Washington State Department of Transportation

Memorandum

April 30, 2018

TO: Ali Amiri, Environmental Manager
Alaskan Way Viaduct Replacement Program
MS: NB-82 66

FROM: Joe St. Charles
(360) 570-2381
MS: 47380

SUBJECT: SR 99 MP 30 Vicinity CS 1791
Alaskan Way Viaduct Demolition
Alaskan Way Lane Closure Cost Estimate
XL5684-70-0154
Cost Estimate - REVISED

This memo supersedes the previous memo dated April 24, 2018 in its entirety.

In response to your April 18, 2018 request and subsequent communication, societal costs were estimated for 24/7 lane closures on Alaskan Way during the SR 99 viaduct demolition. Volumes used were based on the estimated average weekday volumes for Alaskan Way with the SR 99 tunnel open and tolled, as stated in the 2011 Final Environmental Impact Statement and as provided by your office. The lane closures assume one lane open per direction on Alaskan Way during viaduct demolition.

The traffic delay cost based on the data you provided is estimated to be an average of **$13,000 per hour** that the lane closures are in place on Alaskan Way.

If broken down by location, the estimated cost of traffic delay is as follows:

Location #1	North of Pine Street	$ 50,054 per day	$ 2,086 per hour
Location #2	North of Seneca Street	$ 62,821 per day	$ 2,618 per hour
Location #3	South of King Street	$815,435 per day	$33,976 per hour
	Average	*$309,437 per day*	*$12,893 per hour*

The amount shown in this memo is a cost estimate only. It shall not be used for liquidated damages, incentives, or disincentives in any contract.

If you have questions or we may be of further assistance, please call Christie Vintilo at (360) 570-2417.

JSC:CLV
Attachments

cc: w/attachments
Bonnie Nau/Juan Reyes Northwest Region Traffic MS: NB-82 125

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Exhibit 1

SUMMARY

		North of Pine Location #1	North of Seneca Location #2	South of King Location #3	Daily Average
		Cost Per Day	*Cost Per Day*	*Cost Per Day*	*Cost Per Day*
Sunday	Northbound	$0	$0	$177	$59
	Southbound	$0	$0	$662	$221
	Bothway	*$0*	*$0*	*$840*	*$280*
Monday	Northbound	$50,100	$56,670	$979,679	$362,150
	Southbound	$24,425	$27,690	$193,204	$81,773
	Bothway	*$74,525*	*$84,360*	*$1,172,884*	*$443,923*
Tuesday	Northbound	$46,831	$52,921	$968,717	$356,156
	Southbound	$21,750	$45,446	$184,684	$83,960
	Bothway	*$68,581*	*$98,367*	*$1,153,401*	*$440,116*
Wednesday	Northbound	$43,884	$50,264	$927,582	$340,577
	Southbound	$39,326	$45,007	$184,490	$89,608
	Bothway	*$83,210*	*$95,271*	*$1,112,073*	*$430,184*
Thursday	Northbound	$42,995	$49,348	$920,124	$337,489
	Southbound	$20,609	$42,540	$181,949	$81,699
	Bothway	*$63,603*	*$91,887*	*$1,102,073*	*$419,188*
Friday	Northbound	$37,750	$43,943	$841,614	$307,769
	Southbound	$22,707	$25,920	$210,555	$86,394
	Bothway	*$60,457*	*$69,863*	*$1,052,169*	*$394,163*
Saturday	Northbound	$0	$0	$72,996	$24,332
	Southbound	$0	$0	$41,612	$13,871
	Bothway	*$0*	*$0*	*$114,608*	*$38,203*
BW Avg. Day by Location		*$50,054*	*$62,821*	*$815,435*	*$309,437*
BW Avg. Hour by Location		*$2,086*	*$2,618*	*$33,976*	*$12,893*
Average Day Northbound		$31,651	$36,164	$672,984	$246,933
Average Day Southbound		$18,402	$26,658	$142,451	$62,504
Bothway Average Day		$50,054	$62,821	$815,435	$309,437
Average Hour		$2,086	$2,618	$33,976	$12,893

All Locations

	Cost Per Day	*Cost Per Avg Hour*
Average weekday (M-F)	$425,515	$17,730
Average weekend day (Sa-Su)	$19,241	$802

Estimated cost of traffic delay caused by lane closures on Alaskan Way with only one lane per direction open to traffic 24/7 and with tolling on the SR 99 tunnel.

This amount does not include delay on cross streets or other roadways that may occur as a result of reduced capacity on Alaskan Way.

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

North of Pine Street | **Sunday** | **Location #1 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	116	-	-
1-2 am	800	-	71	-	-
2-3 am	800	-	57	-	-
3-4 am	800	-	48	-	-
4-5 am	800	-	59	-	-
5-6 am	800	-	97	-	-
6-7 am	800	-	149	-	-
7-8 am	800	-	198	-	-
8-9 am	800	-	276	-	-
9-10 am	800	-	350	-	-
10-11 am	800	-	436	-	-
11-noon	800	-	486	-	-
noon-1	800	-	516	-	-
1-2 pm	800	-	527	-	-
2-3 pm	800	-	508	-	-
3-4 pm	800	-	485	-	-
4-5 pm	800	-	478	-	-
5-6 pm	800	-	442	-	-
6-7 pm	800	-	375	-	-
7-8 pm	800	-	308	-	-
8-9 pm	800	-	267	-	-
9-10 pm	800	-	236	-	-
10-11 pm	800	-	187	-	-
11-midnight	800	-	113	-	-
			6785		

TOTAL DELAY 0

DELAY COST $0

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 0 hrs. x $23.02 per hour = $0

Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

North of Pine Street | **Sunday** | **Location #1 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	181	-	-
1-2 am	800	-	143	-	-
2-3 am	800	-	125	-	-
3-4 am	800	-	72	-	-
4-5 am	800	-	54	-	-
5-6 am	800	-	66	-	-
6-7 am	800	-	90	-	-
7-8 am	800	-	123	-	-
8-9 am	800	-	164	-	-
9-10 am	800	-	231	-	-
10-11 am	800	-	304	-	-
11-noon	800	-	354	-	-
noon-1	800	-	414	-	-
1-2 pm	800	-	456	-	-
2-3 pm	800	-	483	-	-
3-4 pm	800	-	519	-	-
4-5 pm	800	-	548	-	-
5-6 pm	800	-	502	-	-
6-7 pm	800	-	394	-	-
7-8 pm	800	-	325	-	-
8-9 pm	800	-	293	-	-
9-10 pm	800	-	267	-	-
10-11 pm	800	-	213	-	-
11-midnight	800	-	143	-	-
			6465		

TOTAL DELAY 0

DELAY COST $0

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 0 hrs. x $23.02 per hour = $0

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

North of Pine Street **Monday** **Location #1 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	64	-	-
1-2 am	800	-	34	-	-
2-3 am	800	-	38	-	-
3-4 am	800	-	63	-	-
4-5 am	800	-	98	-	-
5-6 am	800	-	310	-	-
6-7 am	800	-	730	-	-
7-8 am	800	800	1226	1225.63	212.8152
8-9 am	800	1600	1272	2497.772	661.7012
9-10 am	800	2400	885	3382.678	940.2251
10-11 am	800	-	617	-	-
11-noon	800	-	580	-	-
noon-1	800	-	557	-	-
1-2 pm	800	-	558	-	-
2-3 pm	800	-	645	-	-
3-4 pm	800	800	806	805.5155	2.757738
4-5 pm	800	1600	980	1785.227	95.37109
5-6 pm	800	2400	957	2741.8	263.5132
6-7 pm	800	-	588	-	-
7-8 pm	800	-	345	-	-
8-9 pm	800	-	263	-	-
9-10 pm	800	-	246	-	-
10-11 pm	800	-	191	-	-
11-midnight	800	-	117	-	-

