

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



## Executive Summary

Served by six airlines and three air cargo carriers, SIA is the second largest airport in the State of Washington and is recognized by the FAA as a small hub.<sup>1</sup> In addition, SIA is an employment hub for more than 3,000 people and has an important and expanding airfield and aerospace industry cluster.<sup>2</sup> Further, SIA has a \$3B direct and indirect economic impact annually on the Spokane Region<sup>3</sup>.

Traffic in the SIA area is currently transiting on two busy inbound and outbound airport access roads: Airport Drive Inbound and Airport Drive Outbound. Vehicles use Airport Drive Inbound and Outbound and cross Spotted Road to access the Airport, nearby US 2 and I-90. Spotted Road is a key component of the Critical Urban Freight Corridor, providing access to the Airport Industrial Park. The Spotted Road/Airport Drive intersections' geometry has deficiencies creating potential safety issues, and improvements are necessary to address them. The combination of lower-speed traffic trying to cross Airport Drive Inbound and Airport Drive Outbound with higher-speed traffic at two intersecting points has led to multiple frequent accidents, many of which were serious injury accidents and fatalities. Specifically, since 2009, the two intersections have experienced 116 crashes, 75 injuries, and two fatalities. These problems persist despite the installation of additional traffic safety measures and are assumed to worsen as traffic volumes increase. In addition, vehicles on Spotted Road approaching the intersections experience significant delays while waiting for the gap on Airport Drive to cross, which further results in vehicle fuel costs and increased emissions due to idling.

The Airport Road and Spotted Road Safety and Mobility Improvement Project (the Project) will construct an overpass to grade separate Spotted Road from Airport Drive Inbound and Airport Drive Outbound, providing continuous/free flow traffic for vehicles on Spotted Road travelling through the intersections. As a result, the Project would reduce the accidents occurring within the region. Additionally, the Project would realize reductions in-vehicle travel time, fuel costs, and emissions due to avoided vehicle idling.

**Figure 1** below highlights the proposed concept of the Project.

---

<sup>1</sup> Spokane International Airport. *About Spokane International Airport*. Accessed March 25, 2022  
<https://business.spokaneairports.net/about-spokane-international>

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



**Figure 1:** Proposed Concept of the Project

A Benefit-Cost Analysis (BCA) of the Project was conducted in conformance with federal guidance regarding evaluation methods and monetization values recommended by the U.S. Department of Transportation (USDOT) in its January 2023 *Benefit-Cost Analysis Guidance for Discretionary Grant Programs*. **Table ES - 1** on the following page provides a summary of the changes and associated benefits that are expected from the Project.



# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



**Table ES - 1:** Summary of Infrastructure Improvements and Associated Benefits

Current Status (Base Scenario) and Problems to be Addressed	Changes to Baseline (Alternative Scenario)	Types of Impact	Population Affected by Impacts	Economic Benefits	Summary of Results (2021\$, Discounted)
<p>Traffic in at SIA heavily relies on Airport Drive Inbound and Outbound roadways and Spotted Road to access the airport, US 2 and I-90. Spotted Road is a part of the Critical Urban Freight Corridor and provides access to the Airport Industrial Park. However, the Spotted Road/Airport Drive intersections and geometry are dangerous and have led to multiple routine accidents, many of which are serious injury accidents and even some fatalities. In addition, vehicles on Spotted Road</p>	<p>The Project looks to grade-separate Spotted Road from the Airport Drive Inbound and Outbound, which will provide straight through traffic for vehicles on Spotted Road travelling through the intersections. As a result, the Project will look to reduce collisions within the area, in addition to realizing reductions in vehicle travel time, fuel costs, and emissions due to avoided vehicle idling.</p>	Reduction in vehicle collisions from converting the at-grade intersections to an interchange.	Local motorists	Improved Safety and Reduced Accident Costs	\$19.7 M
		Reduced maintenance costs by replacing part of the existing Spotted Road with an overpass.	Local motorists	Avoided Roadway Maintenance Costs	\$2.2 M
		Residual value of the Spotted Overpass at the end of the study period.	Program sponsors	Residual Value of Capital Assets	\$0.0 M
		Travel time savings from eliminated congestion at the Spotted Road/Airport Drive intersection and the higher average travel speeds on the new route.	Local motorists	Travel Time Savings	\$1.9 M
		Vehicle fuel costs savings due to avoided idling at intersections but offset with the vehicle fuel costs from driving a longer distance on the new overpass.	Local motorists	Avoided Vehicle Operating Costs	(\$0.3 M)
		Improved travel time reliability as a result of grade separating Spotted Road from Airport Drive.	Program sponsors	Improved Travel Time Reliability	Not Monetized

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Current Status (Base Scenario) and Problems to be Addressed	Changes to Baseline (Alternative Scenario)	Types of Impact	Population Affected by Impacts	Economic Benefits	Summary of Results (2021\$, Discounted)
approaching the intersections experience significant delay while waiting for the gap on Airport Drive to cross, which further results in vehicle fuel costs and increased emissions.		Reduced emissions from eliminated vehicle idling time and vehicles traveling at higher speeds	Local and State residents and motorists	Avoided GHG Emissions	\$3.8 M
		Reduced emissions from eliminated vehicle idling time and vehicles traveling at higher speeds	Local and State residents and motorists	Avoided CAC Emissions	\$2.7 M

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



The period of analysis used in the estimation of benefits and costs corresponds to 30 full years of operations, excluding the two years for design and construction, as well as the time spent developing the Project. The total costs consist of \$34.9M in capital expenditures, in 2021 dollars. The capital expenditure for this Project, by year, is presented in **Table ES - 2**.<sup>4</sup> Meanwhile,

**Table ES - 3** presents the total benefits from the Project, by merit criteria.

**Table ES - 2:** Summary of Capital Expenditures, 2021\$

Year	Capital Expenditure
2021	\$6.9 M
2022	\$ -
2023	\$ -
2024	\$2.3 M
2025	\$20.6 M
2026	\$5.1 M
<b>Total</b>	<b>\$34.9 M</b>

**Table ES - 3:** Summary of Benefits by Merit Criteria, 2021\$

Merit Criteria	Benefit Category	In Constant Dollars	Discounted
Safety	Improved Safety and Reduced Accident Costs	\$83.2 M	\$19.7 M
State of Good Repair	Avoided Roadway Maintenance Costs	\$8.4 M	\$2.2 M
	Residual Value of Capital Assets	\$ -	\$ -
Economic Competitiveness	Travel Time Savings	\$13.7 M	\$1.9 M
	Avoided Vehicle Operating Costs	(\$1.1 M)	(\$0.3 M)
	Improved Travel Time Reliability	Not Monetized	Not Monetized
Environmental Sustainability	Avoided GHG Emissions	\$7.6 M	\$3.8 M
	Avoided CAC Emissions	\$10.6 M	\$2.7 M
<b>Total</b>		<b>\$122.4 M</b>	<b>\$30.0 M</b>

<sup>4</sup> Previously incurred costs were escalated to 2021 dollars and discounted to be incurred in 2021. Discounting methodology and assumptions align with those presented in the U.S. Department of Transportation's *Benefit-Cost Analysis Guidance for Discretionary Grant Programs* January 2023.

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Based on the BCA conducted (see **Table ES - 4**), the Project is expected to generate \$30.0M in discounted benefits, while only costing \$24.6 million (discounted) based on a 3 percent real discount rate for carbon dioxide (CO<sub>2</sub>)-related impacts and a 7 percent real discount rate for all other impacts per the USDOT BCA guidance. This translates to a net present value (NPV) of \$5.4M and a benefit-cost ratio of 1.2. Additional detailed breakdowns of the analysis, including the various assumptions and methodologies, are presented in the rest of this document.

**Table ES - 4:** Overall Results of the Benefit-Cost Analysis, 2021\$

Key Financial Metrics	Undiscounted	Discounted
Total Benefits	\$122.4 M	\$30.0 M
Total Costs	\$34.9 M	\$24.6 M
Net Present Value (NPV)	\$87.5 M	\$5.4 M
Return on Investment (ROI)	250%	22%
Benefit-Cost Ratio (BCR)	3.5	1.2
Payback Period (years)	11.4	21.9
Internal Rate of Return (IRR)	7.9%	

In addition to the monetized benefits summarized above, the Project would generate benefits that are difficult to quantify. These benefits are described below.

### Improved Travel Time Reliability

Vehicles approaching the Spotted Road/Airport Drive can experience significant delays while waiting for the gap to cross the two intersections, which causes variability in travel time. Grade separating Spotted Road from Airport Drive with an overpass will reduce vehicle wait times at intersections and improve travel time reliability. However, the reliability benefits are difficult to monetize in absence of detailed modelling for different roadway users.

