

BCA Narrative



Mobility Enhancements for Regional Growth & Equity (MERGE) Project

Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant Application
February 2024

Benefit-Cost Analysis

A benefit-cost analysis (BCA) for the MERGE project was completed, and the full analysis is included in the **Appendix D** as well as on the [project website](#). A primary goal for this MERGE project is to improve traffic safety and provide safe multimodal transportation opportunities while maintaining traffic flow at an acceptable level of service.

For the BCA, a Build alternative was analyzed and compared to a No-Build or Do nothing alternative. The Build alternative includes construction of an interchange at 35th Avenue and widening from four to six lanes to 47th Avenue, construction of an interchange at 47th Avenue.

The purpose of a BCA is to express the reasonably expected outcomes of an initial investment to a common measure, base-year dollars. This accounts for benefits occurring over long periods of time, while most of the costs are incurred as an initial investment. Under this approach, a project with monetized benefits that are greater than its costs will have a benefit-to-cost ratio greater than one and therefore is considered an economically beneficial endeavor.

The monetary benefit for this project is quantified in terms of travel time savings, project area collisions, and roadway operations and maintenance. The costs considered for the project include surfacing, grading and drainage, signal and lighting construction, subbase/base, right-of-way acquisition, as well as engineering fees and costs.

The benefits and economic impacts the MERGE project will deliver are diversified and numerous. It will provide enhanced local and regional mobility and connectivity through the elimination of signals and grade-separation thereby allowing the free flow of passenger and freight traffic. MERGE's implementation will generate significant safety improvements for both vehicular and active transportation. Grade-separation of US 34 traffic, in addition to improving the efficiency of east-west travel along the corridor, will provide safer pedestrian and bike crossing which is especially important given several schools, colleges, medical facilities, high density and senior housing and major retail centers are located directly adjacent to the project's location. The elimination of traffic signals at the existing US 34/35th Avenue intersection will alleviate recurring congestion on the regional connector as well as at the busiest local arterial while also lowering greenhouse gases along the corridor through the reduction of idling emissions (where idle times can exceed 220 seconds during peak times).

The results of the analysis provide input for evaluating the overall benefit of the proposed MERGE project to the US 34 corridor. Since the current design is still preliminary, it should be noted certain benefits and costs may change prior to final design, however these changes are anticipated to be relatively minor as initial cost estimates were made to be conservative. A 20-year analysis period beginning in 2028 and ending in 2047 was chosen for the benefit-cost evaluation with all values discounted to 2020 dollars.

Various Benefits

The benefits derived from the Build alternative for travel time are estimated at \$574,847,587 for the network at a 3 percent discount rate. The economic travel benefit was quantified using USDOT’s suggested value for person travel time.

The USDOT’s value of a statistical life (VSL) provided in the Benefit-Cost Analysis Guidance for Discretionary Grant Programs were used for the values of the crashes. A resulting benefit of \$12,044,981 was obtained for a 3 percent discount rate over the 20-year analysis period.

The proposed interchanges will not only decrease travel times but will also decrease greenhouse gas emissions due to less idling time for vehicles. Using the reported NOx and CO2 emissions in SimTraffic and the USDOT recommended emission reduction monetized value, an environmental benefit was calculated for each interchange. This resulted in a benefit of \$5,166,195 for a 3 percent discount rate over the 20-year analysis period.

BCA Results

See **Tables 1** for a results summary of the benefit-cost analysis for the MERGE Project.

Table 1: Benefit-Cost Analysis Summary for the 35th Avenue Interchange and 47th Avenue Interchange

Benefit-Cost Ratio		
	Benefit	Cost
<i>Emissions</i>	\$ 5,166,195.74	\$ -
<i>Vehicle Operating</i>	\$ -	\$ 21,286,460.37
<i>Travel Time</i>	\$ 574,847,587.70	\$ -
<i>Safety</i>	\$ 12,044,981.43	\$ -
<i>Maintenance</i>	\$ 1,630,263.95	\$ -
<i>Construction</i>	\$ -	\$ 61,947,094.83
<i>Salvage Value</i>	\$ 9,094,592.45	\$ -
<i>PV Total Benefit</i>	\$ 593,689,028.82	
<i>PV Total Cost</i>		\$ 83,233,555.20
<i>PV Total Cost-Salvage Value</i>		\$ 74,138,962.75
Benefit-Cost Ratio	8.01	

The analysis of the 35th Avenue and 47th Avenue proposed interchanges indicates the build alternative has a benefit-cost ratio significantly greater than 1.0, meaning each are economically beneficial projects. The benefits of the MERGE project are estimated to be higher than the costs associated with the construction of the project. A more complete breakdown of both the project costs and benefits can be found in **Appendix D**.