

Appendix D: Economic Evaluation

Nelson Arterial Traffic Study

TRACKS Traffic Modelling Results

Year	Option	Total Travel Times (hr)			Total Travel Distance (km)			
		AM	IP	PM	AM	IP	PM	
2006	Do Minimum	2405.8	1980.2	2750.0	109958	93596	122721	
2006	Option A	2405.8	1980.2	2750.0	109958	93596	122721	
2006	Option B	2405.8	1980.2	2750.0	109958	93596	122721	
2006	Option H	2405.8	1980.2	2750.0	109958	93596	122721	
2006	Option I	2405.8	1980.2	2750.0	109958	93596	122721	
2016	Do Minimum	2775.1	2290.8	3227.9	122841	105256	137895	
2016	Option A	2800.0	2322.7	3217.5	123274	105662	138041	
2016	Option B	2711.6	2250.0	3121.2	122544	104834	137165	
2016	Option H	2792.3	2312.6	3257.1	122968	105337	138017	
2016	Option I	2731.8	2285.4	3183.4	123115	105649	137988	
2026	Do Minimum	3013.2	2541.9	3534.7	133548	116961	150512	Interpolated
2026	Option A	3038.9	2554.4	3520.4	133988	117371	150632	Interpolated
2026	Option B	2953.4	2500.2	3435.1	133270	116517	149785	Interpolated
2026	Option H	3031.3	2563.4	3566.2	133667	117050	150615	Interpolated
2026	Option I	2972.8	2533.4	3489.5	133851	117338	150578	Interpolated
2036	Do Minimum	3251.3	2793.0	3841.4	144255	128665	163128	
2036	Option A	3277.8	2786.1	3823.3	144701	129079	163223	
2036	Option B	3195.2	2750.5	3749.1	143995	128199	162405	
2036	Option H	3270.4	2814.2	3875.3	144365	128762	163212	
2036	Option I	3213.8	2781.5	3795.6	144586	129026	163168	

Nelson Arterial Traffic Study

Annual Network Operating Cost Calculations

Correlation between Actual and Modelled Time Periods:

Actual Time Periods	Base Value of Time (\$/hr)	Number of Days per Year	Assessed Number of Hours per Day for each Modelled Time Period		
			AM	IP	PM
Weekday - AM Peak	\$15.13	245	1.5	-	-
Weekday - Interpeak	\$17.95	245	-	7.0	-
Weekday - PM Peak	\$14.96	245	-	-	2.0
Saturday - All Day	\$16.86	60	-	6.0	2.0
Sunday - All Day	\$16.86	60	-	7.0	-

Note: Base Value of Time values taken from EEM Table A4.1.

Road User Cost Data:

Annual Expansion Factor for Modelled AM Peak:	367.5	hours / year (combination of Actual Time Periods as described above)
Annual Expansion Factor for Modelled Interpeak:	2495.0	hours / year (combination of Actual Time Periods as described above)
Annual Expansion Factor for Modelled PM Peak:	610.0	hours / year (combination of Actual Time Periods as described above)

Weighted Average Value of Time (\$/hr) for Modelled AM Peak:	\$15.13
Weighted Average Value of Time (\$/hr) for Modelled Interpeak:	\$17.61
Weighted Average Value of Time (\$/hr) for Modelled PM Peak:	\$15.33

Base Vehicle Running Cost (\$/km): \$0.3020 (EEM Table A5.7 - Urban Arterial VOC ; 45 km/h; 0% Gradient)

Update Factor to July 2009\$ for Travel Time Costs: 1.22 (EEM Appendix 12)

Update Factor to July 2009\$ for Vehicle Operating Costs: 1.00

Annual Cost Calculations:

Year	Option	Travel Time Costs				Travel Distance Costs			
		AM	IP	PM	Annual	AM	IP	PM	Annual
2006	Do Minimum	\$44,408	\$42,540	\$51,444	\$153,839,444	\$33,207	\$28,266	\$37,062	\$105,335,001
2006	Option A	\$44,408	\$42,540	\$51,444	\$153,839,444	\$33,207	\$28,266	\$37,062	\$105,335,001
2006	Option B	\$44,408	\$42,540	\$51,444	\$153,839,444	\$33,207	\$28,266	\$37,062	\$105,335,001
2006	Option H	\$44,408	\$42,540	\$51,444	\$153,839,444	\$33,207	\$28,266	\$37,062	\$105,335,001
2006	Option I	\$44,408	\$42,540	\$51,444	\$153,839,444	\$33,207	\$28,266	\$37,062	\$105,335,001
2016	Do Minimum	\$51,224	\$49,214	\$60,385	\$178,449,302	\$37,098	\$31,787	\$41,644	\$118,345,869
2016	Option A	\$51,685	\$49,900	\$60,190	\$180,210,173	\$37,229	\$31,910	\$41,688	\$118,726,738
2016	Option B	\$50,053	\$48,337	\$58,389	\$174,612,326	\$37,008	\$31,660	\$41,424	\$117,860,453
2016	Option H	\$51,541	\$49,683	\$60,931	\$180,068,278	\$37,136	\$31,812	\$41,681	\$118,443,471
2016	Option I	\$50,424	\$49,097	\$59,553	\$177,354,638	\$37,181	\$31,906	\$41,672	\$118,689,533
2026	Do Minimum	\$55,619	\$54,608	\$66,123	\$197,022,754	\$40,331	\$35,322	\$45,454	\$130,677,620
2026	Option A	\$56,094	\$54,877	\$65,857	\$197,706,387	\$40,464	\$35,446	\$45,491	\$131,057,528
2026	Option B	\$54,516	\$53,713	\$64,261	\$193,247,976	\$40,247	\$35,188	\$45,235	\$130,178,326
2026	Option H	\$55,954	\$55,070	\$66,714	\$198,658,654	\$40,367	\$35,349	\$45,486	\$130,776,807
2026	Option I	\$54,873	\$54,426	\$65,279	\$195,779,714	\$40,423	\$35,436	\$45,475	\$131,007,510
2036	Do Minimum	\$60,015	\$60,002	\$71,862	\$215,596,205	\$43,565	\$38,857	\$49,265	\$143,009,372
2036	Option A	\$60,504	\$59,855	\$71,524	\$215,202,602	\$43,700	\$38,982	\$49,293	\$143,388,317
2036	Option B	\$58,979	\$59,089	\$70,134	\$211,883,625	\$43,486	\$38,716	\$49,046	\$142,496,199
2036	Option H	\$60,367	\$60,458	\$72,496	\$217,249,030	\$43,598	\$38,886	\$49,290	\$143,110,144
2036	Option I	\$59,322	\$59,756	\$71,006	\$214,204,790	\$43,665	\$38,966	\$49,277	\$143,325,487