Finally, additional details on the assumptions and methodologies used within the BCA can be found in the BCA Model submitted with this application.

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



## 1 Introduction

This document provides detailed technical information on the economic analyses conducted in support of the US Department of Transportation’s Fiscal Year 2023 Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant Application for Spokane International Airport’s **From Interstate to Airways, Airport Drive and Spotted Road Safety and Multimodal Improvements Project**. This document includes the following:

- **Section 2, Methodological Framework:** Introduces the conceptual framework used in the Benefit-Cost Analysis (BCA).
- **Section 3, Overview:** Provides an overview of the Project, including a brief description of existing conditions and proposed alternatives; a summary of cost estimates and schedule; and a description of the types of effects that the Project is expected to generate.
- **Section 4, General Assumptions:** Discusses the general assumptions used in the estimation of project costs and benefits.
- **Section 5, Demand Projections:** Provides estimates of travel demand and traffic volumes.
- **Section 6, Benefits Measurement, Data, and Assumptions:** Details the specific data elements and assumptions used to address the goals of the Project to comply with RAISE program requirements.
- **Section 7, Summary of Findings and Benefit-Cost Outcomes:** Provides estimates of the net present value (NPV), its benefit-cost ratio (BCR), and other evaluation metrics.
- **Section 8, Benefit Cost Analysis Sensitivity:** Provides the outcome of the sensitivity analysis that evaluates the difference assumptions made in the analysis, and the impact that the variability of those assumptions may have on the overall results.

Additional data information are provided within the BCA modeling, including annual estimates of benefits and costs to assist with USDOT in its review of the application.<sup>5</sup>

## 2 Methodological Framework

The BCA conducted for this Project includes monetized benefits and costs measured using USDOT guidance, *Benefit-Cost Analysis Guidance for Discretionary Grant Programs*, as well as the quantitative and qualitative merits of the Project. A BCA provides estimates of the benefits that are expected to accrue over a specified period and compares them to the anticipated costs. Costs include both the resources required to develop the Project and the costs of maintaining the new or improved asset over time. Estimated benefits are based on the projected impacts of the Project on both users and non-users of the facility, valued in monetary terms.<sup>6</sup>

<sup>5</sup> While the models and software themselves do not accompany this appendix, they are provided separately as part of the application

<sup>6</sup> U.S. Department of Transportation, *Benefit-Cost Analysis Guidance for Discretionary Grant Programs*, January 2023



# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



While a BCA is just one of many tools that can be used in making decisions about infrastructure investments, USDOT believes that it provides a useful benchmark from which to evaluate and compare potential transportation investments.<sup>7</sup>

The specific methodology employed for this application was developed using the BCA guidance developed by USDOT and is consistent with the RAISE program guidelines. In particular, the methodology involves:

- Establishing existing and future conditions under the Base Case (No Build) and Alternative Case (Build) scenarios.
- Assessing benefits with respect to each of the merit criteria identified in the Notice of Funding Opportunity (NOFO).
- Measuring benefits in dollar terms, whenever possible, and expressing benefits and costs in a common unit of measurement.
- Using USDOT guidance for the valuation of safety benefits and reductions in air emissions, while relying on industry best practice for the valuation of other effects.
- Discounting future benefits and costs with the real discount rates recommended by the USDOT (3 percent for CO<sub>2</sub>-related impacts and 7 percent for all other impacts).
- Conducting a sensitivity analysis to assess the impacts of changes in key assumptions.

## 3 Overview

Served by six airlines and three air cargo carriers, SIA is the second largest airport in the State of Washington and is recognized by the FAA as a small hub.<sup>8</sup> In addition, SIA is an employment hub for over 3,000 people and has an important and expanding airfield and aerospace industry cluster.<sup>9</sup> Further, SIA has a \$3B direct and indirect economic impact annually on the Spokane Region<sup>10</sup>.

Traffic in the SIA area is currently transiting on two busy inbound and outbound airport access roads: Airport Drive Inbound and Airport Drive Outbound. Vehicles use Airport Drive Inbound and Outbound and cross Spotted Road to access the Airport, nearby US 2, and I-90. Spotted Road is a key component of the Critical Urban Freight Corridor, providing access to the Airport Industrial Park. The Spotted Road/Airport Drive intersections' geometry has deficiencies creating potential safety issues, and improvements are necessary to address them. The combination of lower-speed traffic trying to cross Airport Drive Inbound and Airport Drive Outbound with higher-speed traffic at two intersecting points has led to multiple frequent accidents, many of which were serious injury accidents and fatalities. Specifically, since 2009, the two intersections have experienced 116 crashes, 75 injuries, and two fatalities. These problems persist despite the installation of additional traffic safety measures and are assumed to worsen as traffic volumes increase. In addition, vehicles on Spotted Road approaching the

<sup>7</sup> Ibid.

<sup>8</sup> Spokane International Airport. *About Spokane International Airport*. Accessed March 25, 2022  
<https://business.spokaneairports.net/about-spokane-international>

<sup>9</sup> Ibid.

<sup>10</sup> Ibid.



# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



intersections experience significant delays while waiting for the gap on Airport Drive to cross, which further results in vehicle fuel costs and increased emissions due to idling.

The From Interstate to Airways, Airport Road and Spotted Road Safety and Mobility Improvement Project will construct an overpass to grade separate Spotted Road from Airport Drive Inbound and Airport Drive Outbound, providing continuous/free flow traffic for vehicles on Spotted Road travelling through the intersections. As a result, the Project would reduce the accidents occurring within the region. Additionally, the Project would realize reductions in-vehicle travel time, fuel costs, and emissions due to avoided vehicle idling. **Figure 2** below highlights the proposed concept of the Project.



**Figure 2:** Proposed Concept of the Project

## 3.1 Base Case

In the No Build Case, all traffic travelling on Spotted Road and Airport Drive roads will continue to interface at the Spotted Road/Airport Drive intersections. The combination of lower speed traffic on Spotted Road trying to cross the inbound and outbound of Airport Drive roads with higher speed traffic is likely to cause many accidents, including serious injuries and fatalities. In addition, vehicles transiting

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



on Spotted Road will have to stop and wait for a gap to cross the Spotted Road/Airport Drive intersections, resulting in travel time delays, and additional vehicle operating costs and emissions from idling. Moreover, the existing Spotted Road will require significant maintenance costs, as well as rehabilitation and reconstruction in future years.

## 3.2 Alternative Case

In the Build Case, the Project will relocate the Spotted Road/Airport Drive interchange to the east and construct a new grade-separated Spotted Road overpass above and across Airport Drive, which will provide straight through free flow traffic for vehicles on Spotted Road travelling through the Spotted Road/Airport Drive intersections. The interchange is expected to reduce the accidents occurring within the area. Additionally, the Project would eliminate the need for motorists on Spotted Road to idle at the intersections, resulting in avoided vehicle wait times, as well as operating costs, and emissions associated with idling vehicles. Additionally, despite the marginally longer distance, the Project is expected allow motorists to drive at fast speeds, which is expected to generate additional impacts.

## 3.3 Project Cost and Schedule

The Project leverages funding to provide optimal project cost delivery. **Table 1** summarizes the Project's future annual capital expenditures. Design and construction are expected to start in 2025 and be completed in 2026, resulting in the new overpass fully operational in 2027.

As this Project has been in development for more than 20 years, previously incurred costs have been adjusted to constant dollars (2021 dollars) and adjusted to be incurred in 2021 following the discounting methodology presented in the USDOT's BCA Guidance.

**Table 1:** Expenditure Profile, 2021\$

Year	Capital Expenditure
2021	\$6.9 M
2022	\$ -
2023	\$ -
2024	\$2.3 M
2025	\$20.6 M
2026	\$5.1 M
<b>Total</b>	<b>\$34.9 M</b>

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



## 3.4 Project Benefit Impacts

The benefits associated with the Project are presented in **Table 2**, grouped by merit criteria.

