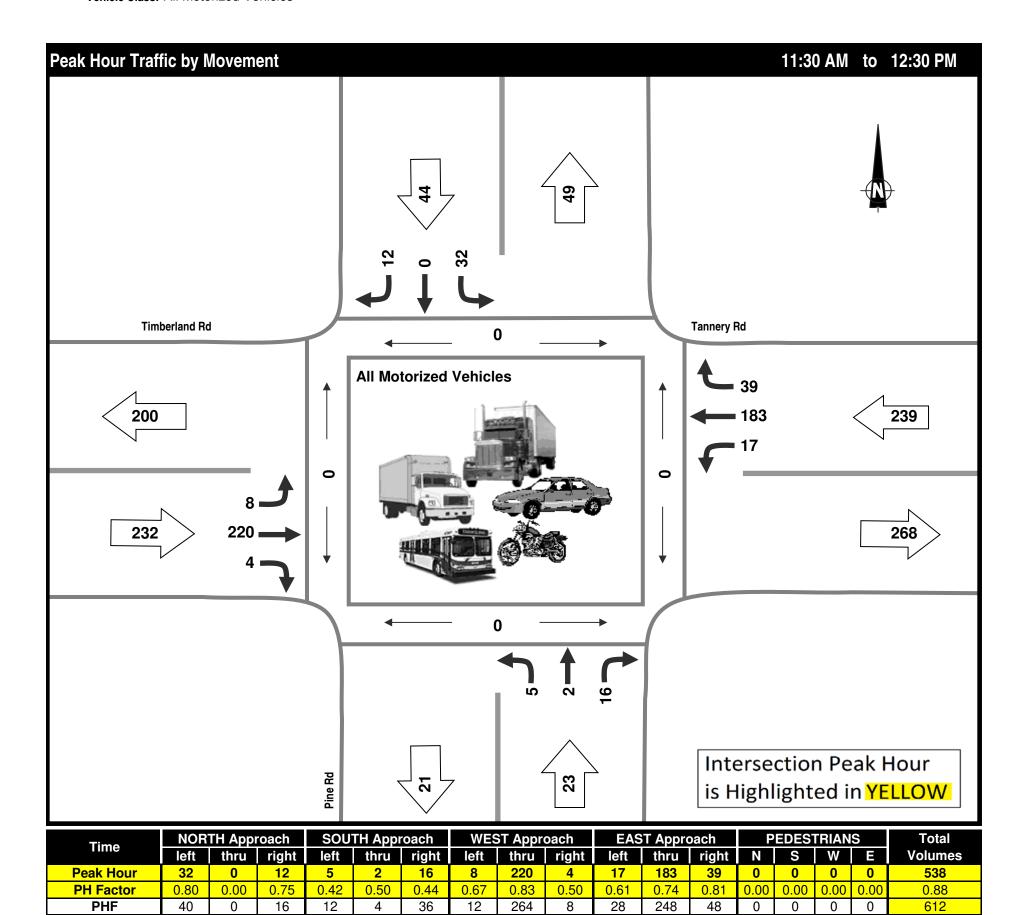
12:45

Project: #7019: 10880 Dyke Road Traffic Impact Study

Municipality: Surrey Weather: Cloudy

Vehicle Class: All Motorized Vehicles

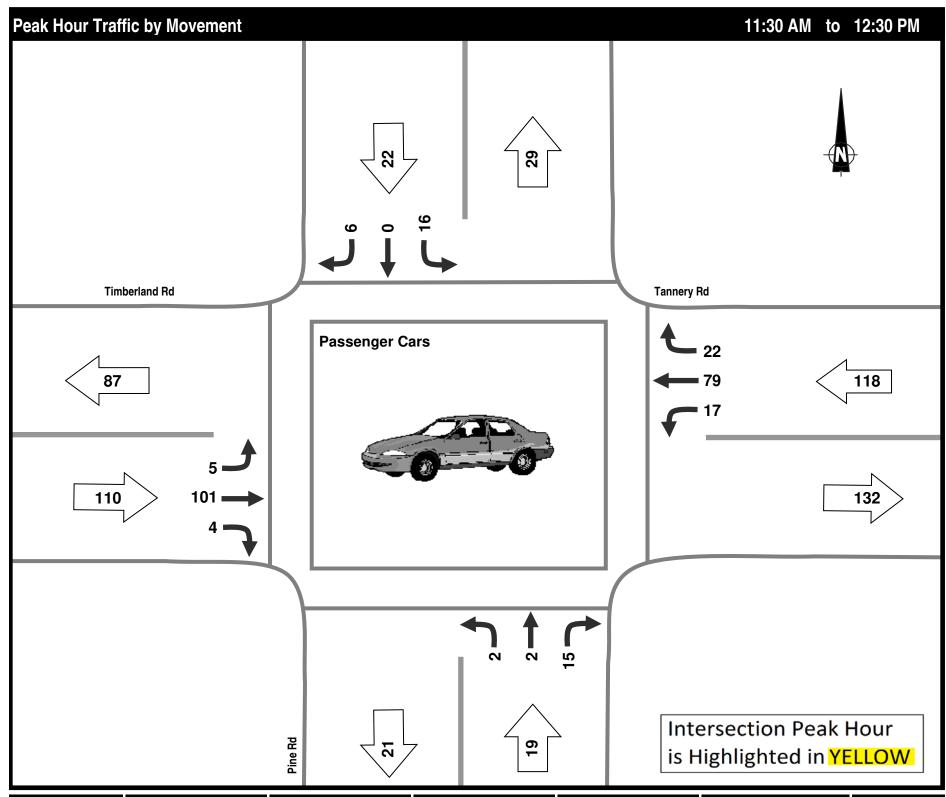
Midday Peak Period





Municipality: Surrey
Weather: Cloudy
Vehicle Class: Passenger Cars

Midday Peak Period



Time	NOR'	ТН Аррі	roach	SOU'	ГН Аррі	oach	WES	ST Appr	oach	EAS	T Appro	oach	P	PEDES"	TRIAN	S	Total
Tillie	left	thru	right	Ν	S	W	E	Volumes									
Peak Hour	16	0	6	2	2	15	5	101	4	17	79	22					269
PHF	0.80	0.00	0.50	0.50	0.50	0.47	0.63	0.77	0.50	0.61	0.66	0.69					0.83
Peak 15 X 4	20	0	12	4	4	32	8	132	8	28	120	32					324
Average Hour	13	0	6	2	1	15	5	71	3	14	63	18					211
Survey Total	25	0	11	3	2	29	9	141	5	28	126	35					414
11:00	2	0	2	0	0	6	1	3	1	0	7	5					27
11:15	2	0	0	1	0	1	0	12	0	2	17	3					38
11:30	2	0	1	0	0	4	0	20	1	7	8	6					49
11:45	5	0	1	1	1	8	2	33	1	6	14	1					73
12:00	5	0	1	1	1	2	2	28	2	1	30	8					81
12:15	4	0	3	0	0	1	1	20	0	3	27	7					66
12:30	5	0	1	0	0	4	1	10	0	1	14	3					39
12:45	0	0	2	0	0	3	2	15	0	8	9	2					41



