

Memorandum

Subject: Castle Creek Bridge Economic Impact Analysis

Project Name: New Castle Creek Bridge Investigative Study with Revised Scope (the Project)

Attention: City of Aspen (the City)

From: Jacobs

Date: July 31, 2024

Copies to: Project File

1. Introduction

This memorandum presents an analysis of existing conditions and potential economic impacts associated with the construction of the replacement bridge. The analysis focuses on the Three-lane Shifted and Three-lane Faster bridge replacement options outlined in the *SH 82 Over Castle Creek Bridge Feasibility Study* (Jacobs 2024); the Entrance to Aspen Preferred Alternative, Splitshot alternative, and other alternatives are not assessed. The analysis also focuses on impacts during the construction period and does not estimate the longer-term operational impacts associated with the Project.

The economic impact analysis estimates the following:

- How the Project construction may increase or decrease economic activity during the construction phase
- Economic impacts from construction delays, including user and traveler costs
- Potential economic benefits from bridge construction to the local and regional economy

A survey was conducted of local businesses to understand how Project construction may impact their revenues. Survey results help inform the potential impacts to City tax revenues associated with changes to business activities.

2. Existing Conditions

This section describes existing conditions in Aspen.

2.1 Overview

Aspen is known for its natural beauty, outdoor recreation, and tourism. Its location in the Rocky Mountains has made it a premier year-round destination. The Aspen Chamber Resort Association (Aspen Chamber) states the following:

“Aspen is nestled in the awe-inspiring Rocky Mountains. Here, visitors can enjoy renowned arts and culture, exceptional cuisine, world-class accommodations, and

countless outdoor pursuits - all the makings for an extraordinary vacation experience...While Aspen gained recognition as a premier skiing destination, it wasn't long before visitors began to explore and appreciate the area, sans snow. Spring, summer, and fall are ideal times for hiking, biking, and rafting. Exceptional dining, premier shopping, a variety of events and leading arts & culture draw people from around the world." (Aspen Chamber 2024a)

As well as its seasonal footfall for outdoor recreation, Aspen hosts regular events that bring more visitors into the city (Aspen Chamber 2024b). Standout annual events include the following:

- Wintersköl
- ESPN Winter X Games
- Aspen Gay Ski Week
- Jazz Aspen Snowmass (JAS) June Experience
- Aspen Music Festival and School
- Theatre Aspen Summer Series
- The Annual Food and Wine Classic in Aspen
- Aspen Ideas Festival
- 4th of July
- JAS Labor Day Experience

The Aspen Chamber undertook a 2022 study that identified the following key challenges for the City (Aspen Chamber 2022):

- Staff shortages: Aspen is experiencing labor force shortages because of high housing costs combined with many jobs only lasting the duration of the busy seasons.
- Mountain migration and gentrification: Many wealthy, high earners from across the county come to Aspen for its natural beauty. However, this inherently gentrifies the city. Furthermore, these individuals often have second homes in Aspen that are not primary residences, which could be interpreted as not fully integrating with the Aspen community.
- Visitor pressure: The sheer volume of visitors during busy seasons can put a strain on the community, particularly when these visitors do not practice certain informal behaviors such as respecting the surrounding natural area.
- Social inequality: There is concern within the working-class population of Aspen that the wealth created by the tourism sector is not benefiting them. This concern is worsened by the working class being priced out of Aspen by high costs of living.
- Transportation management: Ongoing construction, growth in the region, and high tourism levels are increasing road traffic levels beyond capacity, putting a strain on transportation infrastructure.
- Lack of economic diversification: Aspen's economy is heavily focused on tourism, with development in other sectors being desirable.

2.2 Population

The U.S. Census Bureau provides annual estimates of the population of cities and communities within the State of Colorado in the form of the American Community Survey (ACS). ACS population estimates for Aspen, Pitkin County, and the State of Colorado in 2010, 2015, 2020, and 2022 are shown in Table 2-1. The population in Aspen increased at a greater rate (2.9%) between 2015 and 2020 than the wider county and state. However, in the recent years of 2020 to 2022, the population estimates in Aspen have decreased by 5% per year on average, in contrast to the increasing population of Colorado (1.4%). A potential explanation of this is the increased demand for accommodation in Aspen, largely driven by tourism. This could increase housing costs, thus pricing out locals from living in Aspen. Furthermore, an increased proportion of the existing housing stock being used for seasonal accommodation and second homes reduces the amount of accommodation available for permanent residents. The combination of these two factors may cause former Aspen residents to instead reside nearby, outside of Aspen.

Table 2-1: Population

Area	Population				Average Annual Growth Rate (%)		
	2010	2015	2020	2022	2010 to 2015	2015 to 2020	2020 to 2022
Aspen	6,658	6,740	7,721	6,952	0.2%	2.9%	-5.0%
Pitkin County	16,389	17,420	17,980	17,325	1.3%	0.6%	-1.8%
Colorado	5,049,071	5,456,574	5,684,926	5,839,926	1.6%	0.8%	1.4%

Source: U.S. Census Bureau, 2010b; U.S. Census Bureau, 2015b; U.S. Census Bureau, 2020b; U.S. Census Bureau, 2022b.

2.3 Employment

Two estimates of employment are typically used to describe employment in an area: (1) total civilian labor force and (2) employment by industry. Civilian labor force data reflect the employment status of individuals by place of residence and include people who are self-employed, employees on unpaid leave of absence, unpaid family workers, and household workers. Employment by industry data reflect jobs by place of work and exclude the self-employed, unpaid family workers, employees on leave of absence, and household workers. Individuals with more than one job are counted only once in the civilian labor force data, but they are counted for each job in the employment by industry data.