**Table 2:** Expected Effects on Benefit Categories

Merit Criteria	Benefit Category	Description	Monetized	Qualitative
Safety	Improved Safety and Reduced Accident Costs	Reduction in vehicle collisions from converting the at-grade intersections to an interchange.	Yes	-
State of Good Repair	Avoided Roadway Maintenance Costs	Reduced maintenance costs by replacing part of the existing Spotted Road with an overpass.	Yes	-
	Residual Value of Capital Assets	Residual value of the Spotted Overpass at the end of the study period.	Yes	-
Economic Competitiveness	Travel Time Savings	Travel time savings from eliminated congestion at the Spotted Road/Airport Drive intersection and the higher average travel speeds on the new route.	Yes	-
	Avoided Vehicle Operating Costs	Vehicle fuel costs savings due to avoided idling at intersections but offset with the vehicle fuel costs from driving a longer distance on the new overpass.	Yes	-
	Improved Travel Time Reliability	Improved travel time reliability as a result of grade separating Spotted Road from Airport Drive.	-	Yes
Environmental Sustainability	Avoided GHG Emissions	Reduced emissions from eliminated vehicle idling time and vehicles traveling at higher speeds	Yes	-
	Avoided CAC Emissions	Reduced emissions from eliminated vehicle idling time and vehicles traveling at higher speeds	Yes	-

## 4 General Assumptions

The BCA measures benefits against costs throughout a period of analysis, beginning at the start of construction and including 30 full years of operations.



# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



The monetized benefits and costs are estimated in 2021 dollars, with future dollars discounted in compliance with USDOT RAISE requirements.

A breakdown of the general assumptions used in the analysis for the Project is presented in **Table 3**.

**Table 3:** General Assumptions Used in the Analysis

Variable	Units	Value	Source
Discount Rate	%	7.0%	Office of the Secretary. Benefit-Cost Analysis Guidance for Discretionary Grant Programs. USDOT. July 2017. Obtained from: <a href="https://www.transportation.gov/office-policy/transportation-policy/benefit-cost-analysis-guidance">https://www.transportation.gov/office-policy/transportation-policy/benefit-cost-analysis-guidance</a>
Discount Rate, CO2-Related Impacts	%	3.0%	
Base Year	year	2021	Per US DOT BCA Guidance January 2023.
Years of Benefits	years	30	Based on the maximum benefit years for BCA from USDOT BCA Guidance, January 2023.
Construction Start	year	2025	Based on Project Schedule
Construction End	year	2026	
Average Distance Travelled, Southbound of Spotted Road - No-Build	miles	0.9	Weighted average distances for vehicles travelling through Spotted Road/Airport Drive intersections, based on the percent share of traffic from each direction. Distance retrieved from Google maps, and provided by JUB Airport Traffic Study, 2015.
Average Distance Travelled, Northbound of Spotted Road - No-Build	miles	0.7	
Average Distance Travelled, Southbound of Spotted Road - Build	miles	1.0	
Average Distance Travelled, Northbound of Spotted Road - Build	miles	1.2	

## 5 Demand Projections

Accurate demand projections are important to ensure reasonable BCA output results. The magnitudes of the long-term benefits accruing over the project study period are a function of vehicular traffic within the project area.

### 5.1 Methodology

Robust traffic projections are important to ensure reasonable BCA output results. Therefore, historical vehicles approaching the Spotted Road/Airport Drive intersections during the AM and PM peak hours were collected by Iteris as part of the traffic count collection and traffic study conducted for Spokane



# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



International Airport<sup>11</sup>. Daily peak hour<sup>12</sup> traffic counts for August, October and December of 2019 are shown in **Table 4** and **Table 5** below.

**Table 4:** Daily Peak Hour Traffic at Spotted Road / Airport Drive Intersection – August & October

	Aug-19				Oct-19			
	North Leg		South Leg		North Leg		South Leg	
	T	R/L	T	R/L	T	R/L	T	R/L
<i>AM Peak Traffic</i>								
Inbound & Spotted Road	40	16	58	54	61	16	40	61
Outbound & Spotted Road	49	7	94	10	71	10	80	9
<i>PM Peak Traffic</i>								
Inbound & Spotted Road	71	29	58	66	60	13	57	61
Outbound & Spotted Road	75	11	104	12	80	4	104	18

**Note:** T means through traffic; R/L means turning traffic

**Table 5:** Daily Peak Hour Traffic at Spotted Road / Airport Drive Intersection – December

	Dec-19			
	North Leg		South Leg	
	T	R/L	T	R/L
<i>AM Peak Traffic</i>				
Inbound & Spotted Road	44	13	58	57
Outbound & Spotted Road	46	8	96	15
<i>PM Peak Traffic</i>				
Inbound & Spotted Road	54	11	32	52
Outbound & Spotted Road	68	7	75	12

**Note:** T means through traffic; R/L means turning traffic

An average was taken between AM and PM peak hour traffic to obtain the daily peak hour average, which was then prorated to Average Daily Traffic (ADT) using the percent share of peak hour traffic to ADT. Finally, an annual growth rate of 2.5 percent was applied to forecast future traffic volumes based on a 2015 airport traffic study.

<sup>11</sup> Iteris. *Spokane International Airport – Traffic Count Collection and Traffic Study*. 2019.

<sup>12</sup> AM peak hours are defined as between 10:45 AM and 11:45 AM, while PM peak hours are defined as between 1:00 PM and 2:00 PM. Definition obtained from Iteris. *Spokane International Airport – Traffic Count Collection and Traffic Study*. 2019.

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



## 5.2 Assumptions

All assumptions used in the estimation of traffic demand for the Project are provided in **Table 6**.

**Table 6:** Assumptions used in the Estimation of Demand

Variable	Unit	Value	Source
Traffic Annual Growth Rate	%	2.5%	Spokane International Airport Traffic Study, 2015, prepared by JUB Engineers Inc.
Percent Share of Trucks in the Study Area	%	20.0%	Calculated value.
Percent Share of Passenger Cars in the Study Area	%	80.0%	Average percent share of passenger cars in the area. Information retrieved from Spokane International Airport Traffic Count Collection and Traffic Study, 2019, prepared by Iteris.
Percent Share of Peak Hour Traffic	%	8.4%	Calculated based on the percent share of peak hour counts over average daily traffic on Flightline Avenue near SIA.

## 5.3 Demand Projections

The resulting projections for annual traffic volume at the Spotted Road and Airport Drive intersection are presented in **Table 7**. Further details are available in the accompanying BCA spreadsheet model.

**Table 7:** Traffic Volume Projections

Spotted Road / Airport Drive Intersection	Project Opening Year (2027)	2036	2046	2056
Inbound & Spotted Road	1,002,466	1,251,943	1,602,593	2,051,455
Outbound & Spotted Road	986,716	1,232,273	1,577,414	2,019,223

## 6 Benefits Measurement, Data, and Assumptions

This section describes the measurement approach used for each benefit or impact category identified in **Table 2** and provides an overview of the associated methodology, assumptions, and estimates.

### 6.1 Safety

Accident costs and impacts on life, limb, and property are significant components of road user costs. Therefore, road safety is a key economic factor in the planning of roads, as well as an important indicator of transportation efficiency, while outside the economic context, highway safety is often the subject of public concern.

The proposed Project is expected to reduce the number of accidents in the area by separating Spotted Road from Airport Drive Inbound and Outbound, such that lower-speed traffic on Spotted Road can cross inbound and outbound Airport Drive directly without interfering with higher-speed traffic. Specifically, the analysis leverages crash modification factors (CMFs) obtained from the Crash

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Modification Factors Clearinghouse for converting at-grade intersections to an interchange. Additionally, the analysis assumes that due the additional likelihood of accidents attributed to the marginal increase in the distance beyond the accidents estimated by the interchange would be negligible.

The Project is expected to generate substantial benefits in line with the “Safety” merit criteria, with the specific benefits described below. The safety benefits are monetized using the assumptions presented in **Table 8**.

**Table 8:** Assumptions used to Monetize Safety Benefits

Variable	Units	Value	Source
Value of a Statistical Life	2021\$/fatality	\$11,800,000	Obtained from USDOT. January 2023. Based on: Treatment of the Economic Value of Preventing Fatalities and Injuries in Preparing Economic Analyses (2022) <a href="https://www.transportation.gov/officepolicy/transportation-policy/reviseddepartmental-guidance-on-valuation-of-a-statistical-life-in-economic-analysis">https://www.transportation.gov/officepolicy/transportation-policy/reviseddepartmental-guidance-on-valuation-of-a-statistical-life-in-economic-analysis</a>
MAIS Factor - Serious Injury	Fraction of VSL	0.105	USDOT. Treatment of the Value of Preventing Fatalities and Injuries in Preparing Economic Analyses. March 2021.
MAIS Factor - Moderate Injury	Fraction of VSL	0.047	
MAIS Factor - Minor Injury	fraction of VSL	0.003	
Cost of Serious Injury	2021\$/injury	\$1,239,000	Calculated based on the MAIS factor relative to the value of statistical life and the value of statistical life.
Cost of Moderate Injury	2021\$/injury	\$554,600	
Cost of Minor Injury	2021\$/injury	\$35,400	

### 6.1.1 Improved Safety and Reduced Accident Costs

**Methodology.** Safety benefits were estimated by monetizing the avoided fatalities and injuries due to the new overpass. Total fatalities and injuries at the Spotted Road/Airport Drive intersections from 2010 to 2019 were provided by Spokane International Airport, as shown in **Table 9** below.