12168

TOTAL DELAY 2176.3836

DELAY COST $50,100

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 2176.384 hrs. x $23.02 per hour = $50,100

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Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

North of Pine Street | **Monday** | **Location #1 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	95	-	-
1-2 am	800	-	58	-	-
2-3 am	800	-	49	-	-
3-4 am	800	-	42	-	-
4-5 am	800	-	77	-	-
5-6 am	800	-	196	-	-
6-7 am	800	-	405	-	-
7-8 am	800	-	697	-	-
8-9 am	800	-	625	-	-
9-10 am	800	-	464	-	-
10-11 am	800	-	417	-	-
11-noon	800	-	445	-	-
noon-1	800	-	491	-	-
1-2 pm	800	-	540	-	-
2-3 pm	800	-	694	-	-
3-4 pm	800	800	954	953.7571	76.87855
4-5 pm	800	1600	1120	2074.168	313.9628
5-6 pm	800	2400	1192	3266.211	670.1895
6-7 pm	800	-	770	-	-
7-8 pm	800	-	434	-	-
8-9 pm	800	-	345	-	-
9-10 pm	800	-	317	-	-
10-11 pm	800	-	241	-	-
11-midnight	800	-	165	-	-
			10832		

TOTAL DELAY 1061.03082

DELAY COST $24,425

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 1061.031 hrs. x $23.02 per hour = $24,425

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

North of Pine Street | **Tuesday** | **Location #1 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	59	-	-
1-2 am	800	-	36	-	-
2-3 am	800	-	42	-	-
3-4 am	800	-	59	-	-
4-5 am	800	-	90	-	-
5-6 am	800	-	291	-	-
6-7 am	800	-	717	-	-
7-8 am	800	800	1184	1183.773	191.8866
8-9 am	800	1600	1247	2430.809	607.2909
9-10 am	800	2400	922	3353.048	891.9284
10-11 am	800	-	645	-	-
11-noon	800	-	589	-	-
noon-1	800	-	560	-	-
1-2 pm	800	-	551	-	-
2-3 pm	800	-	639	-	-
3-4 pm	800	-	794	-	-
4-5 pm	800	800	968	967.8627	83.93137
5-6 pm	800	1600	983	1950.746	259.3043
6-7 pm	800	-	628	-	-
7-8 pm	800	-	363	-	-
8-9 pm	800	-	281	-	-
9-10 pm	800	-	248	-	-
10-11 pm	800	-	195	-	-
11-midnight	800	-	113	-	-
			12204		

TOTAL DELAY 2034.34153

DELAY COST $46,831

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 2034.342 hrs. x $23.02 per hour = $46,831

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

North of Pine Street | **Tuesday** | **Location #1 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	88	-	-
1-2 am	800	-	64	-	-
2-3 am	800	-	55	-	-
3-4 am	800	-	43	-	-
4-5 am	800	-	71	-	-
5-6 am	800	-	181	-	-
6-7 am	800	-	385	-	-
7-8 am	800	-	673	-	-
8-9 am	800	-	614	-	-
9-10 am	800	-	462	-	-
10-11 am	800	-	407	-	-
11-noon	800	-	440	-	-
noon-1	800	-	489	-	-
1-2 pm	800	-	544	-	-
2-3 pm	800	-	686	-	-
3-4 pm	800	800	934	933.7891	66.89455
4-5 pm	800	1600	1084	2018.241	276.0148
5-6 pm	800	2400	1167	3185.606	601.9233
6-7 pm	800	-	793	-	-
7-8 pm	800	-	462	-	-
8-9 pm	800	-	361	-	-
9-10 pm	800	-	350	-	-
10-11 pm	800	-	270	-	-
11-midnight	800	-	174	-	-
			10796		

TOTAL DELAY	944.83271
DELAY COST	$21,750

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 944.8327 hrs. x $23.02 per hour = $21,750

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CALCSv2 SR 99 Alaskan Way Lane Closures 2018.xlsx Tab: Pine Tu

Exhibit 1

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

North of Pine Street **Wednesday** **Location #1 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	58	-	-
1-2 am	800	-	33	-	-
2-3 am	800	-	35	-	-
3-4 am	800	-	59	-	-
4-5 am	800	-	90	-	-
5-6 am	800	-	282	-	-
6-7 am	800	-	686	-	-
7-8 am	800	800	1148	1147.583	173.7913
8-9 am	800	1600	1214	2361.438	554.5102
9-10 am	800	2400	904	3265.28	813.3588
10-11 am	800	-	639	-	-
11-noon	800	-	607	-	-
noon-1	800	-	555	-	-
1-2 pm	800	-	559	-	-
2-3 pm	800	-	641	-	-
3-4 pm	800	800	801	801.266	0.632985
4-5 pm	800	1600	981	1781.864	91.56483
5-6 pm	800	2400	981	2763.106	272.4848
6-7 pm	800	-	648	-	-
7-8 pm	800	-	381	-	-
8-9 pm	800	-	289	-	-
9-10 pm	800	-	267	-	-
10-11 pm	800	-	207	-	-
11-midnight	800	-	124	-	-
			12188		

TOTAL DELAY 1906.34297

DELAY COST $43,884

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 1906.343 hrs. x $23.02 per hour = $43,884

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

North of Pine Street **Wednesday** **Location #1 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	93	-	-
1-2 am	800	-	68	-	-
2-3 am	800	-	58	-	-
3-4 am	800	-	43	-	-
4-5 am	800	-	68	-	-
5-6 am	800	-	173	-	-
6-7 am	800	-	369	-	-
7-8 am	800	-	657	-	-
8-9 am	800	-	593	-	-
9-10 am	800	-	455	-	-
10-11 am	800	-	400	-	-
11-noon	800	-	431	-	-
noon-1	800	-	492	-	-
1-2 pm	800	-	545	-	-
2-3 pm	800	-	695	-	-
3-4 pm	800	800	936	935.8896	67.9448
4-5 pm	800	1600	1082	2018.112	277.0006
5-6 pm	800	2400	1147	3165.332	591.7217
6-7 pm	800	3200	813	3978.001	771.6666
7-8 pm	800	-	470	-	-
8-9 pm	800	-	380	-	-
9-10 pm	800	-	358	-	-
10-11 pm	800	-	286	-	-
11-midnight	800	-	197	-	-
			10812		

TOTAL DELAY 1708.33373

DELAY COST $39,326

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 1708.334 hrs. x $23.02 per hour = $39,326

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

North of Pine Street | **Thursday** | **Location #1 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	61	-	-
1-2 am	800	-	36	-	-
2-3 am	800	-	35	-	-
3-4 am	800	-	58	-	-
4-5 am	800	-	90	-	-
5-6 am	800	-	274	-	-
6-7 am	800	-	684	-	-
7-8 am	800	800	1129	1128.829	164.4146
8-9 am	800	1600	1189	2318.248	523.5386
9-10 am	800	2400	907	3225.353	771.8005
10-11 am	800	-	646	-	-
11-noon	800	-	604	-	-
noon-1	800	-	572	-	-
1-2 pm	800	-	564	-	-
2-3 pm	800	-	650	-	-
3-4 pm	800	800	814	813.55	6.775021
4-5 pm	800	1600	994	1807.818	110.6838
5-6 pm	800	2400	965	2773.172	290.4947
6-7 pm	800	-	640	-	-
7-8 pm	800	-	386	-	-
8-9 pm	800	-	303	-	-
9-10 pm	800	-	280	-	-
10-11 pm	800	-	218	-	-
11-midnight	800	-	136	-	-
			12235		

TOTAL DELAY 1867.70726

DELAY COST $42,995

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 1867.707 hrs. x $23.02 per hour = $42,995

Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

North of Pine Street | **Thursday** | **Location #1 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	100	-	-
1-2 am	800	-	76	-	-
2-3 am	800	-	65	-	-
3-4 am	800	-	44	-	-
4-5 am	800	-	69	-	-
5-6 am	800	-	171	-	-
6-7 am	800	-	359	-	-
7-8 am	800	-	640	-	-
8-9 am	800	-	584	-	-
9-10 am	800	-	455	-	-
10-11 am	800	-	400	-	-
11-noon	800	-	433	-	-
noon-1	800	-	484	-	-
1-2 pm	800	-	553	-	-
2-3 pm	800	-	699	-	-
3-4 pm	800	800	936	936.2869	68.14345
4-5 pm	800	1600	1068	2004.391	270.3387
5-6 pm	800	2400	1105	3109.149	556.7699
6-7 pm	800	-	800	-	-
7-8 pm	800	-	483	-	-
8-9 pm	800	-	377	-	-
9-10 pm	800	-	369	-	-
10-11 pm	800	-	297	-	-
11-midnight	800	-	198	-	-
			10765		

TOTAL DELAY 895.25206

DELAY COST $20,609

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 895.2521 hrs. x $23.02 per hour = $20,609

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Exhibit 1

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

North of Pine Street | **Friday** | **Location #1 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	68	-	-
1-2 am	800	-	38	-	-
2-3 am	800	-	37	-	-
3-4 am	800	-	59	-	-
4-5 am	800	-	92	-	-
5-6 am	800	-	264	-	-
6-7 am	800	-	640	-	-
7-8 am	800	800	1102	1101.739	150.8693
8-9 am	800	1600	1127	2228.443	465.0908
9-10 am	800	2400	820	3048.017	638.2299
10-11 am	800	-	623	-	-
11-noon	800	-	621	-	-
noon-1	800	-	590	-	-
1-2 pm	800	-	582	-	-
2-3 pm	800	-	673	-	-
3-4 pm	800	800	840	839.6984	19.84922
4-5 pm	800	1600	959	1798.843	119.2706
5-6 pm	800	2400	895	2694.295	246.5686
6-7 pm	800	-	625	-	-
7-8 pm	800	-	411	-	-
8-9 pm	800	-	309	-	-
9-10 pm	800	-	293	-	-
10-11 pm	800	-	259	-	-
11-midnight	800	-	180	-	-
			12107		

TOTAL DELAY 1639.87836

DELAY COST $37,750

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 1639.878 hrs. x $23.02 per hour = $37,750

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Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

North of Pine Street **Friday** **Location #1 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	116	-	-
1-2 am	800	-	90	-	-
2-3 am	800	-	75	-	-
3-4 am	800	-	48	-	-
4-5 am	800	-	69	-	-
5-6 am	800	-	158	-	-
6-7 am	800	-	334	-	-
7-8 am	800	-	592	-	-
8-9 am	800	-	555	-	-
9-10 am	800	-	438	-	-
10-11 am	800	-	413	-	-
11-noon	800	-	456	-	-
noon-1	800	-	542	-	-
1-2 pm	800	-	619	-	-
2-3 pm	800	-	764	-	-
3-4 pm	800	800	989	988.5474	94.27368
4-5 pm	800	1600	1056	2044.414	316.4806
5-6 pm	800	2400	1062	3106.841	575.6274
6-7 pm	800	-	764	-	-
7-8 pm	800	-	481	-	-
8-9 pm	800	-	348	-	-
9-10 pm	800	-	343	-	-
10-11 pm	800	-	324	-	-
11-midnight	800	-	258	-	-
			10893		

TOTAL DELAY 986.381664

DELAY COST $22,707

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 986.3817 hrs. x $23.02 per hour = $22,707

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Exhibit 1

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

North of Pine Street | **Saturday** | **Location #1 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	110	-	-
1-2 am	800	-	63	-	-
2-3 am	800	-	48	-	-
3-4 am	800	-	51	-	-
4-5 am	800	-	67	-	-
5-6 am	800	-	122	-	-
6-7 am	800	-	193	-	-
7-8 am	800	-	289	-	-
8-9 am	800	-	402	-	-
9-10 am	800	-	474	-	-
10-11 am	800	-	529	-	-
11-noon	800	-	591	-	-
noon-1	800	-	627	-	-
1-2 pm	800	-	629	-	-
2-3 pm	800	-	581	-	-
3-4 pm	800	-	552	-	-
4-5 pm	800	-	548	-	-
5-6 pm	800	-	541	-	-
6-7 pm	800	-	484	-	-
7-8 pm	800	-	362	-	-
8-9 pm	800	-	295	-	-
9-10 pm	800	-	295	-	-
10-11 pm	800	-	279	-	-
11-midnight	800	-	190	-	-
			8322		

TOTAL DELAY 0

DELAY COST $0

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 0 hrs. x $23.02 per hour = $0

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Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

North of Pine Street | **Saturday** | **Location #1 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	184	-	-
1-2 am	800	-	149	-	-
2-3 am	800	-	121	-	-
3-4 am	800	-	68	-	-
4-5 am	800	-	61	-	-
5-6 am	800	-	78	-	-
6-7 am	800	-	121	-	-
7-8 am	800	-	173	-	-
8-9 am	800	-	255	-	-
9-10 am	800	-	320	-	-
10-11 am	800	-	387	-	-
11-noon	800	-	440	-	-
noon-1	800	-	477	-	-
1-2 pm	800	-	512	-	-
2-3 pm	800	-	576	-	-
3-4 pm	800	-	634	-	-
4-5 pm	800	-	651	-	-
5-6 pm	800	-	614	-	-
6-7 pm	800	-	537	-	-
7-8 pm	800	-	392	-	-
8-9 pm	800	-	305	-	-
9-10 pm	800	-	315	-	-
10-11 pm	800	-	324	-	-
11-midnight	800	-	269	-	-
			7961		

TOTAL DELAY 0

DELAY COST $0

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 0 hrs. x $23.02 per hour = $0

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

North of Seneca St | **Sunday** | **Location #2 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	120	-	-
1-2 am	800	-	73	-	-
2-3 am	800	-	58	-	-
3-4 am	800	-	49	-	-
4-5 am	800	-	61	-	-
5-6 am	800	-	100	-	-
6-7 am	800	-	153	-	-
7-8 am	800	-	204	-	-
8-9 am	800	-	285	-	-
9-10 am	800	-	360	-	-
10-11 am	800	-	450	-	-
11-noon	800	-	501	-	-
noon-1	800	-	532	-	-
1-2 pm	800	-	543	-	-
2-3 pm	800	-	523	-	-
3-4 pm	800	-	499	-	-
4-5 pm	800	-	493	-	-
5-6 pm	800	-	455	-	-
6-7 pm	800	-	387	-	-
7-8 pm	800	-	318	-	-
8-9 pm	800	-	275	-	-
9-10 pm	800	-	243	-	-
10-11 pm	800	-	192	-	-
11-midnight	800	-	117	-	-
			6992		

TOTAL DELAY 0

DELAY COST $0

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 0 hrs. x $23.02 per hour = $0

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

North of Seneca St | **Sunday** | **Location #2 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	186	-	-
1-2 am	800	-	147	-	-
2-3 am	800	-	128	-	-
3-4 am	800	-	75	-	-
4-5 am	800	-	56	-	-
5-6 am	800	-	68	-	-
6-7 am	800	-	93	-	-
7-8 am	800	-	127	-	-
8-9 am	800	-	169	-	-
9-10 am	800	-	238	-	-
10-11 am	800	-	314	-	-
11-noon	800	-	365	-	-
noon-1	800	-	427	-	-
1-2 pm	800	-	470	-	-
2-3 pm	800	-	498	-	-
3-4 pm	800	-	535	-	-
4-5 pm	800	-	564	-	-
5-6 pm	800	-	517	-	-
6-7 pm	800	-	406	-	-
7-8 pm	800	-	335	-	-
8-9 pm	800	-	302	-	-
9-10 pm	800	-	275	-	-
10-11 pm	800	-	219	-	-
11-midnight	800	-	147	-	-
			6662		