Midday Peak Period

Project: #7019: 10880 Dyke Road Traffic Impact Study

Municipality: Surrey Weather: Cloudy

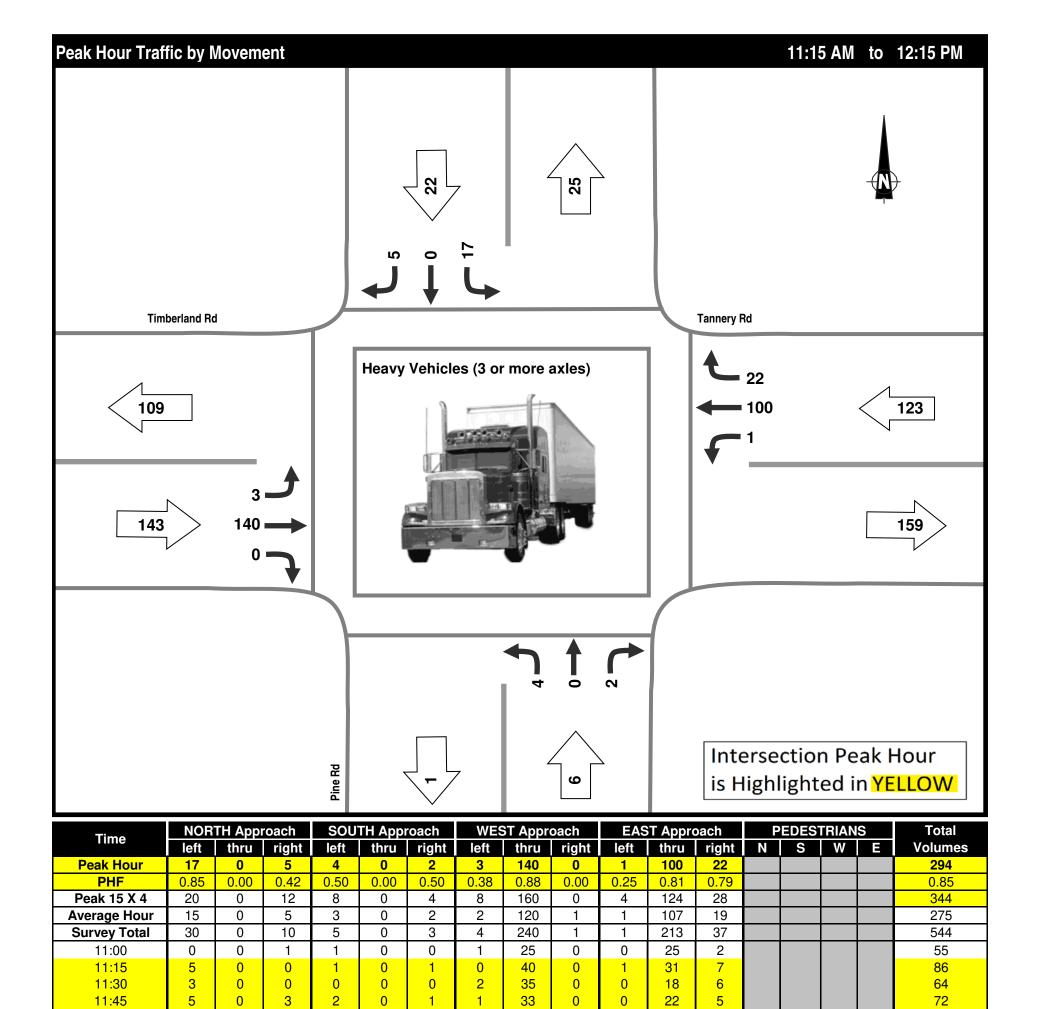
Vehicle Class: Heavy Vehicles (3 or more axles)