2.3.1 Unemployment Rate

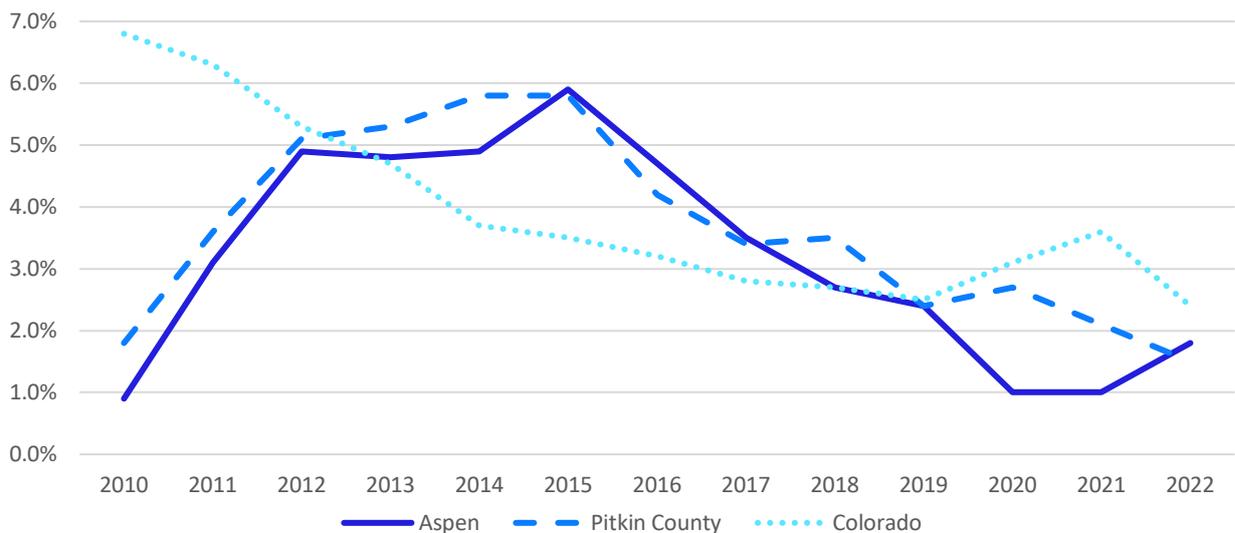
Table 2-2 shows the civilian labor force characteristics for Aspen, Pitkin County, and the State of Colorado for select years. In terms of civilian labor force, the state overall has experienced a steady increase between 2010 and 2022; however, after 2020, both Pitkin County and Aspen experienced an unusual drop in labor force. Like the decrease in population, a potential explanation is that individuals residing outside of Aspen are commuting in. Between 2010 and 2015, the average unemployment rate increased more than sixfold in Aspen but decreased to 1% between 2015 and 2020, less than the county and state rates. In recent years between 2020 and 2022, the Aspen and Colorado unemployment rates have converged slightly.

Table 2-2: Civilian Labor Force and Unemployment Rate

Area	Civilian Labor Force				Unemployment Rate (%)			
	2010	2015	2020	2022	2010	2015	2020	2022
Aspen	4,354	4,391	5,311	4,693	0.9%	5.9%	1.0%	1.8%
Pitkin County	10,726	11,151	12,137	10,720	1.8%	5.8%	2.7%	1.5%
Colorado	2,714,224	2,916,718	3,079,769	3,244,388	6.8%	3.5%	3.1%	2.4%

Source: U.S. Census Bureau, 2010a; U.S. Census Bureau, 2015a; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2022a.

Figure 2-1: Average Annual Unemployment Rate, 2010 to 2022



Trends in the annual unemployment rate for Aspen, Pitkin County, and the State of Colorado are shown on Figure 2-1. In Colorado, the annual unemployment rate peaked in 2010, at the height of the Great Recession, before declining continuously

thereafter. The unemployment rate increased again in 2020 and 2021 following the COVID-19 global pandemic, before starting to decline again in 2022. As a contrast to the state, the Aspen and Pitkin County unemployment rates follow a separate trend, increasing from 2010 to their peak in 2015. After 2015, these rates generally decreased, suggesting that the pandemic led to an influx of employees leaving larger urban areas to work remotely in the county and city, mirroring national trends.

2.3.2 Employment by Industry

Table 2-3 presents the annual full-time and part-time employment by industry in Aspen for 2010, 2016, and 2022. In terms of total industry employment, the combined arts, entertainment, recreation, and accommodation/food services sector is by far the largest industry in Aspen in all observed years, driven by Aspen being a destination for outdoor recreation tourism. In terms of average annual growth rates, most sectors have experienced growth, but others have lost jobs (for example, agriculture, construction, wholesale trade, and retail trade). Between 2010 and 2016, the manufacturing sector experienced the greatest average annual growth rate (40.4%), followed by the other services sector (26.9%), with both maintaining similar employment levels through to 2022. However, between 2016 and 2022, the transportation, warehousing, and utilities sector experienced the greatest average annual growth rate (40.5%), followed by the construction sector (27.8%).

