2023 - 2024 College of Engineering **I-10 FREEWAY SENIOR PROJECT**

California State Polytechnic University, Pomona

Benefit Cost Analysis



Study Participants

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I-10 Interchange Improvement Project (East Ramsey Street and Main Street)



1. Methodology

The Highway Safety Benefit-Cost Analysis Tool provides a method for preparing a simple economic analysis for infrastructure projects. The Tool quantifies project costs and direct and indirect benefits. Direct benefits include expected change in crash frequency. While indirect benefits include operational and environmental benefits that result from a reduction in crashes – such as a reduction in travel time, fuel consumption, and emissions. The model includes a calculation of the present value costs, present value benefits, net present value, and the benefit-cost ratio.

Table 01 – Input Data				
Item	Value	Description		
Total Time Period	25	Total years of the analysis period		
Discount Rate	3%	Used to calculate present value		
Percent of Trucks	20%	Used to calculate value of time		
Fuel Cost	\$4.10/gal	Per gallon fuel costs		
Value of Time Personal	\$30.00	Value time savings for general traffic		
Value of Time Freight	\$40.00	Value time savings for freight traffic		
Combined Value of Time	\$32.00	Weighted proportionally by traffic mix		

Shown in Table 1 shows the model inputs to calibrate the crash benefits.

2. Benefit Cost Analysis

Each alternative was calculated with a benefit cost ratio. Shown in Table 2 summarizes the results of the Tool (print outs of the Tool are shown in Appendix A and B). The value that has the highest Benefit-to-Cost ratio (B/C) would indicate the most cost-effective design.

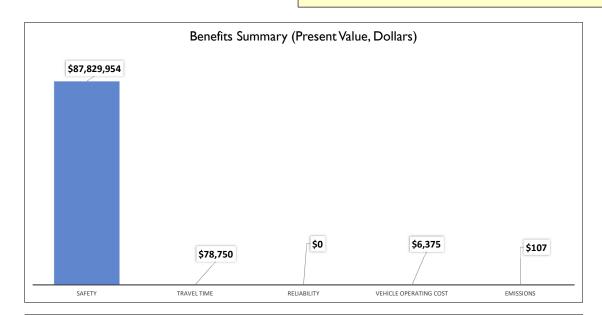
Table 02 – Benefit Cost Summary				
Alternative	Benefit	Cost	B/C	
Alt. R.1 (Trumpet)	\$87,109,292	\$73,069,000	1.19	
Alt. R.2 (Hybrid)	\$91,849,821	\$61,872,000	1.48	
Alt. R.3 (Tight)	\$47,099,207	\$36,619,000	1.29	
Alt. M.1 (SPUI)	\$61,740,000	\$87,915,187	1.42	
Alt. M.2 (Hooks)	\$94,415,523	\$57,707,000	1.64	
Alt. M.3 (Tight)	\$73,222,762	\$57,390,000	1.28	

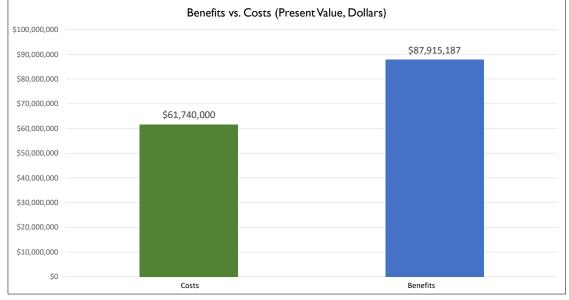
Notes: Refer to Project Study Report for full description of each alternative.

AGENCY: Caltrans		DATE	2/29/2024
			Present
Present Value Costs (\$ Dollars)	\$61,740,000	ITEMIZED BENEFITS (\$ Doll	ars) Value
Present Value Benefits (\$ Dollars)	\$87,915,187	Safety	\$87,829,95
Net Present Value (\$ Dollars)	\$26,175,187	Travel Time	\$78,75
Benefit / Cost Ratio:	1.42	Reliability	\$
Discount Rate	3.1%	Vehicle Operating Cost	\$6,37
		Emissions	\$10