Nelson Arterial Traffic Study

Discounting of Travel Time Costs

Time from T0	Year	Timestream Factor	Discount Factor	Do Minimum	Option A	Option B	Option H	Option I
-4	2006	0.0	1.360	\$0	\$0	\$0	\$0	\$0
-3	2007	0.0	1.260	\$0	\$0	\$0	\$0	\$0
-2	2008	0.0	1.166	\$0	\$0	\$0	\$0	\$0
-1	2009	0.0	1.080	\$0	\$0	\$0	\$0	\$0
0	2010	0.0	1.000	\$0	\$0	\$0	\$0	\$0
1	2011	0.0	0.926	\$0	\$0	\$0	\$0	\$0
2	2012	0.5	0.857	\$72,275,960	\$72,426,926	\$71,947,001	\$72,414,761	\$72,182,110
3	2013	1.0	0.794	\$135,797,980	\$136,357,114	\$134,579,614	\$136,312,058	\$135,450,388
4	2014	1.0	0.735	\$127,547,768	\$128,324,344	\$125,855,593	\$128,261,766	\$127,065,002
5	2015	1.0	0.681	\$119,774,691	\$120,733,426	\$117,685,586	\$120,656,169	\$119,178,683
6	2016	1.0	0.630	\$112,453,330	\$113,562,978	\$110,035,385	\$113,473,560	\$111,763,506
7	2017	1.0	0.583	\$105,207,197	\$106,171,792	\$102,971,988	\$106,152,842	\$104,559,813
8	2018	1.0	0.540	\$98,417,537	\$99,252,481	\$96,351,259	\$99,294,048	\$97,810,091
9	2019	1.0	0.500	\$92,056,484	\$92,775,692	\$90,146,375	\$92,868,915	\$91,486,612
10	2020	1.0	0.463	\$86,097,795	\$86,713,832	\$84,332,057	\$86,850,830	\$85,563,263
11	2021	1.0	0.429	\$80,516,764	\$81,040,968	\$78,884,489	\$81,214,745	\$80,015,464
12	2022	1.0	0.397	\$75,290,137	\$75,732,732	\$73,781,241	\$75,937,087	\$74,820,078
13	2023	1.0	0.368	\$70,396,032	\$70,766,232	\$69,001,193	\$70,995,682	\$69,955,336
14	2024	1.0	0.340	\$65,813,865	\$66,119,967	\$64,524,465	\$66,369,673	\$65,400,761
15	2025	1.0	0.315	\$61,524,276	\$61,773,745	\$60,332,348	\$62,039,447	\$61,137,096
16	2026	1.0	0.292	\$57,509,064	\$57,708,610	\$56,407,242	\$57,986,567	\$57,146,232
17	2027	1.0	0.270	\$53,751,116	\$53,906,766	\$52,732,592	\$54,193,706	\$53,411,151
18	2028	1.0	0.250	\$50,234,350	\$50,351,514	\$49,292,829	\$50,644,580	\$49,915,855
19	2029	1.0	0.232	\$46,943,657	\$47,027,180	\$46,073,319	\$47,323,891	\$46,645,315
20	2030	1.0	0.215	\$43,864,839	\$43,919,064	\$43,060,305	\$44,217,271	\$43,585,413
21	2031	1.0	0.199	\$40,984,564	\$41,013,372	\$40,240,861	\$41,311,226	\$40,722,889
22	2032	1.0	0.184	\$38,290,311	\$38,297,171	\$37,602,841	\$38,593,087	\$38,045,291
23	2033	1.0	0.170	\$35,770,326	\$35,758,330	\$35,134,839	\$36,050,963	\$35,540,928
24	2034	1.0	0.158	\$33,413,574	\$33,385,479	\$32,826,141	\$33,673,690	\$33,198,829
25	2035	1.0	0.146	\$31,209,701	\$31,167,957	\$30,666,689	\$31,450,795	\$31,008,696
26	2036	1.0	0.135	\$29,148,987	\$29,095,771	\$28,647,040	\$29,372,452	\$28,960,865
27	2037	1.0	0.125	\$27,222,318	\$27,159,559	\$26,758,331	\$27,429,442	\$27,046,274
28	2038	1.0	0.116	\$25,421,142	\$25,350,545	\$24,992,245	\$25,613,119	\$25,256,418
29	2039	1.0	0.107	\$23,737,439	\$23,660,509	\$23,340,979	\$23,915,377	\$23,583,324
30	2040	1.0	0.099	\$22,163,688	\$22,081,751	\$21,797,214	\$22,328,614	\$22,019,515
31	2041	1.0	0.092	\$20,692,839	\$20,607,059	\$20,354,083	\$20,845,704	\$20,557,980
32	2042	0.5	0.085	\$9,659,141	\$9,614,839	\$9,502,575	\$9,729,984	\$9,596,074
33	2043	0.0	0.079	\$0	\$0	\$0	\$0	\$0
34	2044	0.0	0.073	\$0	\$0	\$0	\$0	\$0
35	2045	0.0	0.068	\$0	\$0	\$0	\$0	\$0
36	2046	0.0	0.063	\$0	\$0	\$0	\$0	\$0
37	2047	0.0	0.058	\$0	\$0	\$0	\$0	\$0
38	2048	0.0	0.054	\$0	\$0	\$0	\$0	\$0
39	2049	0.0	0.050	\$0	\$0	\$0	\$0	\$0
40	2050	0.0	0.046	\$0	\$0	\$0	\$0	\$0
41	2051	0.0	0.043	\$0	\$0	\$0	\$0	\$0
42	2052	0.0	0.039	\$0	\$0	\$0	\$0	\$0
43	2053	0.0	0.037	\$0	\$0	\$0	\$0	\$0
44	2054	0.0	0.034	\$0	\$0	\$0	\$0	\$0
45	2055	0.0	0.031	\$0	\$0	\$0	\$0	\$0
46	2056	0.0	0.029	\$0	\$0	\$0	\$0	\$0
				\$1,893,186,871	\$1,901,857,704	\$1,859,858,717	\$1,907,522,052	\$1,882,629,250