TOTAL DELAY 0

DELAY COST $0

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 0 hrs. x $23.02 per hour = $0

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

North of Seneca St | **Monday** | **Location #2 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	66	-	-
1-2 am	800	-	35	-	-
2-3 am	800	-	39	-	-
3-4 am	800	-	65	-	-
4-5 am	800	-	101	-	-
5-6 am	800	-	320	-	-
6-7 am	800	-	752	-	-
7-8 am	800	800	1263	1262.932	231.4661
8-9 am	800	1600	1311	2573.791	718.3617
9-10 am	800	2400	912	3485.629	1029.71
10-11 am	800	-	636	-	-
11-noon	800	-	597	-	-
noon-1	800	-	574	-	-
1-2 pm	800	-	575	-	-
2-3 pm	800	-	665	-	-
3-4 pm	800	800	830	830.0312	15.01558
4-5 pm	800	1600	1010	1839.56	134.7954
5-6 pm	800	2400	986	2825.246	332.4028
6-7 pm	800	-	605	-	-
7-8 pm	800	-	355	-	-
8-9 pm	800	-	271	-	-
9-10 pm	800	-	253	-	-
10-11 pm	800	-	196	-	-
11-midnight	800	-	120	-	-
			12538		

TOTAL DELAY 2461.75179

DELAY COST $56,670

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 2461.752 hrs. x $23.02 per hour = $56,670

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

North of Seneca St	Monday	Location #2 Southbound

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	98	-	-
1-2 am	800	-	59	-	-
2-3 am	800	-	50	-	-
3-4 am	800	-	44	-	-
4-5 am	800	-	79	-	-
5-6 am	800	-	202	-	-
6-7 am	800	-	418	-	-
7-8 am	800	-	718	-	-
8-9 am	800	-	644	-	-
9-10 am	800	-	478	-	-
10-11 am	800	-	430	-	-
11-noon	800	-	459	-	-
noon-1	800	-	506	-	-
1-2 pm	800	-	556	-	-
2-3 pm	800	-	715	-	-
3-4 pm	800	800	983	982.7845	91.39225
4-5 pm	800	1600	1155	2137.295	360.0399
5-6 pm	800	2400	1228	3365.617	751.4562
6-7 pm	800	-	793	-	-
7-8 pm	800	-	447	-	-
8-9 pm	800	-	356	-	-
9-10 pm	800	-	326	-	-
10-11 pm	800	-	248	-	-
11-midnight	800	-	170	-	-
			11162		

TOTAL DELAY 1202.88828

DELAY COST -$27,690

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 1202.888 hrs. x $23.02 per hour = $27,690

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

North of Seneca St **Tuesday** **Location #2 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	61	-	-
1-2 am	800	-	37	-	-
2-3 am	800	-	43	-	-
3-4 am	800	-	61	-	-
4-5 am	800	-	93	-	-
5-6 am	800	-	300	-	-
6-7 am	800	-	739	-	-
7-8 am	800	800	1220	1219.801	209.9005
8-9 am	800	1600	1285	2504.79	662.2955
9-10 am	800	2400	950	3455.097	979.9436
10-11 am	800	-	664	-	-
11-noon	800	-	607	-	-
noon-1	800	-	577	-	-
1-2 pm	800	-	568	-	-
2-3 pm	800	-	658	-	-
3-4 pm	800	800	818	817.7517	8.875874
4-5 pm	800	1600	997	1815.071	116.4115
5-6 pm	800	2400	1013	2827.868	321.4696
6-7 pm	800	-	647	-	-
7-8 pm	800	-	374	-	-
8-9 pm	800	-	289	-	-
9-10 pm	800	-	256	-	-
10-11 pm	800	-	201	-	-
11-midnight	800	-	116	-	-
			12575		

TOTAL DELAY 2298.89651

DELAY COST $52,921

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 2298.897 hrs. x $23.02 per hour = $52,921

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Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

North of Seneca St | **Tuesday** | **Location #2 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	91	-	-
1-2 am	800	-	66	-	-
2-3 am	800	-	57	-	-
3-4 am	800	-	44	-	-
4-5 am	800	-	73	-	-
5-6 am	800	-	186	-	-
6-7 am	800	-	396	-	-
7-8 am	800	-	694	-	-
8-9 am	800	-	632	-	-
9-10 am	800	-	476	-	-
10-11 am	800	-	420	-	-
11-noon	800	-	453	-	-
noon-1	800	-	504	-	-
1-2 pm	800	-	560	-	-
2-3 pm	800	-	707	-	-
3-4 pm	800	800	962	962.2088	81.10439
4-5 pm	800	1600	1117	2079.665	320.937
5-6 pm	800	2400	1203	3282.559	681.1123
6-7 pm	800	3200	817	4099.536	891.0475
7-8 pm	800	-	476	-	-
8-9 pm	800	-	372	-	-
9-10 pm	800	-	361	-	-
10-11 pm	800	-	278	-	-
11-midnight	800	-	179	-	-
			11125		

TOTAL DELAY 1974.20122

DELAY COST $45,446

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 1974.201 hrs. x $23.02 per hour = $45,446

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Exhibit 1

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

North of Seneca St **Wednesday** **Location #2 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	59	-	-
1-2 am	800	-	34	-	-
2-3 am	800	-	36	-	-
3-4 am	800	-	61	-	-
4-5 am	800	-	93	-	-
5-6 am	800	-	290	-	-
6-7 am	800	-	707	-	-
7-8 am	800	800	1183	1182.509	191.2545
8-9 am	800	1600	1251	2433.308	607.9084
9-10 am	800	2400	931	3364.658	898.9827
10-11 am	800	-	659	-	-
11-noon	800	-	626	-	-
noon-1	800	-	572	-	-
1-2 pm	800	-	576	-	-
2-3 pm	800	-	661	-	-
3-4 pm	800	800	826	825.6523	12.82616
4-5 pm	800	1600	1010	1836.094	130.8733
5-6 pm	800	2400	1011	2847.201	341.6474
6-7 pm	800	-	668	-	-
7-8 pm	800	-	393	-	-
8-9 pm	800	-	298	-	-
9-10 pm	800	-	275	-	-
10-11 pm	800	-	213	-	-
11-midnight	800	-	128	-	-
			12559		

TOTAL DELAY 2183.49254

DELAY COST $50,264

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 2183.493 hrs. x $23.02 per hour = $50,264

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

North of Seneca St **Wednesday** **Location #2 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	96	-	-
1-2 am	800	-	70	-	-
2-3 am	800	-	59	-	-
3-4 am	800	-	45	-	-
4-5 am	800	-	70	-	-
5-6 am	800	-	179	-	-
6-7 am	800	-	381	-	-
7-8 am	800	-	677	-	-
8-9 am	800	-	611	-	-
9-10 am	800	-	469	-	-
10-11 am	800	-	412	-	-
11-noon	800	-	444	-	-
noon-1	800	-	507	-	-
1-2 pm	800	-	561	-	-
2-3 pm	800	-	716	-	-
3-4 pm	800	800	964	964.3732	82.1866
4-5 pm	800	1600	1115	2079.532	321.9528
5-6 pm	800	2400	1182	3261.668	670.6002
6-7 pm	800	3200	837	4099.071	880.3695
7-8 pm	800	-	485	-	-
8-9 pm	800	-	392	-	-
9-10 pm	800	-	369	-	-
10-11 pm	800	-	295	-	-
11-midnight	800	-	203	-	-
			11141		