TOTAL BENEFITS

\$87,915,187

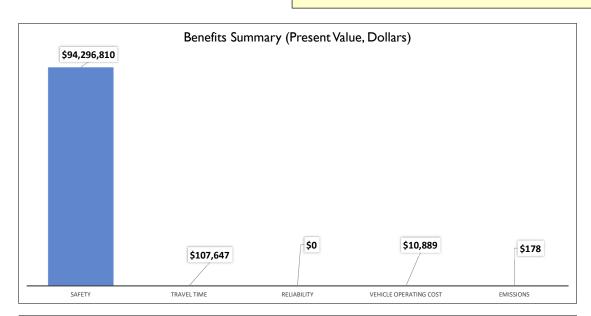


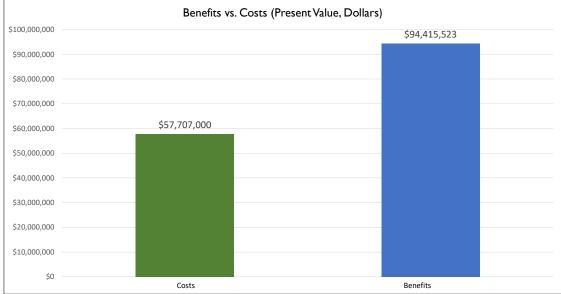


AGENCY: Caltrans		DATE 2/29/2024	
Present Value Costs (\$ Dollars)	\$57,707,000	ITEMIZED BENEFITS (\$ Dollars)	Present Value
Present Value Benefits (\$ Dollars)	\$94,415,523	Safety	\$94,296,81
Net Present Value (\$ Dollars)	\$36,708,523	Travel Time	\$107,64
Benefit / Cost Ratio:	1.64	Reliability	\$
Discount Rate	3.1%	Vehicle Operating Cost	\$10,88
		Emissions	\$17

TOTAL BENEFITS

\$94,415,523

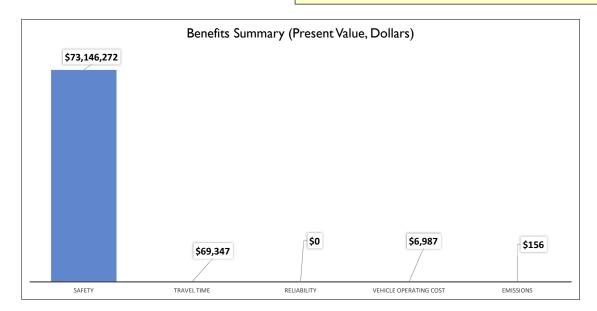


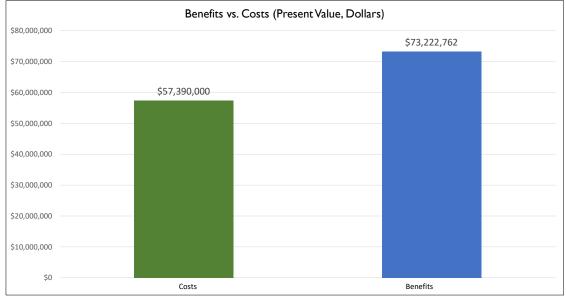


AGENCY: Caltrans		DATE	2/29/2024
			Present
Present Value Costs (\$ Dollars)	\$57,390,000	ITEMIZED BENEFITS	(\$ Dollars) Value
Present Value Benefits (\$ Dollars)	\$73,222,762	Safety	\$73,146,272
Net Present Value (\$ Dollars)	\$15,832,762	Travel Time	\$69,347
Benefit / Cost Ratio:	1.28	Reliability	\$0
Discount Rate	3.1%	Vehicle Operating Cos	st \$6,98
		Emissions	\$156

TOTAL BENEFITS

\$73,222,762





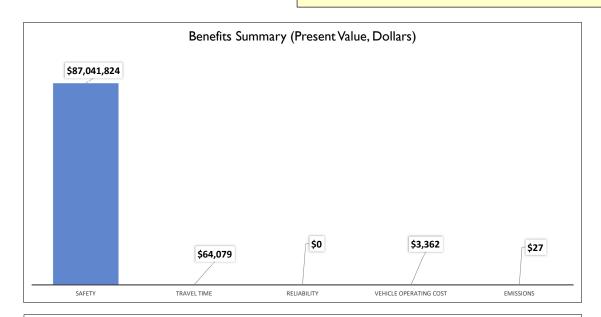
AGENCY: Caltrans		DATE 2/29/202	4
			Present
Present Value Costs (\$ Dollars)	\$73,069,000	ITEMIZED BENEFITS (\$ Dollars)	Value
Present Value Benefits (\$ Dollars)	\$87,109,292	Safety	\$87,041,824
Net Present Value (\$ Dollars)	\$14,040,292	Travel Time	\$64,079
Benefit / Cost Ratio:	1.19	Reliability	\$0
Discount Rate	3.1%	Vehicle Operating Cost	\$3,362