Nelson Arterial Traffic Study

Discounting of Vehicle Operating Costs

Time from T0	Year	Timestream Factor	Discount Factor	Do Minimum	Option A	Option B	Option H	Option I
-4	2006	0.0	1.360	\$0	\$0	\$0	\$0	\$0
-3	2007	0.0	1.260	\$0	\$0	\$0	\$0	\$0
-2	2008	0.0	1.166	\$0	\$0	\$0	\$0	\$0
-1	2009	0.0	1.080	\$0	\$0	\$0	\$0	\$0
0	2010	0.0	1.000	\$0	\$0	\$0	\$0	\$0
1	2011	0.0	0.926	\$0	\$0	\$0	\$0	\$0
2	2012	0.5	0.857	\$48,500,309	\$48,532,963	\$48,458,693	\$48,508,677	\$48,529,773
3	2013	1.0	0.794	\$90,848,232	\$90,969,171	\$90,694,097	\$90,879,224	\$90,957,357
4	2014	1.0	0.735	\$85,075,071	\$85,243,042	\$84,860,994	\$85,118,116	\$85,226,633
5	2015	1.0	0.681	\$79,658,712	\$79,866,083	\$79,394,419	\$79,711,853	\$79,845,825
6	2016	1.0	0.630	\$74,577,972	\$74,817,984	\$74,272,078	\$74,639,478	\$74,794,539
7	2017	1.0	0.583	\$69,773,224	\$69,995,401	\$69,489,178	\$69,830,266	\$69,972,944
8	2018	1.0	0.540	\$65,271,083	\$65,476,751	\$65,007,328	\$65,323,986	\$65,455,265
9	2019	1.0	0.500	\$61,053,082	\$61,243,468	\$60,808,171	\$61,102,146	\$61,222,933
10	2020	1.0	0.463	\$57,101,831	\$57,278,069	\$56,874,418	\$57,147,333	\$57,258,461
11	2021	1.0	0.429	\$53,400,953	\$53,564,095	\$53,189,790	\$53,443,153	\$53,545,391
12	2022	1.0	0.397	\$49,935,038	\$50,086,057	\$49,738,966	\$49,974,175	\$50,068,229
13	2023	1.0	0.368	\$46,689,582	\$46,829,379	\$46,507,523	\$46,725,878	\$46,812,401
14	2024	1.0	0.340	\$43,650,943	\$43,780,352	\$43,481,897	\$43,684,604	\$43,764,195
15	2025	1.0	0.315	\$40,806,288	\$40,926,081	\$40,649,327	\$40,837,506	\$40,910,717
16	2026	1.0	0.292	\$38,143,552	\$38,254,443	\$37,997,812	\$38,172,503	\$38,239,843
17	2027	1.0	0.270	\$35,651,392	\$35,754,044	\$35,516,073	\$35,678,242	\$35,740,179
18	2028	1.0	0.250	\$33,319,149	\$33,414,173	\$33,193,507	\$33,344,050	\$33,401,014
19	2029	1.0	0.232	\$31,136,806	\$31,224,768	\$31,020,148	\$31,159,899	\$31,212,288
20	2030	1.0	0.215	\$29,094,951	\$29,176,377	\$28,986,637	\$29,116,368	\$29,164,546
21	2031	1.0	0.199	\$27,184,747	\$27,260,122	\$27,084,181	\$27,204,609	\$27,248,913
22	2032	1.0	0.184	\$25,397,893	\$25,467,667	\$25,304,521	\$25,416,312	\$25,457,053
23	2033	1.0	0.170	\$23,726,596	\$23,791,185	\$23,639,904	\$23,743,678	\$23,781,139
24	2034	1.0	0.158	\$22,163,541	\$22,223,331	\$22,083,052	\$22,179,383	\$22,213,827
25	2035	1.0	0.146	\$20,701,863	\$20,757,210	\$20,627,133	\$20,716,555	\$20,748,223
26	2036	1.0	0.135	\$19,335,119	\$19,386,353	\$19,265,737	\$19,348,744	\$19,377,859
27	2037	1.0	0.125	\$18,057,266	\$18,104,692	\$17,992,849	\$18,069,901	\$18,096,667
28	2038	1.0	0.116	\$16,862,632	\$16,906,535	\$16,802,827	\$16,874,350	\$16,898,955
29	2039	1.0	0.107	\$15,745,902	\$15,786,542	\$15,690,378	\$15,756,769	\$15,779,386
30	2040	1.0	0.099	\$14,702,089	\$14,739,709	\$14,650,539	\$14,712,166	\$14,732,956
31	2041	1.0	0.092	\$13,726,517	\$13,761,342	\$13,678,658	\$13,735,862	\$13,754,971
32	2042	0.5	0.085	\$6,407,402	\$6,423,521	\$6,385,186	\$6,411,736	\$6,420,517
33	2043	0.0	0.079	\$0	\$0	\$0	\$0	\$0
34	2044	0.0	0.073	\$0	\$0	\$0	\$0	\$0
35	2045	0.0	0.068	\$0	\$0	\$0	\$0	\$0
36	2046	0.0	0.063	\$0	\$0	\$0	\$0	\$0
37	2047	0.0	0.058	\$0	\$0	\$0	\$0	\$0
38	2048	0.0	0.054	\$0	\$0	\$0	\$0	\$0
39	2049	0.0	0.050	\$0	\$0	\$0	\$0	\$0
40	2050	0.0	0.046	\$0	\$0	\$0	\$0	\$0
41	2051	0.0	0.043	\$0	\$0	\$0	\$0	\$0
42	2052	0.0	0.039	\$0	\$0	\$0	\$0	\$0
43	2053	0.0	0.037	\$0	\$0	\$0	\$0	\$0
44	2054	0.0	0.034	\$0	\$0	\$0	\$0	\$0
45	2055	0.0	0.031	\$0	\$0	\$0	\$0	\$0
46	2056	0.0	0.029	\$0	\$0	\$0	\$0	\$0
				\$1,257,699,738	\$1,261,040,909	\$1,253,346,022	\$1,258,567,520	\$1,260,632,999