Table 2-3: Employment Numbers by Industry in Aspen

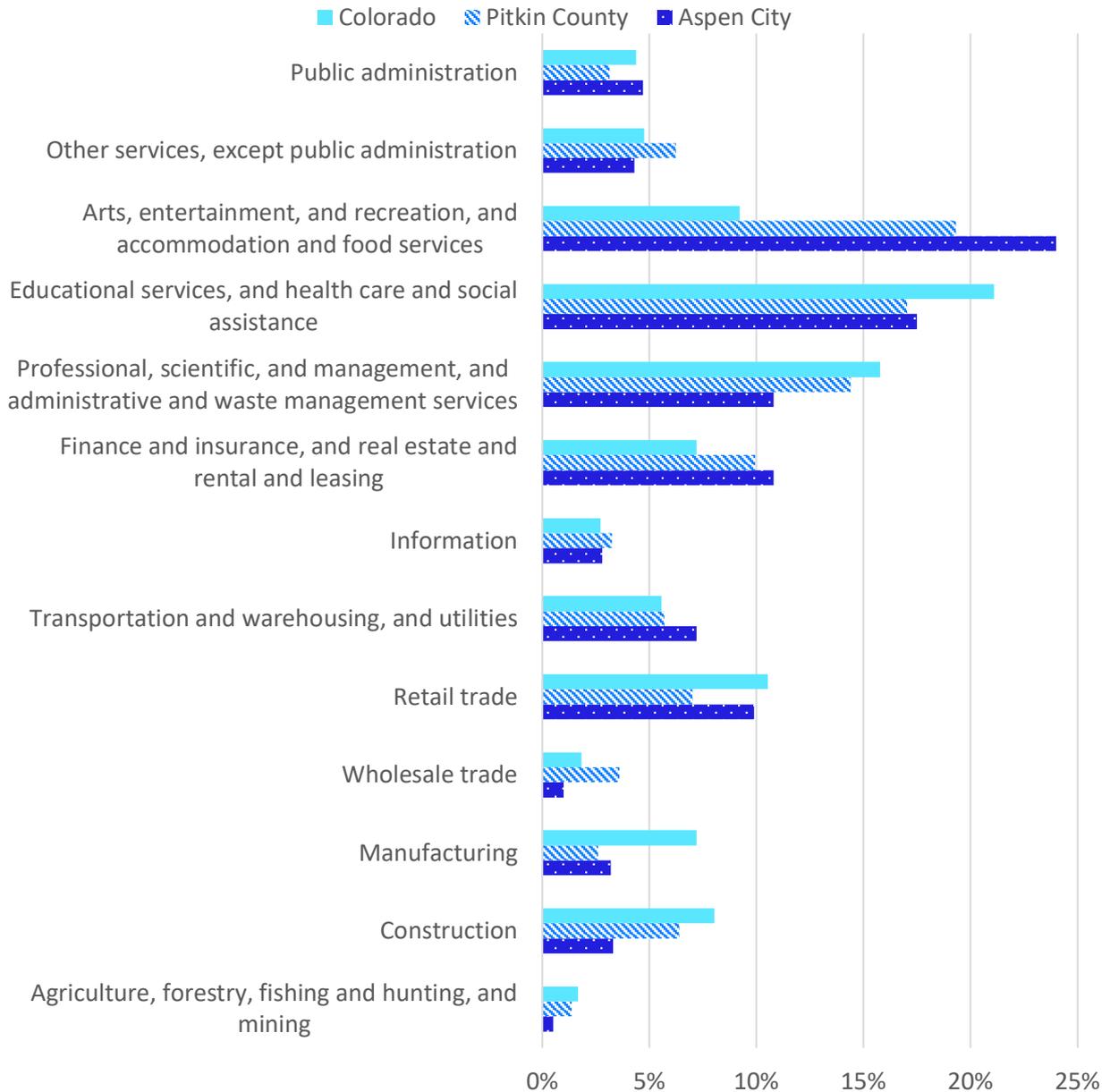
Industry Sector	2010	2016	2022	2010 to 2016	2016 to 2022
Agriculture, forestry, fishing and hunting, and mining	Not available	50	25	Not available	-8.3%
Construction	350	57	152	-14.0%	27.8%
Manufacturing	40	137	147	40.4%	1.2%
Wholesale trade	121	36	48	-11.7%	5.6%
Retail trade	688	477	453	-5.1%	-0.8%
Transportation, warehousing, and utilities	87	96	329	1.7%	40.5%
Information	185	79	128	-9.5%	10.3%
Finance, insurance, real estate, and rental and leasing	393	589	493	8.3%	-2.7%
Professional, scientific, management, administrative, and waste management services	624	655	495	0.8%	-4.1%

Industry Sector	2010	2016	2022	2010 to 2016	2016 to 2022
Educational services, health care, and social assistance	462	714	802	9.1%	2.1%
Arts, entertainment, recreation, and accommodation and food services	1,096	1,068	1,100	-0.4%	0.5%
Other services, except public administration	39	102	195	26.9%	15.2%
Public administration	217	176	215	-3.1%	3.7%
Total Industry Employment	4,302	4,236	4,582	-0.3%	1.4%

Source: U.S. Census Bureau, 2010a; U.S. Census Bureau, 2016; U.S. Census Bureau, 2022a.

Figure 2-2 compares the proportions each industry holds of total employment in 2022 for Aspen, Pitkin County, and Colorado. It is again clear that the arts, entertainment, recreation, and accommodation and food services sector remains the largest industry (24.0%), considerably larger than in wider Colorado (9.2%). Conversely, in Aspen, the construction (3.3%) and manufacturing (3.2%) sectors are among the industries less represented than the Colorado average (8.0% and 7.2%, respectively).

Figure 2-2: Proportional Employment by Industry in 2022



Source: U.S. Census Bureau, 2022a.

2.4 Median Household Income

Table 2-4 shows the real median household incomes (in 2022 dollars) for Aspen, Pitkin County, and Colorado. Incomes in Aspen are consistently more than the Colorado average in all observed years; however, they are also consistently less than the Pitkin County average. Between 2010 and 2020, real median household incomes grew steadily in Aspen, Pitkin County, and Colorado (between 1.5 and 3.6%). Between 2020 and 2022, all geographies experienced considerably higher average annual income growth rates, with Aspen having the highest of these (10.7%).

Table 2-4: Median Household Income, 2010 to 2022

Area	2010	2015	2020	2022	Average Annual Growth Rate (%)		
					2010 to 2015	2015 to 2020	2020 to 2022
Aspen	\$62,458	\$67,164	\$77,669	\$94,338	1.5%	3.1%	10.7%
Pitkin County	\$64,502	\$71,196	\$82,455	\$96,123	2.1%	3.2%	8.3%
Colorado	\$54,046	\$63,909	\$75,231	\$89,302	3.6%	3.5%	9.4%

Source: U.S. Census Bureau, 2010c; U.S. Census Bureau, 2015c; U.S. Census Bureau, 2020c; U.S. Census Bureau, 2022c.

2.5 City of Aspen Financials

Table 2-5 presents the planned revenues for the City in 2024 based on its 2024 proposed budget (City 2023). The City anticipates receiving \$191 million in revenue from a range of sources, including various taxes and charges. The greatest revenue source is charges for services (20%), followed by city sales tax (14%). Overall, tax makes up 50% of the City's revenues.