12:00

12:15

12:30

12:45

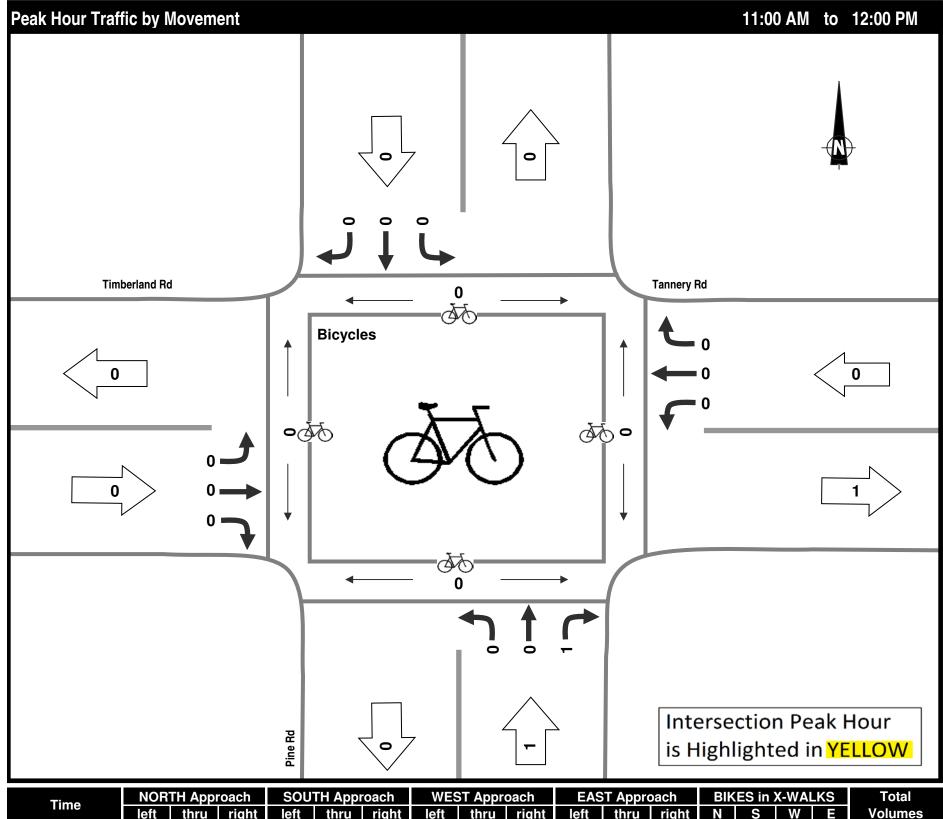




Midday Peak Period

Municipality: Surrey Weather: Cloudy Vehicle Class: Bicycles

Note: Crosswalk bike volumes shown are cyclists who rode their bike across the crosswalk and are not included in the pedestrian volume totals



Time	NORTH Approach		SOUTH Approach			WEST Approach							ES in 2	_KS	Total		
Tillie	left	thru	right	left	thru	right	left	thru	right	left	thru	right	N	S	W	Ξ	Volumes
Peak Hour	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
PHF	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25
Peak 15 X 4	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4
Average Hour	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Survey Total	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0