Nelson Arterial Traffic Study

Discounting of Construction & Operating Costs - Do Minimum

Time from T0	Year	Discount Factor	Travel Demand Mgmt Costs		Public Transport Costs		Roading Costs		Total Costs		Discounted Costs	
			One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs
-4	2006	1.360										
-3	2007	1.260										
-2	2008	1.166										
-1	2009	1.080										
0	2010	1.000										
1	2011	0.926										
2	2012	0.857							\$0	\$0	\$0	\$0
3	2013	0.794			\$500,000		\$250,000		\$750,000	\$0	\$595,374	\$0
4	2014	0.735			\$500,000	\$2,500,000			\$500,000	\$2,500,000	\$367,515	\$1,837,575
5	2015	0.681			\$500,000	\$2,500,000			\$500,000	\$2,500,000	\$340,292	\$1,701,458
6	2016	0.630				\$2,500,000	\$750,000		\$750,000	\$2,500,000	\$472,627	\$1,575,424
7	2017	0.583				\$2,500,000			\$0	\$2,500,000	\$0	\$1,458,726
8	2018	0.540				\$2,500,000			\$0	\$2,500,000	\$0	\$1,350,672
9	2019	0.500				\$2,500,000			\$0	\$2,500,000	\$0	\$1,250,622
10	2020	0.463				\$2,500,000			\$0	\$2,500,000	\$0	\$1,157,984
11	2021	0.429				\$2,500,000			\$0	\$2,500,000	\$0	\$1,072,207
12	2022	0.397				\$2,500,000			\$0	\$2,500,000	\$0	\$992,784
13	2023	0.368				\$2,500,000			\$0	\$2,500,000	\$0	\$919,245
14	2024	0.340				\$2,500,000			\$0	\$2,500,000	\$0	\$851,153
15	2025	0.315				\$2,500,000			\$0	\$2,500,000	\$0	\$788,104
16	2026	0.292				\$2,500,000	\$500,000		\$500,000	\$2,500,000	\$145,945	\$729,726
17	2027	0.270				\$2,500,000			\$0	\$2,500,000	\$0	\$675,672
18	2028	0.250				\$2,500,000			\$0	\$2,500,000	\$0	\$625,623
19	2029	0.232				\$2,500,000			\$0	\$2,500,000	\$0	\$579,280
20	2030	0.215				\$2,500,000			\$0	\$2,500,000	\$0	\$536,371
21	2031	0.199				\$2,500,000	\$500,000		\$500,000	\$2,500,000	\$99,328	\$496,639
22	2032	0.184				\$2,500,000			\$0	\$2,500,000	\$0	\$459,851
23	2033	0.170				\$2,500,000			\$0	\$2,500,000	\$0	\$425,788
24	2034	0.158				\$2,500,000			\$0	\$2,500,000	\$0	\$394,248
25	2035	0.146				\$2,500,000			\$0	\$2,500,000	\$0	\$365,045
26	2036	0.135				\$2,500,000			\$0	\$2,500,000	\$0	\$338,004
27	2037	0.125				\$2,500,000			\$0	\$2,500,000	\$0	\$312,967
28	2038	0.116				\$2,500,000			\$0	\$2,500,000	\$0	\$289,784
29	2039	0.107				\$2,500,000			\$0	\$2,500,000	\$0	\$268,319
30	2040	0.099				\$2,500,000			\$0	\$2,500,000	\$0	\$248,443
31	2041	0.092							\$0	\$0	\$0	\$0
32	2042	0.085										
33	2043	0.079										
34	2044	0.073										
35	2045	0.068										
			\$0	\$0	\$1,500,000	\$67,500,000	\$2,000,000	\$0	\$3,500,000	\$67,500,000	\$2,021,081	\$21,701,716