Table 2-5: City of Aspen Planned Revenue By Category, 2024

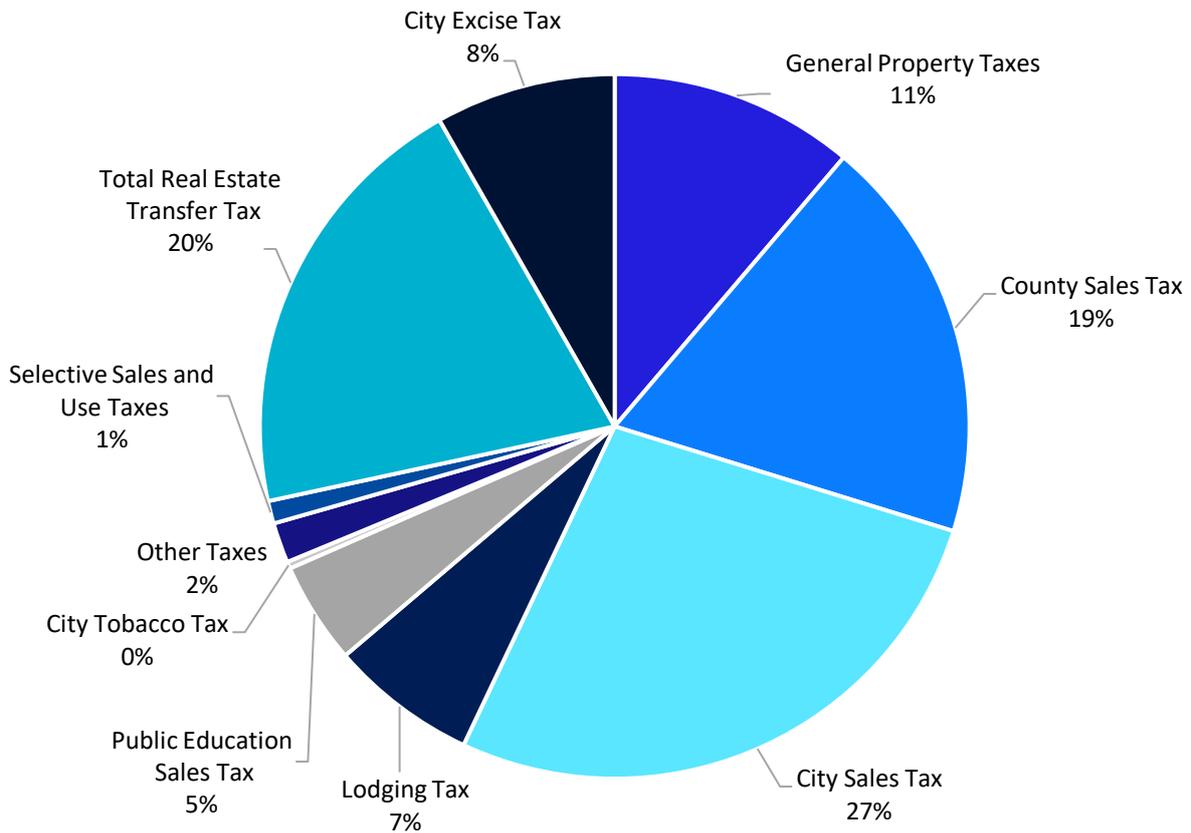
Revenue by Category	2024	% of Total Gross Revenue
General Property Taxes	\$10,734,100	6%
County Sales Tax	\$17,913,000	9%
City Sales Tax	\$26,135,200	14%
Lodging Tax	\$6,460,000	3%
Public Education Sales Tax	\$4,485,360	2%
City Tobacco Tax	\$305,000	0%
Other Taxes	\$1,772,000	1%
Selective Sales and Use Taxes	\$1,000,000	1%
Total Real Estate Transfer Tax	\$19,400,000	10%
City Excise tax	\$7,900,000	4%
General Revenue (Taxes)	\$96,104,660	50%
Licenses and Permits	\$6,819,630	4%
Intergovernmental Revenues	\$860,190	0%
Charges for Services	\$37,256,042	20%

Revenue by Category	2024	% of Total Gross Revenue
Other Inflows	\$18,336,626	10%
Other Revenue Sources	\$13,931,278	7%
General Transfers In	\$17,724,150	9%
Total Gross Revenue	\$191,032,576	100%

Source: City, 2023.

Figure 2-3 shows the proportions each tax category makes up of total tax revenue. The tax revenues are city sales tax (27%), followed by real estate transfer tax (20%), and county sales tax (19%). The combination of city and county sales taxes makes up 46% of total tax revenue.

Figure 2-3: City of Aspen Tax Revenue Proportions



3. Construction Impacts

The following sections discuss how Project construction may increase or decrease economic activity during the construction phase.

3.1 Construction Cost Estimates

Table 3-1 presents the construction cost estimates for the bridge replacement options being considered. The Three-lane Faster option in year of expenditure dollars is nearly \$96 million, whereas the Three-lane Shifted option is approximately \$81 million. The Three-lane Faster option is expected to be built over a 3-year period, whereas the Three-lane Shifted option will take 4 years.

Table 3-1: Summary of Project Cost and Construction Duration

Item	Option: Three-lane Faster	Option Three-lane Shifted
Overall Project Cost (2024 dollars)	\$81.85 million	\$69.28 million
Overall Project Cost (2028 dollars)	\$95.75 million	\$81.05 million
Construction Duration	3 years	4 years

Source: Jacobs, 2024.

3.2 Construction Travel Delay and Costs

Construction-related delays would result in some congestion or traffic halts that will increase user costs for residents and visitors. The construction-related delays would add additional vehicle hours traveled (VHT) during the construction period. Although Project construction would only occur over designated months, the roadway impacts are expected to be year-round. Depending on the alternative selected, construction is expected to last between six to eight construction seasons, and the delay impacts are expected to last 3 to 4 years.

Delay costs can be estimated using input values provided by the U.S. Department of Transportation’s (DOT’s) Benefit-Cost Analysis Guidance for Discretionary Grant Programs (BCA Guidance) (DOT 2023). The assumptions and inputs used in the user costs calculations are standard inputs and values from DOT’s BCA Guidance, such as vehicle occupancy rates and the value of time. Mode split between personal vehicles and commercial vehicles and the estimated travel delay in the network was estimated by Jacobs traffic engineers.

