

The 2016 BCA Resource Guide, which is a supplement to the *Benefit-Cost Analyses Guidance for Applicants*, was utilized for this portion of the grant application. The resource guide provides the technical information and recommendations for monetizing benefits, as well as guidance on methodology. This analysis provides evidence that the expected benefits of the project *justify* the costs with detailed assumptions and calculations in a way that is “transparent and reproducible,” for reviewers.

The full memorandum and analysis spreadsheet are provided as a supplement to this application and can be found at:

http://www.cityoffife.org/downloads/public_works

The specific project details describing the project and what it changes are provided at the beginning of this application in the section PROJECT DESCRIPTION. In addition, the full cost of a project, including federal, state, local, and other funding are also provided in the PROJECT PARTNERS AND FUNDING section of this application.

This application measures costs and benefits of the entire proposed project against a baseline (“no-build” case) to horizon year 2050. Project costs used for the analysis include the total cost of project implementation (including work completed with existing funds) as well as project life cycle operation and maintenance (O&M) costs. For the purposes of the analysis, work completed with existing funds was accounted for in the 2016 base year. The remaining cost of implementation was allocated in equal quantities to years 2017, 2018, and 2019. These installments would approximately account for remaining non-construction costs such as right-of-way and design in 2017 and the costs of construction during 2018 and 2019. After project completion, life cycle O&M costs would begin to accumulate in 2020.

The BCA estimates the project’s expected benefits with respect to three of the five long-term outcomes that DOT specified in *Selection Criteria*. The three long-term outcomes are economic competitiveness (travel time savings), safety (prevented accidents), and environmental sustainability (reduced emissions). A project matrix framing the changes and benefits described in the BCA is provided below.

Current Baseline and Problem to Address	Change to Baseline	Type of Impacts	Population Affected by Impacts	Economic Benefits	Summary of Results	Page of Reference in BCA
Closely spaced intersections, geometrically deficient freeway ramps, and heavy interchange congestion result in excess delay and collisions for local traffic and Port trucks	Interchange reconfiguration with ramp realignments and conversion of the Port of Tacoma Road corridor into a high-capacity one-way couplet with improved traffic signalization	Reduce vehicle delay and collisions at the main access point to one of the region's most active trade centers	Port trucks, commuters, and local traffic that use the Port of Tacoma Road interchange	Monetized travel time savings, collision reductions, and emissions reductions	\$68.6 million in discounted benefits from travel time, collision, and emissions reductions	pp. 3-11

A summary of undiscounted, monetized benefits with respect to travel time savings, prevented accidents, and reduced emissions are shown by year in **Table 5**. Also shown are project costs including those for full project implementation and life cycle O&M. The total benefits from **Table 5** were then adjusted by real discount rates of 3 and 7 percent, following guidance from OMB Circulars A-4 and A-94. Table 6 summarizes the application of these discounted rates. As shown, the benefit/cost ratio of the proposed project would be 2.64 under the 3 percent discount and 1.18 under the 7 percent discount.