Nelson Arterial Traffic Study

Discounting of Construction & Operating Costs - Option A

Time from T0	Year	Discount Factor	Travel Demand Mgmt Costs		Public Transport Costs		Rooding Costs		Total Costs		Discounted Costs	
			One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs
-4	2006	1.360										
-3	2007	1.260										
-2	2008	1.166										
-1	2009	1.080										
0	2010	1.000										
1	2011	0.926										
2	2012	0.857										
3	2013	0.794			\$500,000		\$28,800,000	\$300,000	\$29,300,000	\$300,000	\$23,259,285	\$238,150
4	2014	0.735			\$500,000	\$2,500,000		\$300,000	\$500,000	\$2,800,000	\$367,515	\$2,058,084
5	2015	0.681			\$500,000	\$2,500,000		\$300,000	\$500,000	\$2,800,000	\$340,292	\$1,905,633
6	2016	0.630				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$1,764,475
7	2017	0.583				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$1,633,773
8	2018	0.540				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$1,512,753
9	2019	0.500				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$1,400,697
10	2020	0.463				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$1,296,942
11	2021	0.429				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$1,200,872
12	2022	0.397				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$1,111,919
13	2023	0.368				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$1,029,554
14	2024	0.340				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$953,291
15	2025	0.315				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$882,677
16	2026	0.292				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$817,293
17	2027	0.270				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$756,753
18	2028	0.250				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$700,697
19	2029	0.232				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$648,794
20	2030	0.215				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$600,735
21	2031	0.199				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$556,236
22	2032	0.184				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$515,033
23	2033	0.170				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$476,883
24	2034	0.158				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$441,558
25	2035	0.146				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$408,850
26	2036	0.135				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$378,565
27	2037	0.125				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$350,523
28	2038	0.116				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$324,558
29	2039	0.107				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$300,517
30	2040	0.099				\$2,500,000		\$300,000	\$0	\$2,800,000	\$0	\$278,257
31	2041	0.092										
32	2042	0.085										
33	2043	0.079										
34	2044	0.073										
35	2045	0.068										
			\$0	\$0	\$1,500,000	\$67,500,000	\$28,800,000	\$8,400,000	\$30,300,000	\$75,900,000	\$23,967,091	\$24,544,071