The analysis compares the two build scenarios to existing conditions to define the delay during construction. The overall BCA methodology includes the following steps:

- Define existing conditions and conditions during construction for the build alternatives.
- Estimate delay during Project construction. The construction period will be 3 years for Three-lane Faster option and 4 years for the Three-lane Shifted option.
- Input DOT-recommended monetized values for travel time and operating costs.
- Input mode split of 97.5% all-purpose vehicles and 2.5% commercial vehicles.

- Use dollar values in real 2022 dollars.
- A real discount rate of 3.1% is recommended in the DOT guidance document to discount future costs into 2022 dollars.

The DOT BCA Guidance methodology estimates vehicle operating costs on a per mile basis, and the mileage during construction will be the same as under existing conditions. Thus, potential changes in vehicle operating costs were not evaluated in this analysis.

Traffic delay was annualized using traffic counts and predictive delay estimates. Traffic counts were collected in 15-minute intervals on the existing Castle Creek Bridge on May 20, 2024. Traffic count data between 1999 and 2023 were provided by the City (City, various years). Additional traffic delay from work zone speed reduction along the Project bridge was estimated to be 5 minutes in each direction during traffic peaks and 20 seconds during off-peak. Annualization of this delay was estimated based on the traffic count data available.

The longest delays are estimated to occur for morning inbound and afternoon outbound travel during the peak travel periods. The delay is estimated to be approximately 5 minutes. The travel delay during the morning peak outbound, afternoon peak inbound, and off-peak travel is expected to be approximately 20 seconds. Table 3-2 presents the annual inbound and outbound vehicle hour delay associated with construction of the Project. The annual delay is the same for the Three-lane Shifted and the Three-lane Faster alternatives. The traffic delay calculations are provided in Attachment 1.

Table 3-2: Annualized Construction-related Vehicle Hours Traveled

Direction	Annualized VHT
Inbound	98,681
Outbound	86,817
Total	185,498

The value of construction delay was calculated in accordance with the DOT BCA Guidance (DOT 2024). For all-purpose vehicles, a rate of \$19.60 per person-hour (2022 dollars) was used for all-purpose local travel (automobile) and \$33.50 was used for commercial vehicles. The average occupancy was assumed to be 1.67 for all-purpose vehicles and 1.00 for commercial. The reported mode split is 97.5% all-purpose vehicle and 2.5% commercial.

Construction-related travel delays are expected with both the Three-lane Faster scenario and the Three-lane Shifted scenario. The estimated delays during construction are summarized in Table 3-3. The value of the delay is for the entire construction period for both scenarios. Applying the appropriate traffic inputs and DOT values estimated the net present value of the additional user costs over the

entire construction period would be approximately \$14.7 million for the Three-lane Faster scenario and \$19.3 million for the Three-lane Shifted option.

Table 3-3: Value of Construction-related Delay

Vehicle Type	Three-lane Faster NPV (2022 dollars)	Three-lane Shifted NPV (2022 dollars)
All-Purpose Vehicle	\$14,347,005	\$18,844,677
Commercial Vehicle	\$376,503	\$494,534
Total Value of Delay)	\$14,723,509	\$19,339,211

NPV = net present value

3.3 Business Survey Results

The City conducted a survey of local businesses to assess the potential impacts of the Project. The survey data will inform the (IMpact Analysis for PLANning) (IMPLAN) economic model, which will estimate Project effects on economic activity and tax revenue.

The survey covered various Project-related topics, but the IMPLAN model primarily relies on responses to the following:

- **Primary industry:** Retail was the dominant industry among respondents (32.5%), followed by food (15%), real estate (12.5%), arts and accommodations (both at 7.5%), and tourism (5%). The remaining industries each represented 2.5% of the respondents.
- **Revenue impact:** Most businesses anticipate a significant impact on revenue during construction, with 37% expecting major effects and 34% expecting modest ones. However, 24% reported no anticipated impact.
- **Impact duration:** 76% of respondents expect their business to be affected throughout the entire construction period (estimated at 3 to 4 years), whereas 24% anticipate no impact.

The City partnered with the Aspen Chamber to distribute the survey to over 100 member businesses via email, and City staff members made direct connections with businesses to let them know about the survey. As of July 19, 2024, 42 businesses responded, and the survey closed on that date. Refer to Attachment 2 for detailed survey results.

3.4 Construction Spending Impacts

This section describes the economic impacts associated the Project construction spending and the potential impacts to tourism during the construction phase. It describes the economic impact analysis methodology used to evaluate these impacts, including the inputs and assumptions, and the results from the IMPLAN model runs.

3.4.1 Methodology and Approach

Regional economics is the study of the economy of a small region. Regional economic impacts result from changes in the economy of the region. The magnitude of the economic impacts is determined by the interactions between linkages within the local and regional economy and the leakages¹ from the regional to the larger economy. Economic linkages are the relationships between industries, businesses, factors of production (such as labor and capital), and government created by trade and other exchange, such as taxes, within and among regions. Economic linkages create multiplier effects in a regional economy as money is circulated by trade. The magnitudes of impacts resulting from economic linkages are limited by the amount of leakage that occurs within the region. Economic leakages are a measure of the income shares spent outside of the region. Thus, the more the economic leakage, the less the multiplier effect. Economic leakages are generally greater the smaller the regional economy. For example, the economic leakages for a city are greater than those for a county, which are greater than those for the state, which are greater than those for a nation. For the analysis presented in this memorandum, the local and regional economy is Pitkin County, Colorado, and the larger economy is the rest of the state and/or the nation.

Several regional economic analysis modeling systems (consisting of data, as well as analytical software) are available for use in regional economic analysis—for example, Regional Economic Models Inc. (REMI), Regional Industrial Multiplier System II (RIMS II), and IMPLAN. This analysis used IMPLAN, a computer database and modeling system used to create input-output models for any U.S. county or combination of U.S. counties.

The IMPLAN model is the most widely used input-output impact model system in the U.S. It is much more than a set of multipliers; it provides users with the ability to define industries, economic relationships, and projects to be analyzed. It can be customized for any county, region, or state and used to assess the “ripple effects” or “multiplier effects” caused by increasing or decreasing spending in various parts of the economy. This is used primarily to assess the economic impacts of facilities or industries, or changes in their level of activity in an area.