The BCA assumes that accidents at the Spotted Road/Airport Drive intersections in the No Build case grow at the same rate as the traffic volume. Finally, these accidents can be reduced by grade separating the Spotted Road in the Build case.

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



**Table 9:** Historical Fatalities and Injuries at Spotted Road / Airport Drive Intersections

Incident Type	2010-2019 Total	10-Year Average	Source
Fatalities	1	0.10	SIA. Accident data provided by Spokane Regional Transportation Council on behalf of WSDOT. Accidents for Spotted Road with Airport Drive Inbound and Outbound are used.
Serious Injury	2	0.20	
Evident Injury (Moderate)	27	2.70	
Possible Injury (Minor)	70	7.00	

The fatalities and injuries were then monetized based on assumptions in **Table 10**. The difference in total accident costs between No Build and Build cases determines the improved safety and avoided accident costs.

**Assumptions.** The assumptions used in the estimation of improved safety and reduced accident costs are summarized in **Table 10**.

**Table 10:** Assumptions used in the Estimation of Improved Safety and Reduced Accident Costs

Variable	Units	Value	Source
CMF: Converting at-grade intersection into grade-separated interchange (Serious Injuries, Minor Injuries, and Possible Injuries)	factor	0.430	Elvik, R. and Erke, A. Revision of the Handbook of Road Safety Measures. 2007. Obtained from CMF Clearinghouse. <a href="https://www.cmfclearinghouse.org/detail.cfm?facid=460">https://www.cmfclearinghouse.org/detail.cfm?facid=460</a> . Applicable to serious injuries, minor injury, and possible injury.
CMF: Converting at-grade intersection into grade-separated interchange	factor	0.580	Elvik, R. and Erke, A. Revision of the Handbook of Road Safety Measures. 2007. Obtained from CMF Clearinghouse. <a href="https://www.cmfclearinghouse.org/detail.cfm?facid=460">https://www.cmfclearinghouse.org/detail.cfm?facid=460</a> .

## 6.1.2 Benefit Estimates

**Table 11** provides the monetized benefit estimates of safety benefits. The estimated present value of the discounted benefits over the projected 30-year benefit period is \$19.7M.

**Table 11:** Estimates of Safety Benefits, 2021\$

	Over the Project Lifecycle	
	In Constant Dollars	Discounted
Improved Safety and Reduced Accident Costs	\$83.2 M	\$19.7 M



# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



## 6.2 State of Good Repair

The state of good repair benefits are designed to capture benefits from maintaining infrastructure in good condition. This is captured through reduced maintenance costs and the residual value of assets. The residual value captures any useful life left on the assets constructed, and the reduced maintenance costs capture changes in maintenance costs between the No Build and Build Cases.

### 6.2.1 Reduced Maintenance Costs

**Methodology.** The existing Spotted Road has been aging, and increased maintenance costs have been observed during the past few years due to increasing rehabilitation and reconstruction of part of the Spotted Road. However, this can be reduced significantly by replacing it with the new Spotted Road overpass. Therefore, the reduced maintenance costs captured the difference in maintenance costs between Build and No Build cases.

**Assumptions.** Table 12 and Table 13 highlights the assumptions used to estimate the reduced maintenance costs.

**Table 12:** Assumptions used in the Estimation of the Reduced Maintenance Costs – Historical Maintenance Costs

Variable	Unit	Value	Source
Spotted Road Annual Maintenance Costs - No-Build	2021\$/year	\$300,216	An average of historical maintenance costs of the existing Spotted Road from 2017 to 2019. Data provided by Spokane International Airport. Value adjusted to 2021\$.

**Table 13:** Assumptions Used To Estimate the Reduced Maintenance Costs – Future Maintenance Costs

Year	Description	Cost (2021\$)
2026-2028	No Maintenance Required	\$-
2029	Striping	\$5,700
2030	Striping	\$5,700
2031	Striping	\$5,700
2032	Crack Seal and Asphalt Surface Treatment (Chip Seal)	\$65,864
2033	Striping	\$5,700
2034	Patching	\$3,040
2035	Patching	\$3,040
2036	Striping	\$5,700
2037	Patching	\$3,040
2038	Patching	\$3,040

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Year	Description	Cost (2021\$)
2039	Patching	\$3,040
2040	Crack Seal and Asphalt Surface Treatment (Chip Seal)	\$65,864
2041	Striping	\$5,700
2042	Patching	\$3,040
2043	Striping	\$5,700
2044	Patching	\$3,040
2045	Patching	\$3,040
2046	Striping	\$5,700
2047	Patching	\$3,040
2048	Patching	\$3,040
2049	Striping	\$5,700
2050	Patching	\$3,040
2051	Crack Seal and Asphalt Surface Treatment (Chip Seal)	\$65,864
2052	Patching	\$3,040
2053	Striping	\$5,700
2054	Patching	\$3,040
2055	Patching	\$3,040

## 6.2.2 Residual Value of Capital Assets

**Methodology.** The residual value of capital assets is calculated in line with USDOT's BCA guidance, based on an estimated useful life of 30 years for the new bridge structures.

**Assumptions.** Table 14 highlights the assumptions used in the estimation of the residual value of the capital assets.

**Table 14:** Assumptions used in the Estimation of the Residual Value of Capital Assets

Variable	Unit	Value	Source
Spotted Road Overpass Useful Life	years	30	SIA.
Years of Benefits	years	30	Based on the maximum benefit years for BCA from USDOT BCA Guidance, January 2023.

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



## 6.2.3 Benefit Estimates

**Table 15** shows the estimates of the reduced maintenance costs and the residual value of capital assets. The estimated discounted present value over the projected 30-year benefit period is \$2.2 million.

**Table 15:** Estimates of the State of Good Repair Benefits, 2020\$

	Over the Project Lifecycle	
	In Constant Dollars	Discounted
Avoided Roadway Maintenance Costs	\$8.4 M	\$2.2 M
Residual Value of Capital Assets	\$ -	\$ -
<b>Total</b>	<b>\$8.4 M</b>	<b>\$2.2 M</b>

## 6.3 Economic Competitiveness

The Project will look to improve not only reduce the idling time for vehicles traveling in the area but overall improve the average travel speed for motorists. This is expected to translate into improved travel times for motorists and improved travel time reliability. Additionally, reducing idling time will translate into reduced vehicle operating costs by reducing fuel consumption for idling vehicles.

### 6.3.1 Travel Time Savings

The proposed Project would generate travel time savings for vehicle drivers and passengers, which falls under the quality-of-life merit criteria. Vehicles travelling through the Spotted Road/Airport Drive intersections must stop at intersections and wait for the gap to cross. This can be eliminated with the construction of the overpass. Additionally, the Project will allow motorists to travel at higher speeds, and thus despite the slightly longer route, it is expected to translate into marginal travel time savings.

**Methodology.** In the No Build case, almost all vehicles approaching the Spotted Road/Airport Drive intersections experience some delay while waiting for a gap to cross the intersections or for vehicles ahead to cross first. The relationship between traffic volumes on Spotted Road approaching the intersections and vehicle delay time is not linear. Instead, there is an exponential growth in vehicle delay time when more vehicles are observed at the intersections. This means that if the intersections experience twice the usual traffic volume, the delay time will be more than double. A traffic study for Spokane International Airport conducted by JUB Engineers Inc. in 2015 provided daily historical traffic volumes and vehicle delay time during the peak hour at the Spotted Road/Airport Drive intersections and conducted projections using traffic simulation models for 2019, 2024, and 2034. Results are shown in **Table 16** to **Note: T means through traffic; R/L means turning traffic**

**Table 18** below.

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM

**Table 16:** Historical Traffic Volume

Midday Peak Hour Traffic	2014				2019			
	North Leg		South Leg		North Leg		South Leg	
	T	R/L	T	R/L	T	R/L	T	R/L
Inbound & Spotted Road	90	35	85	35	105	40	95	40
Outbound & Spotted Road	90	5	90	10	105	5	100	10

**Note:** T means through traffic, while R/L means turning traffic

**Table 17:** Forecast Traffic Volume

Midday Peak Hour Traffic	2024				2034			
	North Leg		South Leg		North Leg		South Leg	
	T	R/L	T	R/L	T	R/L	T	R/L
Inbound & Spotted Road	125	50	105	45	170	65	125	50
Outbound & Spotted Road	125	5	110	10	170	10	130	15