Nelson Arterial Traffic Study

Discounting of Construction & Operating Costs - Option B

Time from T0	Year	Discount Factor	Travel Demand Mgmt Costs		Public Transport Costs		Roading Costs		Total Costs		Discounted Costs	
			One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs
-4	2006	1.360										
-3	2007	1.260										
-2	2008	1.166										
-1	2009	1.080										
0	2010	1.000										
1	2011	0.926										
2	2012	0.857					\$5,000,000		\$5,000,000	\$0	\$4,286,694	\$0
3	2013	0.794			\$500,000		\$20,000,000		\$20,500,000	\$0	\$16,273,561	\$0
4	2014	0.735			\$500,000	\$2,500,000	\$12,100,000	\$150,000	\$12,600,000	\$2,650,000	\$9,261,376	\$1,947,829
5	2015	0.681			\$500,000	\$2,500,000		\$150,000	\$500,000	\$2,650,000	\$340,292	\$1,803,545
6	2016	0.630				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$1,669,950
7	2017	0.583				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$1,546,250
8	2018	0.540				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$1,431,713
9	2019	0.500				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$1,325,660
10	2020	0.463				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$1,227,463
11	2021	0.429				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$1,136,540
12	2022	0.397				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$1,052,351
13	2023	0.368				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$974,400
14	2024	0.340				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$902,222
15	2025	0.315				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$835,391
16	2026	0.292				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$773,510
17	2027	0.270				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$716,213
18	2028	0.250				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$663,160
19	2029	0.232				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$614,037
20	2030	0.215				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$568,553
21	2031	0.199				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$526,438
22	2032	0.184				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$487,442
23	2033	0.170				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$451,336
24	2034	0.158				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$417,903
25	2035	0.146				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$386,947
26	2036	0.135				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$358,285
27	2037	0.125				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$331,745
28	2038	0.116				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$307,171
29	2039	0.107				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$284,418
30	2040	0.099				\$2,500,000		\$150,000	\$0	\$2,650,000	\$0	\$263,350
31	2041	0.092										
32	2042	0.085										
33	2043	0.079										
34	2044	0.073										
35	2045	0.068										
			\$0	\$0	\$1,500,000	\$67,500,000	\$37,100,000	\$4,050,000	\$38,600,000	\$71,550,000	\$30,161,923	\$23,003,819

Nelson Arterial Traffic Study

Discounting of Construction & Operating Costs - Option H

Time from T0	Year	Discount Factor	Travel Demand Mgmt Costs		Public Transport Costs		Roading Costs		Total Costs		Discounted Costs		
			One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	
-4	2006	1.360											
-3	2007	1.260											
-2	2008	1.166											
-1	2009	1.080											
0	2010	1.000											
1	2011	0.926											
2	2012	0.857											
3	2013	0.794			\$500,000		\$50,000,000		\$50,500,000	\$0	\$0	\$40,088,528	\$0
4	2014	0.735			\$500,000	\$2,500,000	\$49,200,000	\$200,000	\$49,700,000	\$2,700,000	\$2,700,000	\$36,530,984	\$1,984,581
5	2015	0.681			\$500,000	\$2,500,000		\$200,000	\$500,000	\$2,700,000	\$2,700,000	\$340,292	\$1,837,575
6	2016	0.630				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$1,701,458
7	2017	0.583				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$1,575,424
8	2018	0.540				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$1,458,726
9	2019	0.500				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$1,350,672
10	2020	0.463				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$1,250,622
11	2021	0.429				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$1,157,984
12	2022	0.397				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$1,072,207
13	2023	0.368				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$992,784
14	2024	0.340				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$919,245
15	2025	0.315				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$851,153
16	2026	0.292				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$788,104
17	2027	0.270				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$729,726
18	2028	0.250				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$675,672
19	2029	0.232				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$625,623
20	2030	0.215				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$579,280
21	2031	0.199				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$536,371
22	2032	0.184				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$496,639
23	2033	0.170				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$459,851
24	2034	0.158				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$425,788
25	2035	0.146				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$394,248
26	2036	0.135				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$365,045
27	2037	0.125				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$338,004
28	2038	0.116				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$312,967
29	2039	0.107				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$289,784
30	2040	0.099				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$0	\$268,319
31	2041	0.092											
32	2042	0.085											
33	2043	0.079											
34	2044	0.073											
35	2045	0.068											
			\$0	\$0	\$1,500,000	\$67,500,000	\$99,200,000	\$5,400,000	\$100,700,000	\$72,900,000	\$76,959,803	\$23,437,853	