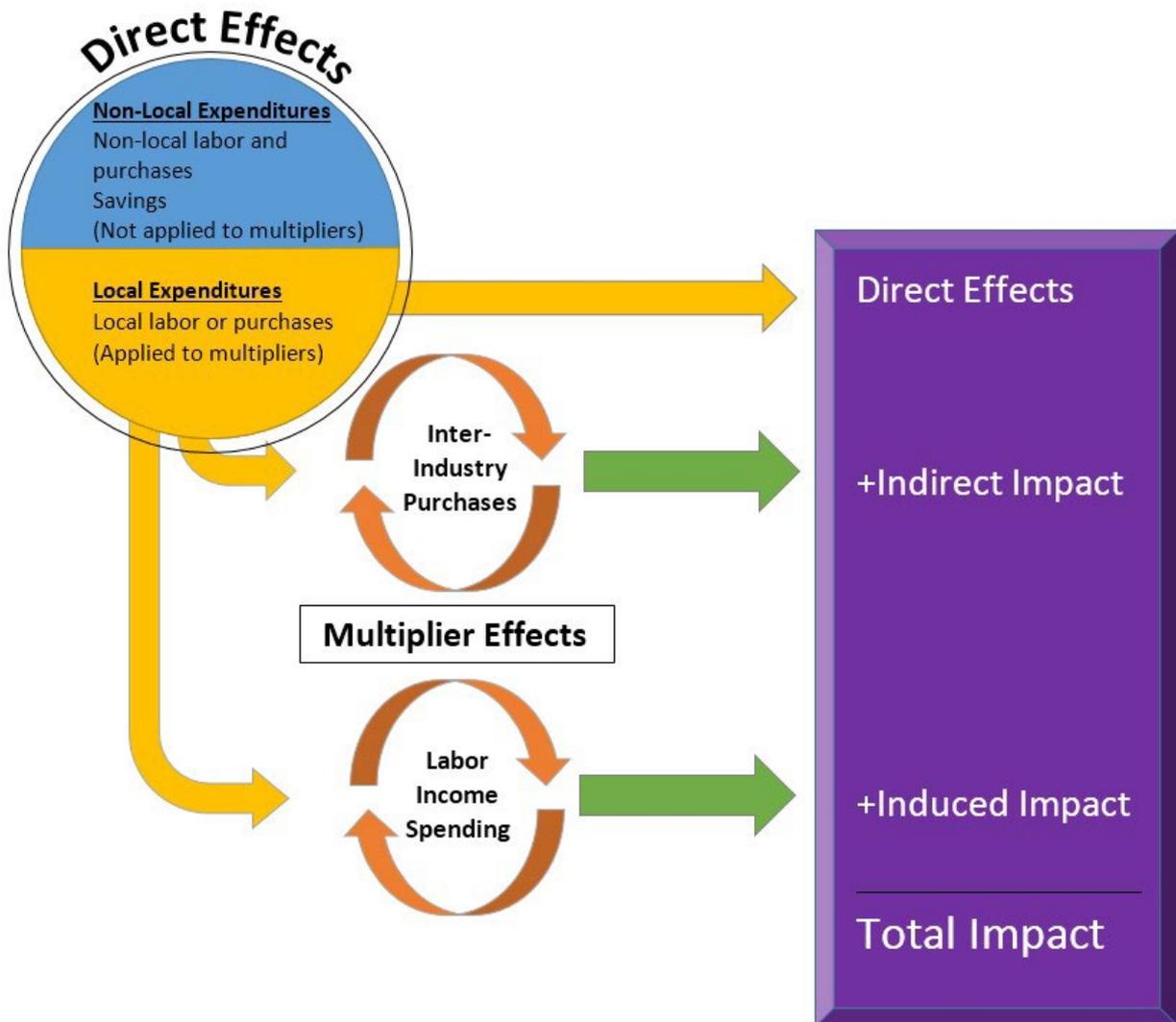
IMPLAN is a static model that estimates impacts for a snapshot in time when the impacts are expected to occur, based on the makeup of the economy at the time of the underlying IMPLAN data. IMPLAN measures the initial impact to the economy but does not consider long-term adjustments as labor and capital move into alternative uses. This approach was used to estimate the economic impacts associated with the construction of the Castle Creek Bridge and anticipated reduction in tourism during bridge construction. Realistically, the structure of the economy will adapt and change; therefore, the IMPLAN results can only be used to compare relative changes

¹ Economic leakage refers to spending being diverted away from a local economy, for example, when local businesses or consumers choose to make purchases from outside of the local economy.

between the existing condition and the construction phase of the Project and cannot be used to predict or forecast future employment, labor income, or output (sales).

Input-output models measure commodity flows from producers to intermediate and final consumers. Purchases for final use (final demand) drive the model. Industries produce goods and services for final demand and purchase goods and services from other producers. These other producers, in turn, purchase goods and services. This buying of goods and services (indirect purchases) continues until leakages from the analysis area (imports and value added) stop the cycle. These indirect and induced effects (the effects of household spending) can be mathematically derived using a set of multipliers. The multipliers describe the change in output for each regional industry caused by a \$1 change in final demand. Figure 3-1 illustrates the concept of input-output modeling.

Figure 3-1: Input-output Modeling Concept



The IMPLAN model package includes state-level or county-level data to describe the local economy in a given year and an online platform that allows users to input more refined and/or accurate input data reflecting the regional economy.

The economic impacts associated with the construction phase of the Project were evaluated using the IMPLAN model of Pitkin County. The model uses 2022 IMPLAN data to estimate the secondary (indirect and induced) regional employment and income; these data were the most current available at the time of this analysis and represent the economy in Pitkin County in 2022.

3.4.2 Economic Impacts of Castle Creek Bridge Construction

This section presents the regional economic impacts of Project construction and anticipated reduction in tourism during bridge construction using the IMPLAN model and the 2022 IMPLAN data for Pitkin County.

3.4.2.1 Assumptions and Cost Inputs: Construction

Project construction would generate a range of short-term effects during the construction phase. Because the IMPLAN model is an annual model that evaluates the regional economic effects of changes in local expenditures, it was necessary to identify which of the Project’s costs would be spent on Pitkin County-sourced material and labor inputs.