**Note:** T means through traffic; R/L means turning traffic

**Table 18:** Historical and Forecast Vehicle Delay (Seconds per Vehicle)

Midday Peak Hour Delay	2014		2019		2024		2034	
	North Leg	South Leg	North Leg	South Leg	North Leg	South Leg	North Leg	South Leg
Inbound & Spotted Road	14.8	16.8	16.6	19.6	19.9	24.7	40.1	65.3
Outbound & Spotted Road	20.0	16.6	25.0	25.0	34.5	21.6	147.8	34.9

As a result of this non-linear pattern between peak hour traffic volumes and vehicle delay time at the intersections, the BCA assumed the relationship found in the JUB traffic study report was still valid, and peak hour delay times were applied to the current traffic projection when they matched the closest to the number in the JUB traffic study report. In other words, the relationship between peak hour delay and traffic projection was maintained and applied to years where the data was most suitable. For example, it was assumed the peak hour delay time at Spotted Road / Airport Drive Inbound north leg was still 14.8 seconds when the peak hour traffic reached 125. Therefore, 14.8 seconds of delay was applied to the year when the peak hour traffic projection was closest to 125. Delay time for other years was either interpolated or applied to the delay time Compound Annual Growth Rate (CAGR) between



# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



2014 and 2034. To estimate the delay time throughout the day, it was assumed that the delay time at Spotted Road/Airport Drive intersections in relation to traffic volumes followed a normal distribution. Therefore, the average delay time for all vehicles approaching the intersections throughout the day is half the peak hour delay. In addition, a sensitivity analysis was conducted (see **Section 8**) to monetize travel time savings during the peak hour only. Once the Spotted Road overpass is operational, the vehicle idling time at previous intersections can be fully eliminated.

Additionally, to incorporate the additional impacts from traveling a longer route on the overpass but at faster speeds, total vehicle miles traveled in the No Build and Build cases were divided by the corresponding driving speeds to estimate the total vehicle travel time.

Vehicle idling and travel time were then multiplied by the average vehicle occupancy rate to estimate personal travel time, which was monetized based on the value of time assumptions. The total travel time savings is the difference between the travel time costs in the No Build and Build cases.

**Assumptions.** The assumptions used in the estimation of travel time savings are summarized in **Table 19**.

**Table 19:** Assumptions used in the Estimation of the Travel Time Savings

Variable	Unit	Value	Source
Average Driving Speed - No-Build	mph	30	Speed limit for the existing Spotted Road, south of Airport Drive outbound and in between Airport Drive inbound and outbound
Average Driving Speed - Build	mph	35	Speed limit for the proposed Spotted Road Overpass.
Average Vehicle Occupancy - Auto (All Travel)	people/vehicle	1.67	Obtained from USDOT. January 2023. Based on 2017 National Household Travel Survey.
Average Vehicle Occupancy - Trucks	people/vehicle	1.00	Assuming one truck driver per truck
Value of Time - Auto Passengers (All Purpose)	2021\$/hour	\$18.80	Obtained from USDOT. January 2023. Based on: Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis (2016)
Value of Time - Truck Drivers	2021\$/hour	\$35.00	<a href="https://www.transportation.gov/officepolicy/transportation-policy/reviseddepartmental-guidance-valuation-traveltime-economic">https://www.transportation.gov/officepolicy/transportation-policy/reviseddepartmental-guidance-valuation-traveltime-economic</a>

### 6.3.2 Vehicle Operating Cost Savings

The proposed Spotted Road overpass looks to avoid vehicle operating costs associated with idling at the Spotted Road/Airport Drive intersections since vehicles can travel through Spotted Road directly without waiting for gaps to cross at the intersections. However, vehicles will experience a slightly longer

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



route when travelling on the overpass, compared to the existing Spotted Road, which will bring a disbenefit to the overall result.

**Methodology.** The elimination of vehicle idling time is directly related to the construction of the Spotted Road overpass. In the No Build case, vehicle delay time was multiplied by the fuel consumption rate to obtain annual estimates of fuel consumed from idling. Then, these volume estimates were multiplied by the cost per gallon of fuel to estimate the vehicle operating costs avoided in the Build case.

To estimate the disbenefit associated with the longer route traveled on the overpass compared to the existing Spotted Road, vehicle miles travelled in the No Build and Build cases were multiplied by the fuel consumption rate and then monetized to get the total vehicle operating costs.

The change in total vehicle operating costs between the No Build and Build cases gives the total net impact on vehicle operating costs due to the Project.

**Assumptions.** Majority of the assumptions used in the estimation of vehicles operating cost savings are summarized in **Table 20**. The remaining assumptions relating to fuel costs are presented in **Table 33** in **Section 9**.

**Table 20:** Assumptions used in the Estimation of Vehicle Operating Cost Savings

Variable	Unit	Value	Source
Average Automobile Fuel Economy	miles/gallon	36.90	Bureau of Transportation Statistics. Table 4-23 Average Fuel Efficiency of U.S. Light Duty Vehicles
Average Heavy-Duty Diesel Vehicle Fuel Economy	miles/gallon	6.30	EPA. MOBILE6.2 output is for heavy-duty diesel vehicles (HDDV).
Gasoline Burned at Idle - Autos	gallons/hour	0.44	US Department of Energy: Alternative Fuels Data Center and Argonne National Laboratory, "Idle Reduction Savings Worksheet" (2018)
Diesel Fuel Burned at Idle - Trucks	gallons/hour	0.90	

### 6.3.3 Improved Travel Time Reliability

Vehicles approaching the Spotted Road/Airport Drive can experience significant delays while waiting for the gap to cross the two intersections, which causes variability in travel time. Grade separating Spotted Road from Airport Drive with an overpass will reduce vehicle wait times at intersections and improve travel time reliability. However, reliability benefits are also difficult to monetize for different roadway users; these impacts were not monetized to avoid double counting the travel time-related benefits.

### 6.3.4 Benefit Estimates

**Table 21** shows the estimated economic competitiveness benefits from travel time savings and vehicle operating cost savings. The estimated discounted present value over the projected 30-year benefit period is \$1.6M.

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM

**Table 21:** Estimates of Economic Competitiveness Benefits, 2021\$

	Over the Project Lifecycle	
	In Constant Dollars	Discounted
Travel Time Savings	\$13.7 M	\$1.9 M
Avoided Vehicle Operating Costs	(\$1.1 M)	(\$0.3 M)
<b>Total</b>	<b>\$12.6 M</b>	<b>\$1.6 M</b>

## 6.4 Environmental Sustainability

Environmental costs are increasingly considered an important component in evaluating transportation projects. The primary environmental impact of vehicle use is exhaust emissions, which impose wide-ranging social costs on people, materials, and vegetation. The adverse effects of pollution depend not only on the quantity of pollution produced but also on the types of pollutants emitted and the local environmental conditions into which the pollution is released.

The proposed Project would reduce vehicle emissions from idling with the construction of the overpass. Additionally, despite the marginally longer route, the new alignment is expected to allow vehicles to travel at marginally higher speeds than the existing Spotted Road. This would translate to a slight net positive to the overall results as vehicles traveling at higher speeds tend to expel fewer emissions/pollutants up to the 60-mph range.

The assumptions used to monetize the reduction in emissions are summarized in **Table 22**.

**Table 22:** Assumptions used in the Estimation of Environmental Benefits – Emission Values

Social Cost of Emissions (2021\$/metric ton)						
Year	CO <sub>2</sub>	NO <sub>x</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOC	Source/Comment
2022	\$56	\$16,600	\$796,700	\$44,300	\$0	Technical Support Document: Estimating the Benefit per Ton of Reducing PM <sub>2.5</sub> Precursors from 17 Sectors (February 2018) <a href="https://www.epa.gov/sites/default/files/2018-02/documents/sourceapportionmentbpttsd_2018.pdf">https://www.epa.gov/sites/default/files/2018-02/documents/sourceapportionmentbpttsd_2018.pdf</a> NO <sub>x</sub> , SO <sub>x</sub> , and PM <sub>2.5</sub> values are inflated from 2015 to 2021 dollars using the GDP deflator. Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990 (February 2021) <a href="https://www.whitehouse.gov/wpcontent/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf">https://www.whitehouse.gov/wpcontent/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf</a> Note: Fuel saved (gasoline, diesel, natural gas, etc.) can be converted into metric tons of emissions using EPA guidelines available at <a href="https://www.epa.gov/energy/greenhousegases-">https://www.epa.gov/energy/greenhousegases-</a>
2023	\$57	\$16,800	\$810,500	\$45,100	\$0	
2024	\$58	\$17,000	\$824,500	\$46,000	\$0	
2025	\$59	\$17,200	\$838,800	\$46,900	\$0	
2026	\$60	\$17,500	\$852,100	\$47,800	\$0	
2027	\$61	\$17,900	\$865,600	\$48,700	\$0	
2028	\$62	\$18,200	\$879,400	\$49,500	\$0	
2029	\$63	\$18,600	\$893,400	\$50,400	\$0	
2030	\$65	\$18,900	\$907,600	\$51,300	\$0	
2031	\$66	\$18,900	\$907,600	\$51,300	\$0	
2032	\$67	\$18,900	\$907,600	\$51,300	\$0	