TOTAL DELAY 1955.1091

DELAY COST $45,007

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 1955.109 hrs. x $23.02 per hour = $45,007

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

North of Seneca St | **Thursday** | **Location #2 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	63	-	-
1-2 am	800	-	37	-	-
2-3 am	800	-	36	-	-
3-4 am	800	-	59	-	-
4-5 am	800	-	93	-	-
5-6 am	800	-	283	-	-
6-7 am	800	-	704	-	-
7-8 am	800	800	1163	1163.185	181.5925
8-9 am	800	1600	1226	2388.803	575.9941
9-10 am	800	2400	935	3323.516	856.1597
10-11 am	800	-	665	-	-
11-noon	800	-	623	-	-
noon-1	800	-	589	-	-
1-2 pm	800	-	581	-	-
2-3 pm	800	-	670	-	-
3-4 pm	800	800	838	838.3103	19.15513
4-5 pm	800	1600	1025	1862.838	150.5742
5-6 pm	800	2400	995	2857.573	360.2054
6-7 pm	800	-	659	-	-
7-8 pm	800	-	398	-	-
8-9 pm	800	-	312	-	-
9-10 pm	800	-	288	-	-
10-11 pm	800	-	225	-	-
11-midnight	800	-	140	-	-
			12608		

TOTAL DELAY 2143.68096

DELAY COST $49,348

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 2143.681 hrs. x $23.02 per hour = $49,348

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Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

North of Seneca St | **Thursday** | **Location #2 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	103	-	-
1-2 am	800	-	78	-	-
2-3 am	800	-	67	-	-
3-4 am	800	-	45	-	-
4-5 am	800	-	71	-	-
5-6 am	800	-	177	-	-
6-7 am	800	-	370	-	-
7-8 am	800	-	659	-	-
8-9 am	800	-	602	-	-
9-10 am	800	-	469	-	-
10-11 am	800	-	412	-	-
11-noon	800	-	446	-	-
noon-1	800	-	499	-	-
1-2 pm	800	-	570	-	-
2-3 pm	800	-	720	-	-
3-4 pm	800	800	965	964.7826	82.39129
4-5 pm	800	1600	1101	2065.394	315.0882
5-6 pm	800	2400	1138	3203.775	634.5846
6-7 pm	800	3200	824	4028.001	815.8881
7-8 pm	800	-	498	-	-
8-9 pm	800	-	389	-	-
9-10 pm	800	-	380	-	-
10-11 pm	800	-	306	-	-
11-midnight	800	-	204	-	-
			11092		

TOTAL DELAY 1847.95218

DELAY COST $42,540

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 1847.952 hrs. x $23.02 per hour = $42,540

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Exhibit 1

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

North of Seneca St **Friday** **Location #2 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	70	-	-
1-2 am	800	-	39	-	-
2-3 am	800	-	38	-	-
3-4 am	800	-	61	-	-
4-5 am	800	-	95	-	-
5-6 am	800	-	272	-	-
6-7 am	800	-	659	-	-
7-8 am	800	800	1135	1135.27	167.6349
8-9 am	800	1600	1161	2296.265	515.7675
9-10 am	800	2400	845	3140.782	718.5238
10-11 am	800	-	642	-	-
11-noon	800	-	639	-	-
noon-1	800	-	608	-	-
1-2 pm	800	-	600	-	-
2-3 pm	800	-	694	-	-
3-4 pm	800	800	865	865.2545	32.62724
4-5 pm	800	1600	988	1853.59	159.4223
5-6 pm	800	2400	923	2776.295	314.9425
6-7 pm	800	-	644	-	-
7-8 pm	800	-	423	-	-
8-9 pm	800	-	318	-	-
9-10 pm	800	-	302	-	-
10-11 pm	800	-	266	-	-
11-midnight	800	-	185	-	-
			12475		

TOTAL DELAY 1908.91814

DELAY COST $43,943

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 1908.918 hrs. x $23.02 per hour = $43,943

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Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

North of Seneca St **Friday** **Location #2 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	119	-	-
1-2 am	800	-	93	-	-
2-3 am	800	-	78	-	-
3-4 am	800	-	50	-	-
4-5 am	800	-	71	-	-
5-6 am	800	-	163	-	-
6-7 am	800	-	344	-	-
7-8 am	800	-	610	-	-
8-9 am	800	-	571	-	-
9-10 am	800	-	452	-	-
10-11 am	800	-	425	-	-
11-noon	800	-	470	-	-
noon-1	800	-	559	-	-
1-2 pm	800	-	638	-	-
2-3 pm	800	-	787	-	-
3-4 pm	800	800	1019	1018.634	109.3168
4-5 pm	800	1600	1088	2106.635	362.6343
5-6 pm	800	2400	1095	3201.397	654.0161
6-7 pm	800	-	788	-	-
7-8 pm	800	-	495	-	-
8-9 pm	800	-	359	-	-
9-10 pm	800	-	353	-	-
10-11 pm	800	-	334	-	-
11-midnight	800	-	266	-	-
			11225		

TOTAL DELAY 1125.96719

DELAY COST $25,920

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 1125.967 hrs. x $23.02 per hour = $25,920

Exhibit 1

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

North of Seneca St | **Saturday** | **Location #2 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	113	-	-
1-2 am	800	-	65	-	-
2-3 am	800	-	49	-	-
3-4 am	800	-	53	-	-
4-5 am	800	-	69	-	-
5-6 am	800	-	126	-	-
6-7 am	800	-	199	-	-
7-8 am	800	-	298	-	-
8-9 am	800	-	414	-	-
9-10 am	800	-	488	-	-
10-11 am	800	-	545	-	-
11-noon	800	-	609	-	-
noon-1	800	-	646	-	-
1-2 pm	800	-	648	-	-
2-3 pm	800	-	599	-	-
3-4 pm	800	-	569	-	-
4-5 pm	800	-	564	-	-
5-6 pm	800	-	558	-	-
6-7 pm	800	-	498	-	-
7-8 pm	800	-	373	-	-
8-9 pm	800	-	304	-	-
9-10 pm	800	-	304	-	-
10-11 pm	800	-	288	-	-
11-midnight	800	-	196	-	-
			8575		

TOTAL DELAY 0

DELAY COST $0

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 0 hrs. x $23.02 per hour = $0

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Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

North of Seneca St | **Saturday** | **Location #2 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	189	-	-
1-2 am	800	-	153	-	-
2-3 am	800	-	124	-	-
3-4 am	800	-	70	-	-
4-5 am	800	-	63	-	-
5-6 am	800	-	80	-	-
6-7 am	800	-	124	-	-
7-8 am	800	-	178	-	-
8-9 am	800	-	262	-	-
9-10 am	800	-	330	-	-
10-11 am	800	-	399	-	-
11-noon	800	-	453	-	-
noon-1	800	-	492	-	-
1-2 pm	800	-	528	-	-
2-3 pm	800	-	593	-	-
3-4 pm	800	-	654	-	-
4-5 pm	800	-	671	-	-
5-6 pm	800	-	632	-	-
6-7 pm	800	-	553	-	-
7-8 pm	800	-	404	-	-
8-9 pm	800	-	314	-	-
9-10 pm	800	-	325	-	-
10-11 pm	800	-	333	-	-
11-midnight	800	-	277	-	-

$203

TOTAL DELAY 0

DELAY COST $0

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 0 hrs. x $23.02 per hour = $0