Table 3-4 presents the total rough order of magnitude estimates of Project costs in 2024 dollars for each of the two build alternatives. Because the accuracy of the results depends on the accuracy of the inputs, the cost estimates are considered preliminary and could change as the engineering design is developed and refined. Additionally, the cost estimates were converted to 2022 dollars using the implicit gross domestic product (GDP) deflator, which is necessary for them to be used as the direct input into the 2022 IMPLAN model (BEA n.d.).

Table 3-4: Total Project Costs

Cost	Three-lane Faster	Three-lane Shifted
Overall Project Cost (2024 dollars)	\$81,850,000	\$69,280,000
Overall Project Cost (2022 dollars)	\$75,869,000	\$64,217,000

Based on information derived from similar projects in the area, the following assumptions were used to determine the Pitkin County portion of project cost:

- Between 5% and 10% of the total Project cost is assumed to be spent within Pitkin County.
- Of these local expenditures, 60% are assumed to be labor expenditures, and 40% are assumed to be expenditures on materials, supplies, services, and other nonlabor costs.

Table 3-5 shows the breakdown of the costs in 2024 dollars based on the previously stated assumptions. The lower bound estimate for the portion of the Project expenditures during construction within Pitkin County are represented as 5% of the Project cost estimates, and the upper bound for the local portion of the Project expenditures within the county are represented as 10% of the Project cost estimates. In addition to showing the lower and higher bounds for the local expenditures, Table 3-5 also shows the proportion of these local costs that are labor and nonlabor (for example, materials, supplies, and services) expenditures.

Table 3-5: Breakdown of Total Local Project Costs (in 2024 Dollars)

Bound Estimate	Category	Three-lane Faster	Three-lane Shifted
Lower	Local (within Pitkin County) Estimate (5%)	\$4,093,000 ^[a]	\$3,464,000
Lower	Labor (60%)	\$2,456,000 ^[b]	\$2,078,000
Lower	Nonlabor (40%)	\$1,637,000 ^[c]	\$1,386,000
Upper	Local (within Pitkin County) Estimate (10%)	\$8,185,000 ^[d]	\$6,928,000
Upper	Labor (60%)	\$4,911,000 ^[e]	\$4,157,000
Upper	Nonlabor (40%)	\$3,274,000 ^[f]	\$2,771,000

^[a] \$4,093,000 = \$75,869,000 x 5%

^[b] \$2,456,000 = \$4,093,000 x 60%

^[c] \$1,637,000 = \$4,093,000 x 40%

^[d] \$8,185,000 = \$64,217,000 x 10%

^[e] \$4,911,000 = \$8,185,000 x 60%

^[f] \$3,274,000 = \$8,185,000 x 40%

Note: Costs estimates shown for the Three-lane Shifted alternative were determined using calculations similar to those shown for the Three-lane Faster alternative in the table.

The local cost estimates shown in Table 3-5 were divided by the duration of the construction period, which was assumed to be 3 years for the Three-lane Faster alternative and 4 years for the Three-laned Shifted alternative. Table 3-6 summarizes the resulting annual local construction cost estimates in 2024 dollars. These annual construction cost estimates were converted to 2022 dollars using the implicit GDP deflator, which is necessary for them to be used as the direct input into the 2022 IMPLAN model (BEA n.d.). Table 3-7 presents these annual direct local expenditures in 2022 dollars.

Table 3-6: Breakdown of Annual Direct Local Construction Costs (in 2024 Dollars)

Bound Estimate	Item	Three-lane Faster	Three-lane Shifted
Lower	Local (within Pitkin County) Estimate (5%)	\$1,364,000	\$866,000
Lower	Labor (60%)	\$819,000	\$520,000
Lower	Nonlabor (40%)	\$546,000	\$347,000
Upper	Local (within Pitkin County) Estimate (10%)	\$2,728,000	\$1,732,000
Upper	Labor (60%)	\$1,637,000	\$1,039,000
Upper	Nonlabor (40%)	\$1,091,000	\$693,000

Table 3-7: Breakdown of Annual Direct Local Construction Costs (in 2022 Dollars)

Bound Estimate	Item	Three-lane Faster	Three-lane Shifted
Lower	Local (within Pitkin County) Estimate (5%)	\$1,264,000	\$803,000
Lower	Labor (60%)	\$759,000	\$482,000
Lower	Nonlabor (40%)	\$506,000	\$321,000
Upper	Local (within Pitkin County) Estimate (10%)	\$2,529,000	\$1,605,000
Upper	Labor (60%)	\$1,517,000	\$963,000
Upper	Nonlabor (40%)	\$1,012,000	\$642,000

The labor and material cost estimates were identified separately and run through the corresponding IMPLAN sector, which for this Project is IMPLAN Sector 54, Construction of New Highways and Streets. The results of the IMPLAN model runs, which are described in Section 3.2, are the annual indirect and induced employment and income impacts associated with Project construction. To estimate the annual direct local construction workforce under each construction alternative (that is, Three-lane Faster and Three-lane Shifted), the following assumptions were used:

- The average mean hourly construction wage for all construction occupations in Colorado in May 2022 (the most recent available data) of \$29.35 was adjusted to \$31.66 in 2024 dollars using the implicit GDP price deflator (BLS 2023; BEA n.d.).
- Assuming 35% in benefits, the average mean hourly construction wage in 2024 dollars including benefits was estimated at about \$43, and the annual construction salary including benefits was estimated at about \$89,000.

Based on the annual construction salary, the annual direct full-time equivalent (FTE) construction jobs in the county are as shown in Table 3-8. This represents the number of workers on average that would be employed during Project construction. These

numbers were derived by dividing direct annual labor costs in 2024 dollars from Table 3-6 by the annual construction salary of \$89,000.

Table 3-8: Direct Annual Full-time Equivalent Jobs

Annual Direct FTE	Three-lane Faster	Three-lane Shifted
Based on lower bound of annual labor costs	9 ^[a]	6
Based on upper bound of annual labor costs	18 ^[b]	12

^[a] Direct FTE = \$819,000 divided by \$89,000 = 9

^[b] Direct FTE = \$1,637,000 divided by \$89,000 = 18

Note: Costs estimates shown for the Three-lane Shifted alternative were determined using calculations similar to those shown for the Three-lane Faster alternative in the table.