16:45

17:00

17:15

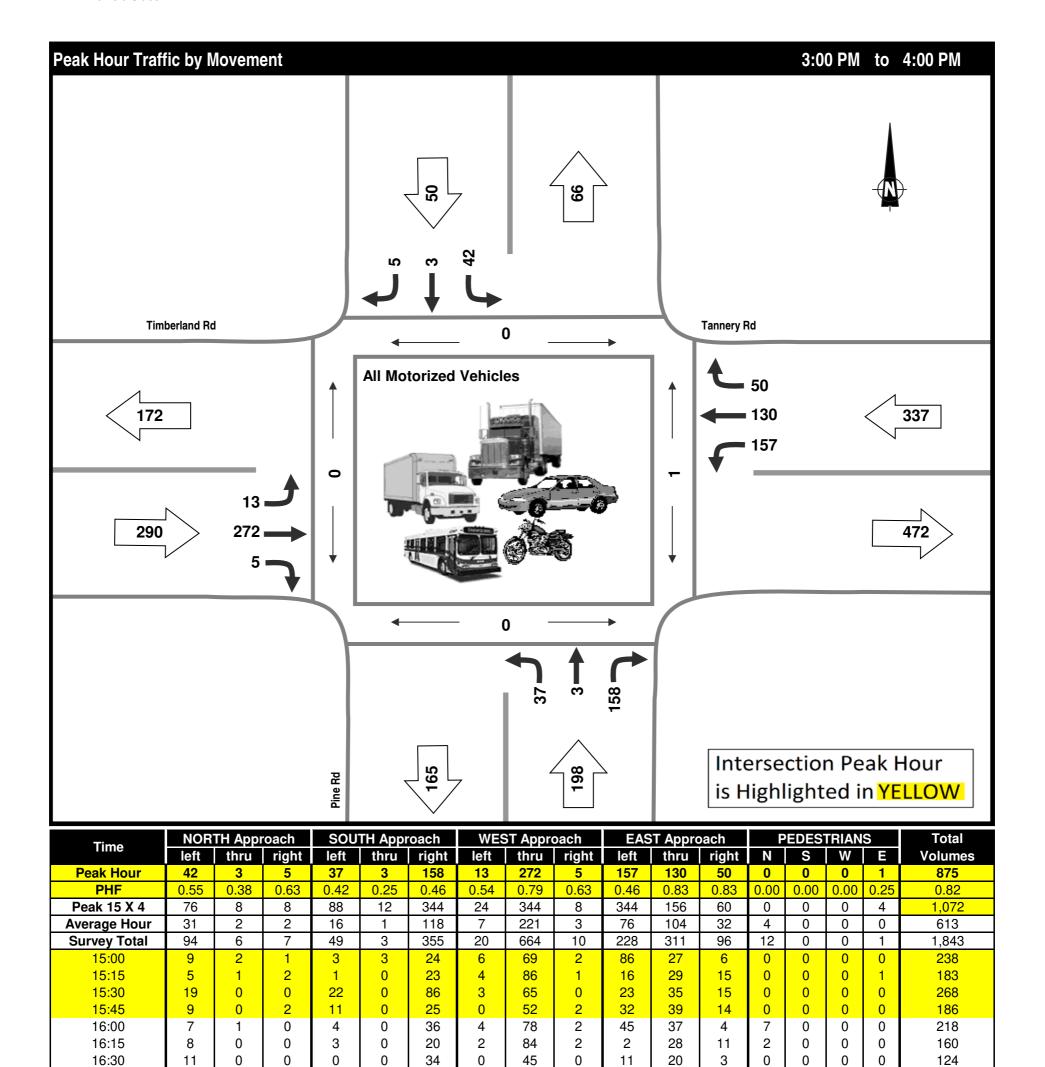
17:30

17:45

Project: #7019: 10880 Dyke Road Traffic Impact Study

Municipality: Surrey Weather: Cloudy

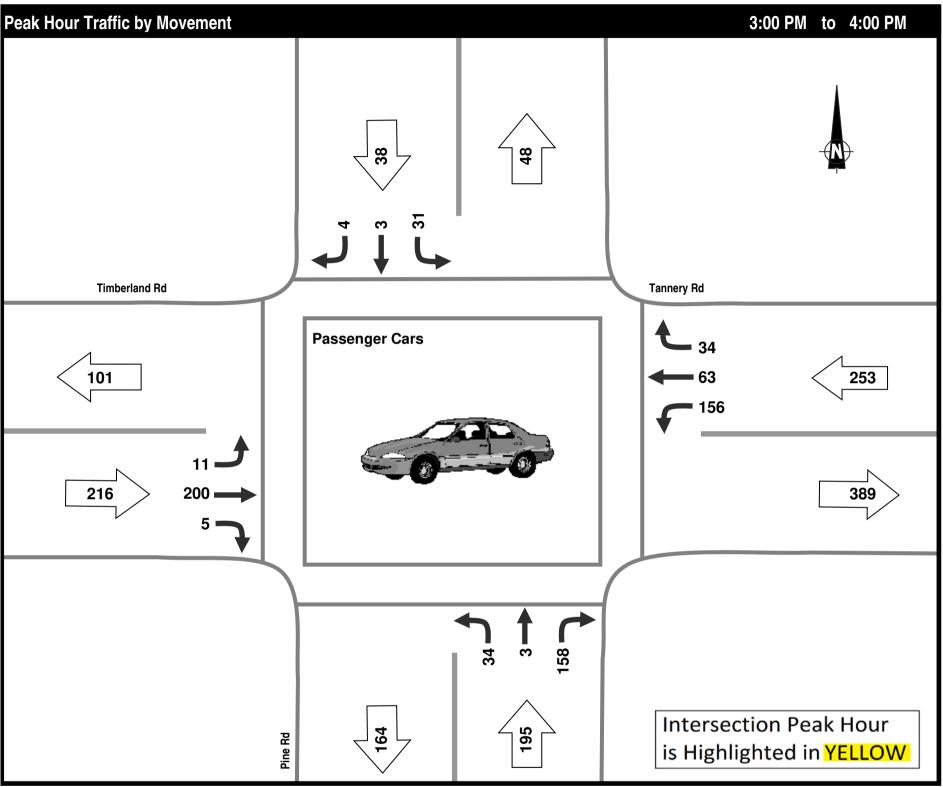
Vehicle Class: All Motorized Vehicles





Municipality: Surrey
Weather: Cloudy
Vehicle Class: Passenger Cars

Afternoon Peak Period



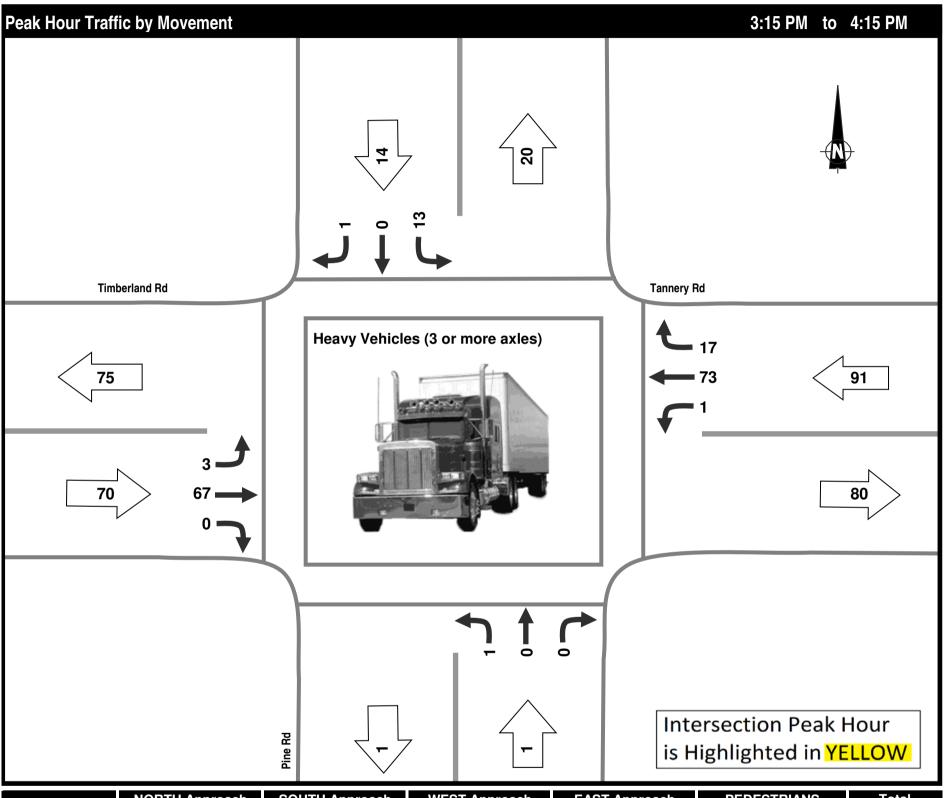
Time	NOR	ТН Аррі	roach	SOU	ТН Аррі	roach	WES	ST Appr	oach	EAS	T Appro	oach	P	PEDES	TRIAN	S	Total
Time	left	thru	right	Ν	S	W	E	Volumes									
Peak Hour	31	3	4	34	3	158	11	200	5	156	63	34					702
PHF	0.60	0.38	0.50	0.39	0.25	0.46	0.46	0.85	0.63	0.45	0.88	0.71					0.77
Peak 15 X 4	52	8	8	88	12	344	24	236	8	344	72	48					908
Average Hour	22	2	2	15	1	118	5	156	3	75	40	20					459
Survey Total	67	6	5	45	3	354	16	467	10	225	119	59					1,376
15:00	9	2	1	1	3	24	6	51	2	86	14	4					203
15:15	3	1	2	1	0	23	3	59	1	15	18	8					134
15:30	13	0	0	22	0	86	2	51	0	23	18	12					227
15:45	6	0	1	10	0	25	0	39	2	32	13	10					138
16:00	5	1	0	4	0	36	3	65	2	45	18	1					180
16:15	5	0	0	3	0	20	2	69	2	2	11	4					118
16:30	5	0	0	0	0	34	0	32	0	9	8	3					91
16:45	8	1	0	4	0	43	0	31	0	2	2	2					93
17:00	6	0	1	0	0	41	0	16	0	2	4	0					70
17:15	3	0	0	0	0	12	0	7	1	7	3	6					39
17:30	0	1	0	0	0	6	0	27	0	2	4	2					42
17:45	4	0	0	0	0	4	0	20	0	0	6	7					41



Municipality: Surrey Weather: Cloudy

Vehicle Class: Heavy Vehicles (3 or more axles)