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Social Cost of Emissions (2021\$/metric ton)						
Year	CO <sub>2</sub>	NO <sub>x</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	VOC	Source/Comment
2033	\$68	\$18,900	\$907,600	\$51,300	\$0	<a href="#">equivalencies-calculatorcalculations-and-references</a>
2034	\$69	\$18,900	\$907,600	\$51,300	\$0	Values beyond 2050 are assumed to be constant.
2035	\$70	\$18,900	\$907,600	\$51,300	\$0	
2036	\$72	\$18,900	\$907,600	\$51,300	\$0	
2037	\$73	\$18,900	\$907,600	\$51,300	\$0	
2038	\$74	\$18,900	\$907,600	\$51,300	\$0	
2039	\$75	\$18,900	\$907,600	\$51,300	\$0	
2040	\$76	\$18,900	\$907,600	\$51,300	\$0	
2041	\$78	\$18,900	\$907,600	\$51,300	\$0	
2042	\$79	\$18,900	\$907,600	\$51,300	\$0	
2043	\$80	\$18,900	\$907,600	\$51,300	\$0	
2044	\$81	\$18,900	\$907,600	\$51,300	\$0	
2045	\$82	\$18,900	\$907,600	\$51,300	\$0	
2046	\$84	\$18,900	\$907,600	\$51,300	\$0	
2047	\$85	\$18,900	\$907,600	\$51,300	\$0	
2048	\$86	\$18,900	\$907,600	\$51,300	\$0	
2049	\$87	\$18,900	\$907,600	\$51,300	\$0	
2050+	\$88	\$18,900	\$907,600	\$51,300	\$0	

**Notes:** GDP = gross domestic product; NO<sub>x</sub> = nitrogen oxides; PM = particulate matter; SO<sub>2</sub> = sulfur dioxide; VOC = volatile organic compounds

### 6.4.1 Reduced Emission Costs

**Methodology.** Vehicle delay time in the No Build case was used to estimate total emissions released from vehicle idling at Spotted Road/Airport Drive intersections, which was then multiplied by the appropriate emission factors for tons of nitrogen oxides (NO<sub>x</sub>), particulate matter (PM<sub>2.5</sub>), sulfur dioxide (SO<sub>2</sub>), carbon dioxide (CO<sub>2</sub>) and volatile organic compounds (VOC) emitted per year. Each pollutant, measured in tons, is then multiplied by its monetary value, presented in **Table 22**, to get the total emission cost in the No Build case. Therefore, grade separating the Spotted Road in the Build case would eliminate emissions related to vehicle idling.

To estimate the additional impact associated with traveling a marginally longer route at higher speeds, vehicle miles travelled in No Build and Build cases were used to estimate the total emissions released. Vehicle miles travelled were multiplied by the appropriate emission factors based on the new average



# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



vehicle speeds and then monetized to get the total emission costs. The change in total emission costs between No Build and Build cases indicates the total avoided emission costs as a result of the Project.

**Assumptions.** The assumptions used in the estimation of reduced emissions costs are presented in Section 9.

## 6.4.2 Benefit Estimates

**Table 23** shows the estimated environmental benefits from reduced emissions. The estimated discounted present value over the projected 30-year benefit period is \$6.5 million.

**Table 23:** Estimates of Environmental Benefits, 2021\$

	Over the Project Lifecycle	
	In Constant Dollars	Discounted
Avoided GHG Emissions	\$7.6 M	\$3.8 M
Avoided CAC Emissions	\$10.6 M	\$2.7 M
<b>Total</b>	<b>\$18.2 M</b>	<b>\$6.5 M</b>

**Notes:** CAC = criteria air contaminant; GHG = greenhouse gas

## 7 Summary of Findings and Benefit-Cost Outcomes

**Table 24** and **Table 25** summarize the BCA findings. Annual costs and benefits are computed over the lifecycle of the Project. As previously stated, construction is expected to be completed by 2026. Benefits accrue during the full operation of the Project, starting in 2027.

**Table 24:** Benefit Estimates by Benefit Category, Millions of 2021 Dollars

Merit Criteria	Benefit Category	In Constant Dollars	Discounted
Safety	Improved Safety and Reduced Accident Costs	\$83.2 M	\$19.7 M
State of Good Repair	Avoided Roadway Maintenance Costs	\$8.4 M	\$2.2 M
	Residual Value of Capital Assets	\$ -	\$ -
Economic Competitiveness	Travel Time Savings	\$13.7 M	\$1.9 M
	Avoided Vehicle Operating Costs	(\$1.1 M)	(\$0.3 M)
	Improved Travel Time Reliability	<i>Not Monetized</i>	<i>Not Monetized</i>
Environmental Sustainability	Avoided GHG Emissions	\$7.6 M	\$3.8 M
	Avoided CAC Emissions	\$10.6 M	\$2.7 M
<b>Total</b>		<b>\$122.4 M</b>	<b>\$30.0 M</b>

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



**Table 25:** Overall Results of the Benefit Cost Analysis, 2021\$

Key Financial Metrics	Undiscounted	Discounted
Total Benefits	\$122.4 M	\$30.0 M
Total Costs	\$34.9 M	\$24.6 M
Net Present Value (NPV)	\$87.5 M	\$5.4 M
Return on Investment (ROI)	250%	22%
Benefit-Cost Ratio (BCR)	3.5	1.2
Payback Period (years)	11.4	21.9
Internal Rate of Return (IRR)	7.9%	

Considering all monetized benefits and costs, the estimated internal rate of return of the Project is 7.9 percent. With a 3 percent real discount rate for CO<sub>2</sub>-related impacts and 7 percent real discount rate for all other impacts, the \$24.6M investment would result in \$30.0M in total benefits for a NPV of \$5.4M and a BCR of approximately 1.2.

## 8 Benefit Cost Analysis Sensitivity

### 8.1 Variation in Key Inputs and Assumptions

The BCA outcomes presented in the previous sections rely on many assumptions and long-term projections, all of which are subject to considerable uncertainty.

The primary purpose of the sensitivity analysis is to help identify the variables and model parameters whose variations have the greatest impact on the BCA outcomes: the “critical variables.”

The sensitivity analysis can also be used to:

- Evaluate the impact of changes in individual critical variables—how much the results would vary with reasonable departures from the “preferred” or value for the variable; and
- Assess the robustness of the BCA and evaluate whether the conclusions reached under the “preferred” set of input values are significantly altered by reasonable departures from those values.

The outcomes of the quantitative analysis for the Project, using a 3 percent discount rate for CO<sub>2</sub>-related impacts and 7 percent discount rate for all other impacts, are summarized in **Table 26**.

**Table 26** provides the percentage changes in the Project’s NPV associated with variations in variables or parameters, as indicated in the column headers.

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM

**Table 26:** Sensitivity Analysis Results

Original NPV Discounted	Original BCR	Parameter	Change in Parameter Value	New NPV Discounted	Change in NPV	New B/C Ratio
\$5.4 M	1.2	Project Capital Cost	-15% of future project capital cost	\$8.2 M	51.6%	1.4
			+15% of future project capital cost	\$2.6 M	-51.6%	1.1
		Years of Benefit	20 years of benefit	\$2.5 M	-53.2%	1.1
		Off-Peak Delay Time	Assuming vehicles approaching the Spotted Road/Airport Drive intersections do not experience any delay during off-peak hours.	\$2.0 M	-63.7%	1.1

Based on the sensitivity analysis, a 15 percent change in the capital cost is expected to translate into a 51.6 percent change in the NPV, resulting a BCR ranging from 1.1 to 1.4. Meanwhile, reducing the years of benefits from 30 to 25 is expected to reduce the NPV from \$5.4M to \$2.5M, a 53.2 percent reduction. However, in this case the BCR is still 1.1, greater than the 1.0 threshold.

Finally, adjusting the off-peak delay time assumptions such that vehicles approached the Spotted Road/Airport Drive intersection do not experience any delay during the off-peak hours, is expected to result in an NPV of \$2.0M and a BCR of 1.1.