Table 5. Benefit-Cost Analysis Summary

Calendar Year	Project Year	Total Costs	Benefits				Benefits Subtotal
			Travel Time Savings	Prevented Accidents	Emissions other than CO2	CO2 Emissions	
2016	0	(\$9,720,000)	\$0	\$0	\$0	\$0	\$0
2017	0	(\$17,950,000)	\$0	\$0	\$0	\$0	\$0
2018	0	(\$17,950,000)	(\$5,791,957)	\$0	(\$11,806)	(\$62,813)	(\$5,866,577)
2019	0	(\$17,940,000)	(\$6,025,358)	\$0	(\$12,282)	(\$66,797)	(\$6,104,437)
2020	1	(\$117,610)	\$268,462	\$1,539,126	\$547	\$3,041	\$1,811,176
2021	2	(\$117,610)	\$980,085	\$1,539,126	\$1,998	\$11,101	\$2,532,310
2022	3	(\$117,610)	\$1,691,708	\$1,539,126	\$3,448	\$19,570	\$3,253,852
2023	4	(\$117,610)	\$2,403,332	\$1,539,126	\$4,899	\$28,960	\$3,976,317
2024	5	(\$117,610)	\$3,114,955	\$1,539,126	\$6,349	\$38,286	\$4,698,716
2025	6	(\$117,610)	\$3,826,578	\$1,539,126	\$7,800	\$47,954	\$5,421,459
2026	7	(\$117,610)	\$4,538,202	\$1,543,326	\$9,251	\$57,966	\$6,148,744
2027	8	(\$117,610)	\$5,249,825	\$1,543,326	\$10,701	\$68,321	\$6,872,173
2028	9	(\$117,610)	\$5,961,448	\$1,543,326	\$12,152	\$79,019	\$7,595,945
2029	10	(\$117,610)	\$6,673,072	\$1,547,525	\$13,602	\$88,451	\$8,322,651
2030	11	(\$117,610)	\$7,384,695	\$1,547,525	\$15,053	\$99,663	\$9,046,937
2031	12	(\$117,610)	\$8,096,318	\$1,547,525	\$16,503	\$113,170	\$9,773,517
2032	13	(\$117,610)	\$8,807,942	\$1,547,525	\$17,954	\$125,240	\$10,498,661
2033	14	(\$117,610)	\$9,519,565	\$1,547,525	\$19,404	\$137,652	\$11,224,147
2034	15	(\$117,610)	\$10,231,189	\$1,547,525	\$20,855	\$150,408	\$11,949,977
2035	16	(\$117,610)	\$10,942,812	\$1,547,525	\$22,305	\$163,507	\$12,676,150
2036	17	(\$117,610)	\$11,654,435	\$1,547,525	\$23,756	\$176,949	\$13,402,665
2037	18	(\$117,610)	\$12,366,059	\$1,547,525	\$25,207	\$190,733	\$14,129,524
2038	19	(\$117,610)	\$13,077,682	\$1,547,525	\$26,657	\$204,861	\$14,856,726
2039	20	(\$117,610)	\$13,789,305	\$1,547,525	\$28,108	\$222,655	\$15,587,593
2040	21	(\$117,610)	\$14,500,929	\$1,547,525	\$29,558	\$237,640	\$16,315,653
2041	22	(\$117,610)	\$14,645,938	\$1,547,525	\$29,854	\$243,546	\$16,466,864
2042	23	(\$117,610)	\$14,792,397	\$1,547,525	\$30,152	\$245,982	\$16,616,057
2043	24	(\$117,610)	\$14,940,321	\$1,547,525	\$30,454	\$252,042	\$16,770,343
2044	25	(\$117,610)	\$15,089,725	\$1,547,525	\$30,758	\$258,199	\$16,926,208
2045	26	(\$117,610)	\$15,240,622	\$1,547,525	\$31,066	\$264,454	\$17,083,667
2046	27	(\$117,610)	\$15,393,028	\$1,547,525	\$31,377	\$270,808	\$17,242,739
2047	28	(\$117,610)	\$15,546,958	\$1,547,525	\$31,690	\$277,263	\$17,403,437
2048	29	(\$117,610)	\$15,702,428	\$1,547,525	\$32,007	\$287,604	\$17,569,565
2049	30	(\$117,610)	\$15,859,452	\$1,547,525	\$32,327	\$294,303	\$17,733,608
2050	31	(\$117,610)	\$16,018,047	\$1,547,525	\$32,651	\$301,106	\$17,899,329
Total		(\$67,205,910)	\$296,490,199	\$47,910,295	\$604,356	\$4,830,844	\$349,835,694

Table 6. Discounted Benefit-Cost Analysis

Calendar Year	Project Year	Project Costs (undiscounted)	Project Benefits	
			Discounted at 3%	Discounted at 7%
2016	0	(\$9,720,000)	\$0	\$0
2017	0	(\$17,950,000)	\$0	\$0
2018	0	(\$17,950,000)	(\$5,528,087)	(\$5,126,715)
2019	0	(\$17,940,000)	(\$5,584,644)	(\$4,987,861)
2020	1	(\$117,610)	\$1,609,128	\$1,382,041
2021	2	(\$117,610)	\$2,184,114	\$1,806,884
2022	3	(\$117,610)	\$2,724,573	\$2,171,051
2023	4	(\$117,610)	\$3,232,423	\$2,481,077
2024	5	(\$117,610)	\$3,708,330	\$2,741,756
2025	6	(\$117,610)	\$4,154,026	\$2,958,513
2026	7	(\$117,610)	\$4,573,987	\$3,138,119
2027	8	(\$117,610)	\$4,963,166	\$3,280,380
2028	9	(\$117,610)	\$5,326,028	\$3,391,413
2029	10	(\$117,610)	\$5,665,566	\$3,475,377
2030	11	(\$117,610)	\$5,979,172	\$3,533,877
2031	12	(\$117,610)	\$6,271,133	\$3,571,878
2032	13	(\$117,610)	\$6,540,145	\$3,589,609
2033	14	(\$117,610)	\$6,788,368	\$3,590,557
2034	15	(\$117,610)	\$7,016,779	\$3,576,842
2035	16	(\$117,610)	\$7,226,315	\$3,550,380
2036	17	(\$117,610)	\$7,417,877	\$3,512,895
2037	18	(\$117,610)	\$7,592,329	\$3,465,943
2038	19	(\$117,610)	\$7,750,500	\$3,410,920
2039	20	(\$117,610)	\$7,894,819	\$3,350,717
2040	21	(\$117,610)	\$8,022,815	\$3,283,224
2041	22	(\$117,610)	\$7,861,278	\$3,102,064
2042	23	(\$117,610)	\$7,701,456	\$2,929,591
2043	24	(\$117,610)	\$7,546,520	\$2,768,458
2044	25	(\$117,610)	\$7,394,765	\$2,616,471
2045	26	(\$117,610)	\$7,246,124	\$2,473,108
2046	27	(\$117,610)	\$7,100,530	\$2,337,873
2047	28	(\$117,610)	\$6,957,921	\$2,210,303
2048	29	(\$117,610)	\$6,819,660	\$2,091,386
2049	30	(\$117,610)	\$6,682,804	\$1,977,827
2050	31	(\$117,610)	\$6,548,748	\$1,870,690
Total		(\$67,205,910)	\$177,388,668	\$79,526,648
Cost / Benefit Ratio			2.64	1.18