Afternoon Peak Period



Time	NORTH Approach		roach	SOU	ТН Аррі	roach	WES	ST Appr	oach	EAS	T Appro	oach	Р	EDES	TRIAN	S	Total
Time	left	thru	right	left	thru	right	left	thru	right	left	thru	right	N	S	W	E	Volumes
Peak Hour	13	0	1	1	0	0	3	67	0	1	73	17					176
PHF	0.54	0.00	0.25	0.25	0.00	0.00	0.75	0.62	0.00	0.25	0.70	0.61					0.90
Peak 15 X 4	24	0	4	4	0	0	4	108	0	4	104	28					196
Average Hour	9	0	1	1	0	0	1	66	0	1	64	12					155
Survey Total	27	0	2	4	0	1	4	197	0	3	192	37					467
15:00	0	0	0	2	0	0	0	18	0	0	13	2					35
15:15	2	0	0	0	0	0	1	27	0	1	11	7					49
15:30	6	0	0	0	0	0	1	14	0	0	17	3					41
15:45	3	0	1	1	0	0	0	13	0	0	26	4					48
16:00	2	0	0	0	0	0	1	13	0	0	19	3					38
16:15	3	0	0	0	0	0	0	15	0	0	17	7					42
16:30	6	0	0	0	0	0	0	13	0	2	12	0					33
16:45	0	0	1	0	0	0	0	12	0	0	11	5					29
17:00	2	0	0	1	0	1	0	17	0	0	24	3					48
17:15	3	0	0	0	0	0	0	16	0	0	10	0					29
17:30	0	0	0	0	0	0	1	16	0	0	15	2					34
17:45	0	0	0	0	0	0	0	23	0	0	17	1					41



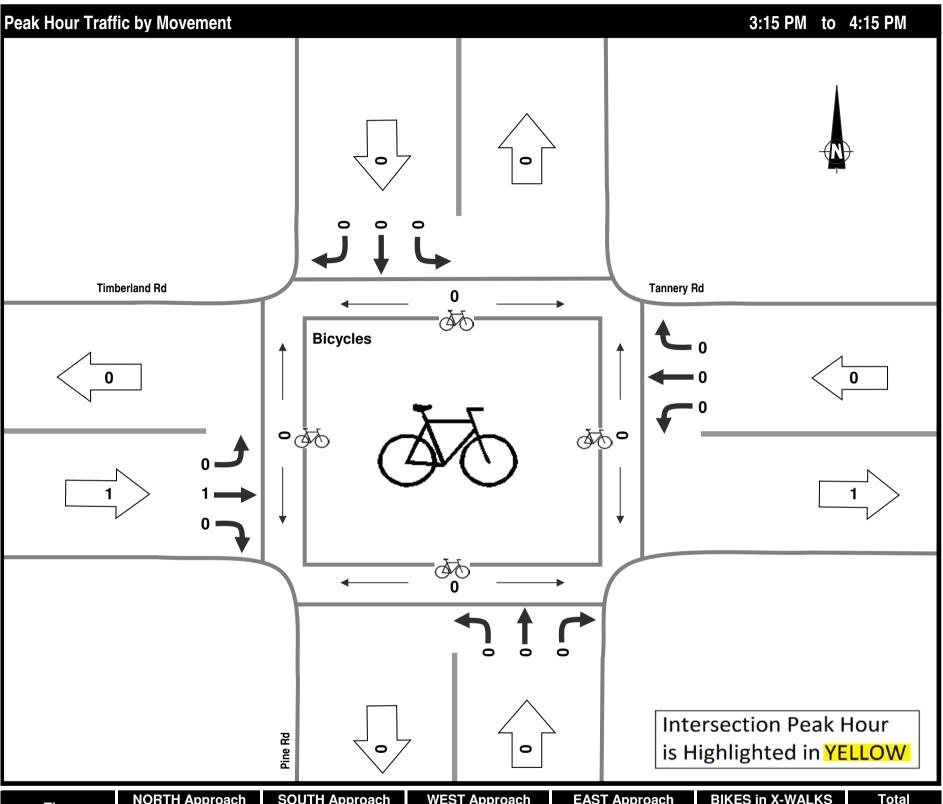
Vehicle Class: Bicycles

Project: #7019: 10880 Dyke Road Traffic Impact Study

Municipality: Surrey
Weather: Cloudy

Note: Crosswalk bike volumes shown are cyclists who rode their bike across the crosswalk and are not included in the pedestrian volume totals

Afternoon Peak Period



Time	NOR'	NORTH Approach			ГН Аррі	roach	WES	T Appr	oach	EAS	T Appro	oach	BIK	ES in	X-WAI	_KS	Total
Tille	left	thru	right	left	thru	right	left	thru	right	left	thru	right	N	S	W	E	Volumes
Peak Hour	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
PHF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25
Peak 15 X 4	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4
Average Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Survey Total	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX B Capacity Analysis Worksheets

APPENDIX C Swept Path Analysis