Nelson Arterial Traffic Study

Discounting of Construction & Operating Costs - Option I

Time from T0	Year	Discount Factor	Travel Demand Mgmt Costs		Public Transport Costs		Roading Costs		Total Costs		Discounted Costs	
			One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs	One-Off Costs	Annual Costs
-4	2006	1.360										
-3	2007	1.260										
-2	2008	1.166										
-1	2009	1.080										
0	2010	1.000										
1	2011	0.926										
2	2012	0.857										
3	2013	0.794			\$500,000		\$30,000,000		\$30,500,000	\$0	\$24,211,883	\$0
4	2014	0.735			\$500,000	\$2,500,000	\$25,400,000	\$200,000	\$25,900,000	\$2,700,000	\$19,037,273	\$1,984,581
5	2015	0.681			\$500,000	\$2,500,000		\$200,000	\$500,000	\$2,700,000	\$340,292	\$1,837,575
6	2016	0.630				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$1,701,458
7	2017	0.583				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$1,575,424
8	2018	0.540				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$1,458,726
9	2019	0.500				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$1,350,672
10	2020	0.463				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$1,250,622
11	2021	0.429				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$1,157,984
12	2022	0.397				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$1,072,207
13	2023	0.368				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$992,784
14	2024	0.340				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$919,245
15	2025	0.315				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$851,153
16	2026	0.292				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$788,104
17	2027	0.270				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$729,726
18	2028	0.250				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$675,672
19	2029	0.232				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$625,623
20	2030	0.215				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$579,280
21	2031	0.199				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$536,371
22	2032	0.184				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$496,639
23	2033	0.170				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$459,851
24	2034	0.158				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$425,788
25	2035	0.146				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$394,248
26	2036	0.135				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$365,045
27	2037	0.125				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$338,004
28	2038	0.116				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$312,967
29	2039	0.107				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$289,784
30	2040	0.099				\$2,500,000		\$200,000	\$0	\$2,700,000	\$0	\$268,319
31	2041	0.092										
32	2042	0.085										
33	2043	0.079										
34	2044	0.073										
35	2045	0.068										
			\$0	\$0	\$1,500,000	\$67,500,000	\$55,400,000	\$5,400,000	\$56,900,000	\$72,900,000	\$43,589,448	\$23,437,853

COST-BENEFIT ANALYSIS OF PROJECT OPTIONS

WORKSHEET 4

All Projects in Strategy Options

1	Project Options	Do Minimum	Option A	Option B	Option H	Option I	Do Minimum	Option A	Option B	Option H	Option I
COSTS:								Net Costs of the Project Options (\$)			
2	Capital Costs		\$23,967,091	\$30,161,923	\$76,959,803	\$43,589,448	\$2,021,081	\$21,946,010	\$28,140,842	\$74,938,722	\$41,568,367
3	Maintenance Costs										
4	Operating Costs		\$24,544,071	\$23,003,819	\$23,437,853	\$23,437,853	\$21,701,716	\$2,842,356	\$1,302,103	\$1,736,137	\$1,736,137
5	Costs (2) to (4)							\$24,788,366	\$29,442,945	\$76,674,860	\$43,304,504
BENEFITS:								Net Benefits of the Project Options (\$)			
6	Travel Time Costs	\$1,893,186,871	\$1,901,857,704	\$1,859,858,717	\$1,907,522,052	\$1,882,629,250		-\$8,670,833	\$33,328,155	-\$14,335,180	\$10,557,622
7	Vehicle Operating Costs	\$1,257,699,738	\$1,261,040,909	\$1,253,346,022	\$1,258,567,520	\$1,260,632,999		-\$3,341,171	\$4,353,716	-\$867,783	-\$2,933,261
8	Accident Costs										
9	Seal Ext. / Passing Lane										
10	Carbon Dioxide	\$62,884,987	\$63,052,045	\$62,667,301	\$62,928,376	\$63,031,650		-\$167,059	\$217,686	-\$43,389	-\$146,663
11	Benefits (6) to (10)							-\$12,179,063	\$37,899,556	-\$15,246,352	\$7,477,697
12	B/C Ratio (11) / (5)							-0.5	1.3	-0.2	0.2

INCREMENTAL COST-BENEFIT ANALYSIS OF OPTIONS:

WORKSHEET 5

Step	BASE OPTION FOR COMPARISON			NEXT HIGHER COST OPTION			INCREMENTAL ANALYSIS			
	Option (1)	Costs (2)	Benefits (3)	Option (4)	Costs (5)	Benefits (6)	Incremental Costs (7) = (5) - (2)	Incremental Benefits (8) = (6) - (3)	Incremental B/C Ratio (9) = (8) / (7)	Base Option for Next Step (10)
1	Option A	\$24,788,366	-\$12,179,063	Option B	\$29,442,945	\$37,899,556	\$4,654,579	\$50,078,619	10.8	Option B
2	Option B	\$29,442,945	\$37,899,556	Option H	\$76,674,860	-\$15,246,352	\$47,231,915	-\$53,145,908	-1.1	Option B
3	Option B	\$29,442,945	\$37,899,556	Option I	\$43,304,504	\$7,477,697	\$13,861,560	-\$30,421,859	-2.2	Option B
4										
5										
6										
7										
8										

11. Preferred Project Option: _____

12. Other Factors: _____