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Exhibit 1

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

South of King St | **Sunday** | **Location #3 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	180	-	-
1-2 am	800	-	110	-	-
2-3 am	800	-	87	-	-
3-4 am	800	-	74	-	-
4-5 am	800	-	91	-	-
5-6 am	800	-	151	-	-
6-7 am	800	-	230	-	-
7-8 am	800	-	306	-	-
8-9 am	800	-	428	-	-
9-10 am	800	-	541	-	-
10-11 am	800	-	675	-	-
11-noon	800	-	752	-	-
noon-1	800	-	799	-	-
1-2 pm	800	800	815	815.4097	7.704838
2-3 pm	800	-	786	-	-
3-4 pm	800	-	750	-	-
4-5 pm	800	-	741	-	-
5-6 pm	800	-	684	-	-
6-7 pm	800	-	581	-	-
7-8 pm	800	-	477	-	-
8-9 pm	800	-	413	-	-
9-10 pm	800	-	365	-	-
10-11 pm	800	-	289	-	-
11-midnight	800	-	175	-	-
			10502		

TOTAL DELAY 7.70483822

DELAY COST $177

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 7.704838 hrs. x $23.02 per hour = $177

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Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

South of King St | **Sunday** | **Location #3 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	280	-	-
1-2 am	800	-	221	-	-
2-3 am	800	-	193	-	-
3-4 am	800	-	112	-	-
4-5 am	800	-	84	-	-
5-6 am	800	-	103	-	-
6-7 am	800	-	140	-	-
7-8 am	800	-	190	-	-
8-9 am	800	-	254	-	-
9-10 am	800	-	357	-	-
10-11 am	800	-	471	-	-
11-noon	800	-	549	-	-
noon-1	800	-	641	-	-
1-2 pm	800	-	706	-	-
2-3 pm	800	-	748	-	-
3-4 pm	800	800	803	803.2953	1.647629
4-5 pm	800	1600	848	1650.961	27.12816
5-6 pm	800	-	777	-	-
6-7 pm	800	-	610	-	-
7-8 pm	800	-	504	-	-
8-9 pm	800	-	453	-	-
9-10 pm	800	-	413	-	-
10-11 pm	800	-	329	-	-
11-midnight	800	-	221	-	-
			10006		

TOTAL DELAY 28.7757899

DELAY COST $662

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 28.77579 hrs. x $23.02 per hour = $662

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Exhibit 1

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

South of King St **Monday** **Location #3 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	99	-	-
1-2 am	800	-	53	-	-
2-3 am	800	-	59	-	-
3-4 am	800	-	97	-	-
4-5 am	800	-	152	-	-
5-6 am	800	-	480	-	-
6-7 am	800	800	1130	1129.962	164.9812
7-8 am	800	1600	1897	3027.025	878.4937
8-9 am	800	2400	1969	4996.079	2011.552
9-10 am	800	3200	1370	6365.76	2880.919
10-11 am	800	4000	955	7321.146	3243.453
11-noon	800	4800	898	8218.651	3369.898
noon-1	800	5600	862	9080.817	3449.734
1-2 pm	800	6400	864	9944.726	3512.771
2-3 pm	800	7200	998	10942.91	3643.82
3-4 pm	800	8000	1247	12189.71	3966.313
4-5 pm	800	8800	1516	13706.13	4547.923
5-6 pm	800	9600	1481	15186.74	5246.439
6-7 pm	800	10400	909	16096.15	5641.448
7-8 pm	800	-	534	-	-
8-9 pm	800	-	407	-	-
9-10 pm	800	-	381	-	-
10-11 pm	800	-	295	-	-
11-midnight	800	-	181	-	-
			18833		

TOTAL DELAY 42557.7462

DELAY COST $979,679

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 42557.75 hrs. x $23.02 per hour = $979,679

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Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

South of King St | **Monday** | **Location #3 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	146	-	-
1-2 am	800	-	89	-	-
2-3 am	800	-	76	-	-
3-4 am	800	-	66	-	-
4-5 am	800	-	119	-	-
5-6 am	800	-	304	-	-
6-7 am	800	-	627	-	-
7-8 am	800	800	1079	1079.246	139.6232
8-9 am	800	1600	967	2046.346	362.7964
9-10 am	800	-	718	-	-
10-11 am	800	-	646	-	-
11-noon	800	-	689	-	-
noon-1	800	-	761	-	-
1-2 pm	800	800	835	835.1017	17.55085
2-3 pm	800	1600	1074	1908.791	171.9462
3-4 pm	800	2400	1476	3385.041	646.9157
4-5 pm	800	3200	1734	5119.243	1452.142
5-6 pm	800	4000	1845	6964.317	2441.78
6-7 pm	800	4800	1192	8155.951	3160.134
7-8 pm	800	-	672	-	-
8-9 pm	800	-	535	-	-
9-10 pm	800	-	490	-	-
10-11 pm	800	-	373	-	-
11-midnight	800	-	255	-	-
			16767		

TOTAL DELAY 8392.8872

DELAY COST $193,204

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 8392.887 hrs. x $23.02 per hour = $193,204

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Exhibit 1

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

South of King St | **Tuesday** | **Location #3 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	91	-	-
1-2 am	800	-	56	-	-
2-3 am	800	-	65	-	-
3-4 am	800	-	92	-	-
4-5 am	800	-	140	-	-
5-6 am	800	-	451	-	-
6-7 am	800	800	1110	1110.437	155.2186
7-8 am	800	1600	1832	2942.712	826.5747
8-9 am	800	2400	1930	4872.907	1907.809
9-10 am	800	3200	1427	6300.372	2786.639
10-11 am	800	4000	998	7298.106	3199.239
11-noon	800	4800	912	8210.036	3354.071
noon-1	800	5600	866	9076.446	3443.241
1-2 pm	800	6400	853	9929.118	3502.782
2-3 pm	800	7200	988	10917.53	3623.325
3-4 pm	800	8000	1228	12145.88	3931.707
4-5 pm	800	8800	1498	13643.97	4494.926
5-6 pm	800	9600	1521	15165.3	5204.633
6-7 pm	800	10400	972	16137.44	5651.371
7-8 pm	800	-	562	-	-
8-9 pm	800	-	435	-	-
9-10 pm	800	-	385	-	-
10-11 pm	800	-	302	-	-
11-midnight	800	-	174	-	-
			18890		

TOTAL DELAY 42081.5371

DELAY COST $968,717

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 42081.54 hrs. x $23.02 per hour = $968,717

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Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

South of King St | **Tuesday** | **Location #3 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	136	-	-
1-2 am	800	-	100	-	-
2-3 am	800	-	86	-	-
3-4 am	800	-	66	-	-
4-5 am	800	-	110	-	-
5-6 am	800	-	280	-	-
6-7 am	800	-	595	-	-
7-8 am	800	800	1042	1041.75	120.8751
8-9 am	800	1600	950	1991.583	316.6665
9-10 am	800	-	715	-	-
10-11 am	800	-	630	-	-
11-noon	800	-	681	-	-
noon-1	800	-	757	-	-
1-2 pm	800	800	842	841.9158	20.9579
2-3 pm	800	1600	1061	1903.188	172.5519
3-4 pm	800	2400	1445	3348.531	625.8596
4-5 pm	800	3200	1679	5027.073	1387.802
5-6 pm	800	4000	1807	6833.952	2330.513
6-7 pm	800	4800	1227	8061.141	3047.546
7-8 pm	800	-	715	-	-
8-9 pm	800	-	559	-	-
9-10 pm	800	-	542	-	-
10-11 pm	800	-	417	-	-
11-midnight	800	-	269	-	-
			16710		

TOTAL DELAY 8022.77255

DELAY COST $184,684

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 8022.773 hrs. x $23.02 per hour = $184,684