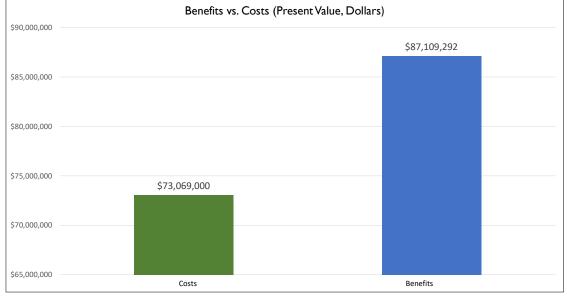
Emissions

TOTAL BENEFITS

\$27

\$87,109,292





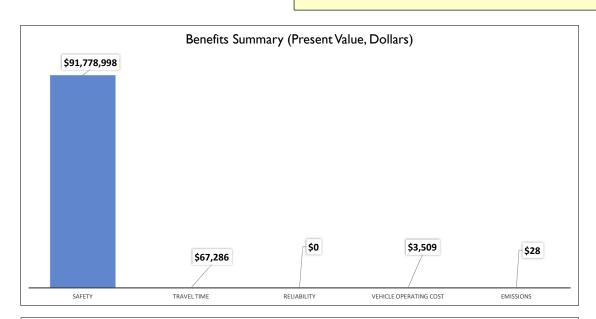
AGENCY: Caltrans		DATE	2/29/2024
			Present
Present Value Costs (\$ Dollars)	\$61,872,000	ITEMIZED BENEFITS	
Present Value Benefits (\$ Dollars)	\$91,849,821	Safety	\$91,778,9
Net Present Value (\$ Dollars)	\$29,977,821	Travel Time	\$67,2
Benefit / Cost Ratio:	1.48	Reliability	
Discount Rate	3.1%	Vehicle Operating Cos	st \$3,5

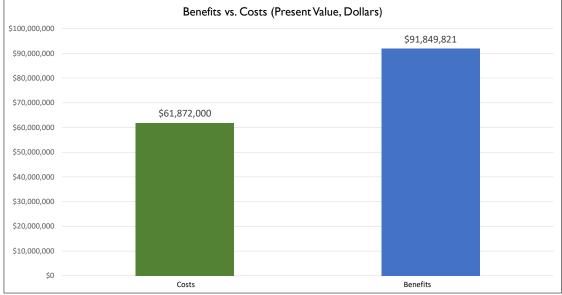
Emissions

TOTAL BENEFITS

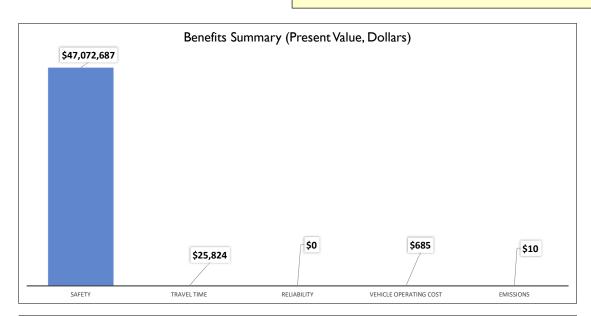
\$28

\$91,849,821





AGENCY: Caltrans		DATE 2/29/2	024
	#24 4 10 000		Present
Present Value Costs (\$ Dollars)	\$36,619,000	ITEMIZED BENEFITS (\$ Dollars)	Value
Present Value Benefits (\$ Dollars)	\$47,099,207	Safety	\$47,072,6
Net Present Value (\$ Dollars)	\$10,480,207	Travel Time	\$25,8
Benefit / Cost Ratio:	1.29	Reliability	
Discount Rate	3.1%	Vehicle Operating Cost	\$6
		Emissions	\$



TOTAL BENEFITS

\$47,099,207