As evident in the table above, regardless of the various scenarios considered, the overall BCR is robust, with a value greater than 1.0.

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



## 9 Supplementary Information

This section contains additional information highlighting some of the data used in the estimation of the benefits.

**Table 27:** Emission Factors Assumptions – Idling Trucks

Idling Truck Emissions (grams/hour)						
Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2022	24.355	1.538	0.503	0.0161	4,789	Based on MOVES average annual emission factors for trucks in Spokane Valley, Washington. Assuming idling trucks have the same emissions profile as trucks traveling 2.5 miles per hour. Moves model run in February 2023.
2023	23.710	1.424	0.458	0.0158	4,701	
2024	23.065	1.310	0.414	0.0155	4,613	
2025	22.421	1.195	0.369	0.0152	4,525	
2026	21.776	1.081	0.324	0.0149	4,436	
2027	21.131	0.967	0.279	0.0146	4,348	
2028	20.486	0.853	0.234	0.0143	4,260	
2029	19.842	0.739	0.190	0.0140	4,172	
2030	19.197	0.625	0.145	0.0136	4,084	
2031	19.062	0.601	0.137	0.0135	4,052	
2032	18.927	0.577	0.129	0.0134	4,021	
2033	18.792	0.553	0.121	0.0133	3,989	
2034	18.657	0.529	0.114	0.0132	3,957	
2035	18.522	0.505	0.106	0.0131	3,926	
2036	18.387	0.481	0.098	0.0130	3,894	



# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



**Idling Truck Emissions (grams/hour)**

Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2037	18.251	0.458	0.090	0.0129	3,862	
2038	18.116	0.434	0.082	0.0128	3,831	
2039	17.981	0.410	0.075	0.0127	3,799	
2040	17.846	0.386	0.067	0.0126	3,767	
2041	17.827	0.384	0.066	0.0125	3,762	
2042	17.807	0.382	0.065	0.0125	3,757	
2043	17.787	0.381	0.065	0.0125	3,752	
2044	17.767	0.379	0.064	0.0125	3,746	
2045	17.748	0.377	0.063	0.0125	3,741	
2046	17.728	0.376	0.063	0.0125	3,736	
2047	17.708	0.374	0.062	0.0124	3,730	
2048	17.689	0.372	0.061	0.0124	3,725	
2049	17.669	0.370	0.060	0.0124	3,720	
2050	17.649	0.369	0.060	0.0124	3,714	
2051	17.641	0.368	0.059	0.0124	3,714	
2052	17.633	0.366	0.059	0.0124	3,713	
2053	17.625	0.365	0.058	0.0124	3,712	
2054	17.616	0.364	0.058	0.0124	3,711	

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Idling Truck Emissions (grams/hour)						
Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2055	17.608	0.363	0.057	0.0124	3,710	
2056	17.600	0.362	0.057	0.0124	3,709	

**Table 28:** Emission Factors Assumptions - Trucks While Driving (No Build)

Emissions per Gallon of Fuel Burned - Trucks (grams/miles)						
Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2022	3.960	0.183	0.102	0.0044	1,303	Based on MOVES average annual emission factors for trucks in Spokane Valley, Washington. Assuming vehicles are traveling at 30mph. Moves model run in February 2023.
2023	3.810	0.169	0.093	0.0043	1,282	
2024	3.661	0.155	0.084	0.0042	1,260	
2025	3.511	0.142	0.076	0.0042	1,238	
2026	3.362	0.128	0.067	0.0041	1,217	
2027	3.212	0.114	0.058	0.0040	1,195	
2028	3.063	0.100	0.049	0.0039	1,173	
2029	2.913	0.087	0.041	0.0039	1,152	
2030	2.764	0.073	0.032	0.0038	1,130	
2031	2.736	0.070	0.031	0.0037	1,121	
2032	2.708	0.068	0.029	0.0037	1,113	
2033	2.679	0.065	0.028	0.0037	1,104	

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Emissions per Gallon of Fuel Burned - Trucks (grams/miles)

Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2034	2.651	0.062	0.026	0.0037	1,095	
2035	2.623	0.059	0.025	0.0036	1,086	
2036	2.595	0.056	0.024	0.0036	1,078	
2037	2.567	0.054	0.022	0.0036	1,069	
2038	2.539	0.051	0.021	0.0035	1,060	
2039	2.511	0.048	0.020	0.0035	1,051	
2040	2.483	0.045	0.018	0.0035	1,043	
2041	2.479	0.045	0.018	0.0035	1,041	
2042	2.475	0.045	0.018	0.0035	1,040	
2043	2.471	0.045	0.018	0.0035	1,038	
2044	2.467	0.044	0.018	0.0035	1,037	
2045	2.463	0.044	0.017	0.0035	1,036	
2046	2.459	0.044	0.017	0.0034	1,034	
2047	2.455	0.044	0.017	0.0034	1,033	
2048	2.450	0.044	0.017	0.0034	1,031	
2049	2.446	0.043	0.017	0.0034	1,030	
2050	2.442	0.043	0.017	0.0034	1,028	
2051	2.441	0.043	0.016	0.0034	1,028	

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Emissions per Gallon of Fuel Burned - Trucks (grams/miles)						
Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2052	2.439	0.043	0.016	0.0034	1,028	
2053	2.437	0.043	0.016	0.0034	1,028	
2054	2.435	0.043	0.016	0.0034	1,027	
2055	2.433	0.042	0.016	0.0034	1,027	
2056	2.431	0.042	0.016	0.0034	1,027	

**Table 29:** Emission Factors Assumptions - Trucks While Driving (Build)

Emissions per Gallon of Fuel Burned - Trucks (grams/miles)						
Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2022	3.260	0.162	0.082	0.0038	1,142	Based on MOVES average annual emission factors for trucks in Spokane Valley, Washington. Assuming vehicles are traveling at 35mph. Moves model run in February 2023.
2023	3.123	0.149	0.075	0.0038	1,122	
2024	2.986	0.136	0.068	0.0037	1,102	
2025	2.849	0.124	0.061	0.0036	1,082	
2026	2.711	0.111	0.053	0.0036	1,062	
2027	2.574	0.099	0.046	0.0035	1,042	
2028	2.437	0.086	0.039	0.0034	1,022	
2029	2.300	0.073	0.032	0.0034	1,002	
2030	2.163	0.061	0.025	0.0033	982	



# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Emissions per Gallon of Fuel Burned - Trucks (grams/miles)

Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2031	2.137	0.058	0.024	0.0033	974	
2032	2.112	0.056	0.023	0.0032	966	
2033	2.086	0.053	0.022	0.0032	958	
2034	2.060	0.051	0.021	0.0032	950	
2035	2.035	0.048	0.019	0.0031	942	
2036	2.009	0.046	0.018	0.0031	934	
2037	1.983	0.043	0.017	0.0031	926	
2038	1.958	0.040	0.016	0.0031	918	
2039	1.932	0.038	0.015	0.0030	910	
2040	1.907	0.035	0.014	0.0030	902	
2041	1.903	0.035	0.014	0.0030	901	
2042	1.899	0.035	0.013	0.0030	900	
2043	1.895	0.035	0.013	0.0030	898	
2044	1.892	0.034	0.013	0.0030	897	
2045	1.888	0.034	0.013	0.0030	896	
2046	1.884	0.034	0.013	0.0030	894	
2047	1.881	0.034	0.013	0.0030	893	
2048	1.877	0.034	0.013	0.0030	892	

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Emissions per Gallon of Fuel Burned - Trucks (grams/miles)						
Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2049	1.873	0.033	0.012	0.0030	890	
2050	1.869	0.033	0.012	0.0030	889	
2051	1.868	0.033	0.012	0.0030	889	
2052	1.866	0.033	0.012	0.0030	889	
2053	1.864	0.033	0.012	0.0030	888	
2054	1.863	0.033	0.012	0.0030	888	
2055	1.861	0.033	0.012	0.0030	888	
2056	1.860	0.033	0.012	0.0030	888	

**Table 30:** Emission Factors Assumptions - Idling Automobiles

Idling Auto Emissions (grams/hour)						
Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2022	0.238	0.162	0.008	0.0108	1,628	Based on MOVES average annual emission factors for autos in Spokane Valley, Washington. Assuming idling autos have the same emissions profile as passenger vehicles traveling 2.5 miles per hour. Moves model run in February 2023.
2023	0.214	0.147	0.007	0.0106	1,592	
2024	0.190	0.132	0.007	0.0103	1,556	
2025	0.166	0.117	0.007	0.0101	1,521	
2026	0.142	0.103	0.007	0.0099	1,485	
2027	0.118	0.088	0.007	0.0096	1,449	