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Exhibit 1

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

South of King St | **Wednesday** | **Location #3 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	89	-	-
1-2 am	800	-	51	-	-
2-3 am	800	-	55	-	-
3-4 am	800	-	91	-	-
4-5 am	800	-	140	-	-
5-6 am	800	-	436	-	-
6-7 am	800	800	1062	1061.671	130.8353
7-8 am	800	1600	1776	2837.929	749.7999
8-9 am	800	2400	1879	4716.766	1777.347
9-10 am	800	3200	1399	6115.756	2616.261
10-11 am	800	4000	989	7105.212	3010.484
11-noon	800	4800	940	8045.025	3175.119
noon-1	800	5600	859	8903.593	3274.309
1-2 pm	800	6400	865	9768.883	3336.238
2-3 pm	800	7200	992	10761.05	3464.966
3-4 pm	800	8000	1240	12001.27	3781.159
4-5 pm	800	8800	1518	13519.06	4360.166
5-6 pm	800	9600	1519	15037.86	5078.46
6-7 pm	800	10400	1003	16041.12	5539.488
7-8 pm	800	-	590	-	-
8-9 pm	800	-	447	-	-
9-10 pm	800	-	413	-	-
10-11 pm	800	-	320	-	-
11-midnight	800	-	192	-	-
			18865		

TOTAL DELAY 40294.632

DELAY COST $927,582

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 40294.63 hrs. x $23.02 per hour = $927,582

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Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

South of King St **Wednesday** **Location #3 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	145	-	-
1-2 am	800	-	106	-	-
2-3 am	800	-	89	-	-
3-4 am	800	-	67	-	-
4-5 am	800	-	106	-	-
5-6 am	800	-	268	-	-
6-7 am	800	-	572	-	-
7-8 am	800	800	1017	1016.617	108.3086
8-9 am	800	1600	918	1934.257	275.4369
9-10 am	800	-	705	-	-
10-11 am	800	-	620	-	-
11-noon	800	-	668	-	-
noon-1	800	-	761	-	-
1-2 pm	800	800	843	843.2454	21.62268
2-3 pm	800	1600	1076	1919.346	181.2959
3-4 pm	800	2400	1449	3367.941	643.6436
4-5 pm	800	3200	1675	5043.032	1405.487
5-6 pm	800	4000	1776	6818.73	2330.881
6-7 pm	800	4800	1258	8076.601	3047.665
7-8 pm	800	-	728	-	-
8-9 pm	800	-	588	-	-
9-10 pm	800	-	555	-	-
10-11 pm	800	-	442	-	-
11-midnight	800	-	305	-	-
			16735		

TOTAL DELAY 8014.34045

DELAY COST $184,490

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 8014.34 hrs. x $23.02 per hour = $184,490

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Exhibit 1

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

South of King St | **Thursday** | **Location #3 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	95	-	-
1-2 am	800	-	55	-	-
2-3 am	800	-	54	-	-
3-4 am	800	-	89	-	-
4-5 am	800	-	140	-	-
5-6 am	800	-	425	-	-
6-7 am	800	800	1058	1058.082	129.0408
7-8 am	800	1600	1747	2805.313	731.6973
8-9 am	800	2400	1841	4646.326	1725.82
9-10 am	800	3200	1404	6050.367	2548.347
10-11 am	800	4000	999	7049.562	2949.965
11-noon	800	4800	935	7984.937	3117.25
noon-1	800	5600	885	8869.634	3227.286
1-2 pm	800	6400	873	9742.598	3306.116
2-3 pm	800	7200	1007	10749.45	3446.026
3-4 pm	800	8000	1259	12008.69	3779.071
4-5 pm	800	8800	1539	13547.64	4378.164
5-6 pm	800	9600	1494	15041.84	5094.741
6-7 pm	800	10400	991	16032.4	5537.122
7-8 pm	800	-	598	-	-
8-9 pm	800	-	468	-	-
9-10 pm	800	-	433	-	-
10-11 pm	800	-	338	-	-
11-midnight	800	-	211	-	-
			18936		

TOTAL DELAY 39970.645

DELAY COST $920,124

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 39970.64 hrs. x $23.02 per hour = $920,124

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Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

South of King St | **Thursday** | **Location #3 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	155	-	-
1-2 am	800	-	117	-	-
2-3 am	800	-	100	-	-
3-4 am	800	-	68	-	-
4-5 am	800	-	106	-	-
5-6 am	800	-	265	-	-
6-7 am	800	-	556	-	-
7-8 am	800	800	990	989.8973	94.94866
8-9 am	800	1600	904	1894.025	241.9614
9-10 am	800	-	704	-	-
10-11 am	800	-	619	-	-
11-noon	800	-	671	-	-
noon-1	800	-	749	-	-
1-2 pm	800	800	857	856.543	28.27151
2-3 pm	800	1600	1081	1938.035	197.2888
3-4 pm	800	2400	1449	3387.244	662.6393
4-5 pm	800	3200	1653	5040.483	1413.863
5-6 pm	800	4000	1710	6750.457	2295.47
6-7 pm	800	4800	1238	7988.534	2969.495
7-8 pm	800	-	748	-	-
8-9 pm	800	-	584	-	-
9-10 pm	800	-	571	-	-
10-11 pm	800	-	460	-	-
11-midnight	800	-	306	-	-
			16662		

TOTAL DELAY 7903.93795

DELAY COST $181,949

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 7903.938 hrs. x $23.02 per hour = $181,949

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Exhibit 1

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

South of King St **Friday** **Location #3 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	106	-	-
1-2 am	800	-	59	-	-
2-3 am	800	-	58	-	-
3-4 am	800	-	92	-	-
4-5 am	800	-	142	-	-
5-6 am	800	-	409	-	-
6-7 am	800	800	990	990.1147	95.05733
7-8 am	800	1600	1705	2695.414	642.7645
8-9 am	800	2400	1744	4439.357	1567.386
9-10 am	800	3200	1269	5707.915	2273.636
10-11 am	800	4000	965	6672.978	2590.446
11-noon	800	4800	961	7633.559	2753.269
noon-1	800	5600	913	8546.519	2890.039
1-2 pm	800	6400	901	9447.59	2997.054
2-3 pm	800	7200	1042	10489.61	3168.601
3-4 pm	800	8000	1300	11789.32	3539.465
4-5 pm	800	8800	1485	13273.91	4131.613
5-6 pm	800	9600	1386	14659.91	4766.909
6-7 pm	800	10400	968	15627.87	5143.891
7-8 pm	800	-	636	-	-
8-9 pm	800	-	478	-	-
9-10 pm	800	-	454	-	-
10-11 pm	800	-	400	-	-
11-midnight	800	-	278	-	-
			18739		

TOTAL DELAY 36560.1297

DELAY COST $841,614

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 36560.13 hrs. x $23.02 per hour = $841,614

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Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

South of King St | **Friday** | **Location #3 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	179	-	-
1-2 am	800	-	140	-	-
2-3 am	800	-	117	-	-
3-4 am	800	-	74	-	-
4-5 am	800	-	106	-	-
5-6 am	800	-	245	-	-
6-7 am	800	-	517	-	-
7-8 am	800	800	916	916.3574	58.17872
8-9 am	800	1600	858	1774.672	145.5148
9-10 am	800	-	679	-	-
10-11 am	800	-	639	-	-
11-noon	800	-	706	-	-
noon-1	800	800	839	839.3301	19.66504
1-2 pm	800	1600	958	1797.167	118.2485
2-3 pm	800	2400	1182	2979.328	388.2476
3-4 pm	800	3200	1530	4509.428	944.3781
4-5 pm	800	4000	1634	6143.725	1726.577
5-6 pm	800	4800	1644	7788.178	2565.952
6-7 pm	800	5600	1183	8971.49	3179.834
7-8 pm	800	-	744	-	-
8-9 pm	800	-	539	-	-
9-10 pm	800	-	530	-	-
10-11 pm	800	-	501	-	-
11-midnight	800	-	399	-	-
			16861		

TOTAL DELAY 9146.595

DELAY COST $210,555

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 9146.595 hrs. x $23.02 per hour = $210,555