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Idling Auto Emissions (grams/hour)

Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2028	0.095	0.073	0.006	0.0094	1,413	
2029	0.071	0.058	0.006	0.0091	1,377	
2030	0.047	0.043	0.006	0.0089	1,342	
2031	0.043	0.041	0.006	0.0088	1,329	
2032	0.039	0.039	0.006	0.0087	1,316	
2033	0.035	0.038	0.006	0.0087	1,303	
2034	0.032	0.036	0.006	0.0086	1,290	
2035	0.028	0.034	0.005	0.0085	1,277	
2036	0.024	0.032	0.005	0.0084	1,264	
2037	0.020	0.030	0.005	0.0083	1,251	
2038	0.016	0.028	0.005	0.0082	1,238	
2039	0.012	0.026	0.005	0.0081	1,225	
2040	0.008	0.025	0.005	0.0080	1,212	
2041	0.008	0.024	0.005	0.0080	1,209	
2042	0.008	0.024	0.005	0.0080	1,207	
2043	0.007	0.024	0.005	0.0080	1,204	
2044	0.007	0.024	0.005	0.0080	1,202	
2045	0.007	0.024	0.005	0.0080	1,199	

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Idling Auto Emissions (grams/hour)						
Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2046	0.006	0.023	0.005	0.0079	1,197	
2047	0.006	0.023	0.005	0.0079	1,194	
2048	0.006	0.023	0.005	0.0079	1,192	
2049	0.006	0.023	0.005	0.0079	1,189	
2050	0.005	0.023	0.005	0.0079	1,187	
2051	0.005	0.022	0.005	0.0079	1,186	
2052	0.005	0.022	0.005	0.0079	1,186	
2053	0.005	0.022	0.005	0.0079	1,186	
2054	0.005	0.022	0.005	0.0079	1,186	
2055	0.005	0.022	0.005	0.0079	1,186	
2056	0.005	0.022	0.005	0.0079	1,185	

**Table 31:** Emission Factors Assumptions - Automobiles While Driving (No Build)

Emissions per Gallon of Fuel Burned - Autos (grams/miles)						
Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2022	0.129	0.040	0.002	0.0020	296	Based on MOVES average annual emission factors for passenger vehicles in Spokane Valley, Washington. Assuming vehicles are traveling at 30mph. Moves model run in February 2023.
2023	0.117	0.037	0.002	0.0019	289	
2024	0.104	0.033	0.002	0.0019	283	



# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Emissions per Gallon of Fuel Burned - Autos (grams/miles)

Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2025	0.092	0.030	0.002	0.0018	276	
2026	0.079	0.026	0.002	0.0018	270	
2027	0.067	0.023	0.001	0.0017	263	
2028	0.054	0.019	0.001	0.0017	257	
2029	0.042	0.016	0.001	0.0017	250	
2030	0.029	0.012	0.001	0.0016	244	
2031	0.027	0.012	0.001	0.0016	241	
2032	0.024	0.011	0.001	0.0016	239	
2033	0.022	0.010	0.001	0.0016	236	
2034	0.020	0.010	0.001	0.0016	234	
2035	0.017	0.009	0.001	0.0015	232	
2036	0.015	0.009	0.001	0.0015	229	
2037	0.012	0.008	0.001	0.0015	227	
2038	0.010	0.008	0.001	0.0015	225	
2039	0.008	0.007	0.001	0.0015	222	
2040	0.005	0.007	0.001	0.0015	220	
2041	0.005	0.007	0.001	0.0015	219	
2042	0.005	0.007	0.001	0.0015	219	

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Emissions per Gallon of Fuel Burned - Autos (grams/miles)						
Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	Source/Comment
2043	0.005	0.007	0.001	0.0015	218	
2044	0.004	0.007	0.001	0.0014	218	
2045	0.004	0.007	0.001	0.0014	218	
2046	0.004	0.006	0.001	0.0014	217	
2047	0.004	0.006	0.001	0.0014	217	
2048	0.004	0.006	0.001	0.0014	216	
2049	0.003	0.006	0.001	0.0014	216	
2050	0.003	0.006	0.001	0.0014	215	
2051	0.003	0.006	0.001	0.0014	215	
2052	0.003	0.006	0.001	0.0014	215	
2053	0.003	0.006	0.001	0.0014	215	
2054	0.003	0.006	0.001	0.0014	215	
2055	0.003	0.006	0.001	0.0014	215	
2056	0.003	0.006	0.001	0.0014	215	

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



**Table 32:** Emission Factors Assumptions - Automobiles While Driving (Build)

Emissions per Gallon of Fuel Burned - Autos (grams/miles)						Source/Comment
Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	
2022	0.128	0.035	0.002	0.002	282	Based on MOVES average annual emission factors for passenger vehicles in Spokane Valley, Washington. Assuming vehicles are traveling at 35 mph. Moves model run in February 2023.
2023	0.116	0.032	0.002	0.002	275	
2024	0.104	0.029	0.002	0.002	269	
2025	0.091	0.026	0.002	0.002	263	
2026	0.079	0.023	0.001	0.002	257	
2027	0.066	0.020	0.001	0.002	251	
2028	0.054	0.017	0.001	0.002	244	
2029	0.042	0.014	0.001	0.002	238	
2030	0.029	0.011	0.001	0.002	232	
2031	0.027	0.010	0.001	0.002	230	
2032	0.024	0.010	0.001	0.002	228	
2033	0.022	0.009	0.001	0.001	225	
2034	0.020	0.009	0.001	0.001	223	
2035	0.017	0.008	0.001	0.001	221	
2036	0.015	0.008	0.001	0.001	218	
2037	0.012	0.008	0.001	0.001	216	
2038	0.010	0.007	0.001	0.001	214	

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Emissions per Gallon of Fuel Burned - Autos (grams/miles)						Source/Comment
Year	NO <sub>x</sub>	VOC	PM <sub>2.5</sub>	SO <sub>2</sub>	CO <sub>2</sub>	
2039	0.008	0.007	0.001	0.001	212	
2040	0.005	0.006	0.001	0.001	209	
2041	0.005	0.006	0.001	0.001	209	
2042	0.005	0.006	0.001	0.001	209	
2043	0.005	0.006	0.001	0.001	208	
2044	0.004	0.006	0.001	0.001	208	
2045	0.004	0.006	0.001	0.001	207	
2046	0.004	0.006	0.001	0.001	207	
2047	0.004	0.006	0.001	0.001	206	
2048	0.004	0.006	0.001	0.001	206	
2049	0.003	0.006	0.001	0.001	205	
2050	0.003	0.006	0.001	0.001	205	
2051	0.003	0.006	0.001	0.001	205	
2052	0.003	0.006	0.001	0.001	205	
2053	0.003	0.006	0.001	0.001	205	
2054	0.003	0.006	0.001	0.001	205	
2055	0.003	0.006	0.001	0.001	205	
2056	0.003	0.006	0.001	0.001	205	



# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



**Table 33:** Fuel Costs

Fuel Costs (2021\$/gallon)			
Year	Gasoline	Diesel Fuel	Source/Comment
2022	\$2.43	\$2.56	Based on forecast of transportation fuel costs less Federal and States taxes. Data obtained from US EPA's Annual Energy Outlook 2022 Release.
2023	\$2.13	\$2.46	
2024	\$2.11	\$2.57	Values beyond 2050 are assumed to be constant.
2025	\$2.09	\$2.57	
2026	\$2.12	\$2.57	
2027	\$2.16	\$2.59	
2028	\$2.19	\$2.62	
2029	\$2.22	\$2.64	
2030	\$2.29	\$2.64	
2031	\$2.38	\$2.73	
2032	\$2.42	\$2.75	
2033	\$2.45	\$2.77	
2034	\$2.47	\$2.78	
2035	\$2.49	\$2.80	
2036	\$2.51	\$2.82	
2037	\$2.53	\$2.86	
2038	\$2.57	\$2.88	

# Airport Drive and Spotted Road Safety and Multimodal Improvements

2023 USDOT RAISE GRANT PROGRAM



Fuel Costs (2021\$/gallon)			
Year	Gasoline	Diesel Fuel	Source/Comment
2039	\$2.58	\$2.89	
2040	\$2.60	\$2.92	
2041	\$2.63	\$2.94	
2042	\$2.63	\$2.95	
2043	\$2.67	\$2.99	
2044	\$2.70	\$3.03	
2045	\$2.71	\$3.05	
2046	\$2.74	\$3.08	
2047	\$2.75	\$3.09	
2048	\$2.74	\$3.08	
2049	\$2.75	\$3.08	
2050+	\$2.75	\$3.08	