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Exhibit 1

Societal costs for increasing direction multi-lane one open of: **Alaskan Way**

South of King St | **Saturday** | **Location #3 Northbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	170	-	-
1-2 am	800	-	97	-	-
2-3 am	800	-	74	-	-
3-4 am	800	-	80	-	-
4-5 am	800	-	103	-	-
5-6 am	800	-	189	-	-
6-7 am	800	-	299	-	-
7-8 am	800	-	447	-	-
8-9 am	800	-	622	-	-
9-10 am	800	-	733	-	-
10-11 am	800	800	818	818.2438	9.121893
11-noon	800	1600	915	1732.762	75.50269
noon-1	800	2400	970	2702.731	217.7461
1-2 pm	800	3200	973	3675.751	389.241
2-3 pm	800	4000	900	4575.58	525.6656
3-4 pm	800	4800	855	5430.112	602.8459
4-5 pm	800	5600	848	6278.005	654.0587
5-6 pm	800	6400	838	7115.576	696.7908
6-7 pm	800	-	749	-	-
7-8 pm	800	-	561	-	-
8-9 pm	800	-	457	-	-
9-10 pm	800	-	457	-	-
10-11 pm	800	-	432	-	-
11-midnight	800	-	295	-	-
			12880		

TOTAL DELAY 3170.97256

DELAY COST $72,996

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 3170.973 hrs. x $23.02 per hour = $72,996

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Exhibit 1

Societal costs for decreasing direction multi-lane one open of: **Alaskan Way**

South of King St | **Saturday** | **Location #3 Southbound**

Traffic data from: Estimated AWD volumes from 2011 FEIS for year 2015 with tolling on tunnel
Factored to hourly curve for ADC R101 at SR 99 MP 29.37 (2010 AADT)

TIME	Capacity per 1 lane open	CAPACITY (Accum.)	Volume direction	VOLUME (Accum.)	DELAY
midnight	800	-	285	-	-
1-2 am	800	-	230	-	-
2-3 am	800	-	187	-	-
3-4 am	800	-	106	-	-
4-5 am	800	-	94	-	-
5-6 am	800	-	121	-	-
6-7 am	800	-	187	-	-
7-8 am	800	-	267	-	-
8-9 am	800	-	394	-	-
9-10 am	800	-	496	-	-
10-11 am	800	-	599	-	-
11-noon	800	-	681	-	-
noon-1	800	-	739	-	-
1-2 pm	800	-	792	-	-
2-3 pm	800	800	891	891.172	45.58601
3-4 pm	800	1600	982	1873.13	182.1508
4-5 pm	800	2400	1008	2881.375	377.2526
5-6 pm	800	3200	950	3831.067	556.2211
6-7 pm	800	4000	831	4661.796	646.4311
7-8 pm	800	-	607	-	-
8-9 pm	800	-	472	-	-
9-10 pm	800	-	488	-	-
10-11 pm	800	-	501	-	-
11-midnight	800	-	416	-	-
			12322		

TOTAL DELAY 1807.64161

DELAY COST $41,612

Table A-8 1975 cost = $4111.52/1000 = $4.11/hr.
2016 cost = $4.11/hr. x 5.6 = $23.02/hr.
Time period analyzed is from midnight to midnight with a time and operating cost value of $23.02 per hr.

Delay cost = 1807.642 hrs. x $23.02 per hour = $41,612

REVISED Cost Estimate for Traffic Delay on Alaskan Way During Viaduct Demolition

(April 2018)

Acronyms: *ADT = average daily traffic (7-day per week averages)*
AWDT = average weekday traffic
FEIS = Final environmental impact statement

Scenario:

(Per request from Ali Amiri) During the demolition of the Alaskan Way viaduct, Alaskan Way will have lane closures limiting traffic to one lane per direction in the section approximately bounded by Dearborn Street and Pike Street. The closures will generally cover about three blocks at a time and the closures will be in place 24/7. The city of Seattle will specify the hours that a noise variance will be in place to allow the noisy part of the viaduct demolition. Ali requested an average hourly cost rate for delay.

Traffic data:

The project office provided estimated AWDT (average weekday traffic) volumes for three locations along Alaskan Way. It was requested that we use the estimated volumes for year 2015 with tolls in place on the SR 99 tunnel. The estimates were from the 2011 FEIS.

Location #1 - north of Pine Street	23,000 AWDT
Location #2 - north of Seneca Street	23,700 AWDT
Location #3 - south of King Street	35,600 AWDT

We used the volumes as-is and did not attempt to use a growth factor to change the estimated 2015 volumes to 2018 numbers. The data provided was AWDT with no comparable data for average day or average weekend day. This office did not attempt to validate or replicate the estimated numbers, just used the numbers provided.

We did not have hourly traffic volumes which are needed to estimate the cost of traffic delay. WSDOT's Northwest Region traffic count data base had only one readily available count listed, an off-system count vic. SR 99 MP 30.20 at the intersection of Alaskan Way and Atlantic Street, conducted Tuesday March 20, 2012 through Monday March 26, 2012. Initially, we considered using this count, but the hourly curve pattern was deemed to be very different from what would be considered typical in the area.

In the end, we chose to use annual average traffic data from permanent recorder site #R101 on SR 99 at MP 29.37 as a pattern for the hourly and directional estimates. We chose year 2010 as being before most of the Viaduct Replacement project work had disrupted traffic patterns significantly.

Using the north-bound and southbound average hourly volumes from that count, for each day of the week we calculated the hourly factors for each direction and applied that factor to the AWDT volumes from the FEIS. We also estimated the average Saturday and Sunday hourly and daily volumes based on the recorder site. The resulting hourly directional volumes by day of week for each location were used in the calculation templates.

Calculations:

The templates used in this estimate are the standard ones that are used by WSDOT for estimating societal costs of travel delay for use in per-day liquidated damages. Estimated directional hourly volumes for each of the three locations for each day of the week were used to populate the templates. The northbound and southbound estimated daily costs were combined to come up with a bothway daily cost for each location. The results from the three locations were averaged for an estimated cost of $309,437 per day or $12,893 per hour (rounded to $13,000).

What is not included:

- This estimate does not include the cost of delays on adjacent or parallel streets which may occur as a result of the backups from the lane closures on Alaskan Way or from traffic diverting to avoid the lane closures.

- Hourly delay costs in the templates are estimated based on a one-size-fits-all cost rate for urban areas. Actual cost rates in Seattle may be higher than what is currently used in our templates.
- Detailed per-person costs are not factored into this estimate, so the per-vehicle cost of delay to a transit bus does not adequately reflect the passengers costs.

Other:
A complete analysis including updated traffic counts, location-specific cost rates, freshly estimated volumes for the open and tolled tunnel, would be costly and time consuming. For that reason, the standard liquidated damages templates and methodology were used as the best available way to estimate the delay costs. A full analysis would likely result in a higher delay cost.

Where SR 99 in this vicinity is primarily a through route with a heavy commute hour emphasis, Alaskan Way along the waterfront is assumed to be very different with less pronounced commute hour traffic, and more daytime commercial traffic. Saturdays and Sundays are the lightest days on SR 99, but that may not be the case on Alaskan Way as it is likely to have more recreational and commercial traffic than SR 99. Nevertheless, the SR 99 traffic patterns were the best available choice given the time and resource constraints for completing this estimate.

Because the scenario with the SR 99 tunnel open and tolled is quite different from the 2010 data year and the current conditions, this poses further questions as to the validity of this cost estimate. Besides the cost of the tunnel, the entry and exit points to/from SR 99 will be different than they are today, and from what they were in data year 2010.

Under the circumstances, we believe this estimate of lane closures costs is a reasonable -- though likely considerably lower than actual -- estimate of the average per-hour cost of lane closures on Alaskan Way.