3.4.2.2 Assumptions: Tourism

Project construction is anticipated to result in a reduction in business activity. Based on the estimated traffic delays and business survey results discussed in Section 3.3, business reduction is assumed to be between 2% and 5% and to primarily affect the retail, food, accommodation, recreation (tourism and arts), and real estate sectors.

Output in the IMPLAN sectors corresponding to the retail, food, accommodation, recreation, and real estate sectors were reduced by 2% and 5%. The results from the IMPLAN model are summarized in the following section.

3.4.3 Results

The economic impacts associated with construction expenditures and those associated with the reduction in business are summarized in Section 3.4.4.1 and 3.4.4.2, respectively.

3.4.3.1 Construction Impacts

This section presents the regional economic impacts associated with construction spending using the IMPLAN model and the 2022 IMPLAN data for Pitkin County.

Three-lane Faster

Construction of the Three-lane Faster alternative is expected to take 3 years. Table 3-9 shows the annual direct and secondary (indirect and induced) economic impacts within Pitkin County associated with the construction of this alternative. Because the impacts were evaluated for a range of annual direct cost inputs, the results are presented as a range of values whereby the lower value corresponds to the lower cost input and the higher value corresponds to the higher cost input.

Table 3-9: Annual Regional Employment and Labor Income Associated with Construction, Three-lane Faster

Impact	Employment (FTEs) ^[a]	Labor Income (thousands, 2024 dollars) ^[b]
Direct	10 to 20	\$819 to \$1,637
Indirect	10 to 10	\$469 to \$938
Induced	0	\$31 to \$62
Total	20 to 30	\$1,319 to \$2,637

Source: IMPLAN, 2024.

^[a] FTEs rounded to the nearest 10 jobs.

^[b] Labor Income shown is IMPLAN's Employee Compensation, which includes total payroll cost of the employee paid by the employer. It includes wage and salary plus benefits and payroll taxes.

Table 3-9 demonstrates that, in addition to the annual direct 10 to 20 FTE jobs, the Project construction phase under the Three-lane Faster alternative would result in indirect employment of 10 FTEs and average induced employment of less than 0.5 FTE within Pitkin County. The total annual construction employment within Pitkin County is estimated to be between 20 and 30 FTEs for each of the 3 years of construction.

As expected, the increase in regional employment would be accompanied by increased levels of labor income within Pitkin County (Table 3-9). Construction of Three-lane Faster alternative is expected to result in about \$0.8 million to \$1.6 million in annual direct labor income. The annual indirect labor income is estimated at about \$0.5 million to about \$0.9 million, and the annual induced labor income is estimated to be between \$31,000 and \$62,000. The total annual labor income within Pitkin County is estimated to be between \$1.3 million and \$2.6 million. All estimates are in 2024 dollars.

Three-lane Shifted

Construction of the Three-lane Shifted alternative is expected to take 4 years. Table 3-10 shows the annual direct and secondary (indirect and induced) economic impacts within Pitkin County associated with the construction of Three-lane Shifted alternative.

Table 3-10 shows that, in addition to the annual direct 10 FTE jobs, the Project construction phase under the Three-lane Shifted alternative would result in annual indirect employment of 10 FTEs and annual induced employment of 10 to 20 FTEs within Pitkin County. The total annual construction employment within Pitkin County is estimated to be between 10 and 20 FTEs for each of the 4 years of construction.

Table 3-10: Regional Employment and Labor Income Associated with Construction, Three-lane Shifted

Impact	Employment (FTEs) ^[a]	Labor Income (thousands 2024 dollars) ^{[b],[c]}
Direct	10 to 10	\$520 to \$1,039
Indirect	0 to 10	\$298 to \$595
Induced	0	\$20 to \$40
Total	10 to 20	\$837 to \$1,674

Source: IMPLAN, 2024.

^[a] FTEs rounded to the nearest 10 jobs.

^[b] Labor Income shown is IMPLAN's Employee Compensation, which includes total payroll cost of the employee paid by the employer. It includes wage and salary plus benefits and payroll taxes.

^[c] Labor income is rounded to the nearest \$1,000.

As expected, the increase in regional employment would be accompanied by increased levels of labor income within Pitkin County (Table 3-10). Construction of Three-lane Shifted alternative is expected to result in about \$0.5 million to \$1.0 million in annual direct labor income. The annual indirect labor income is estimated to be between \$0.3 million and \$0.6 million, and the annual induced labor income is estimated to be between \$20,000 and \$40,000. The total annual labor income within Pitkin County is estimated to be between \$0.8 million and \$1.7 million. All estimates are in 2024 dollars.

3.4.3.2 Tourism Impacts

Table 3-11 shows the annual direct and secondary (indirect and induced) economic impacts within Pitkin County associated with a 2% and a 5% reduction in business. The results are presented as a range of values whereby the lower value corresponds to the 2% reduction and the higher value corresponds to the 5% reduction in business. The potential annual impact to the tourism sector would be the same for each of the bridge replacement alternatives and would occur during each year of construction. The Three-Lane Shifted alternative is estimated to take one year longer to construct thus the impacts would be greater than for the Three-Lane Faster alternative.

Table 3-11: Regional Employment and Labor Income Associated with Loss in Tourism Business

Impact	Employment (FTEs) ^[a]	Labor Income (millions 2024\$) ^{[b],[c]}
Direct	-120 to -310	-\$7.5 to -\$18.8
Indirect	-50 to -120	-\$3.0 to -\$7.4
Induced	-10 to -20	-0.6 to -\$1.5
Total	-180 to -450 to	-11.1 to -\$27.8

Source: IMPLAN, 2024.

^[a] FTEs rounded to the nearest 10 jobs.

^[b] Labor Income shown is IMPLAN's Employee Compensation, which includes total payroll cost of the employee paid by the employer. It includes wage and salary plus benefits and payroll taxes.

^[c] Labor income is rounded to the nearest \$1 million.

Table 3-11 illustrates that, in addition to the annual direct loss of 120 to 310 FTE jobs in the tourism-related sectors within Pitkin County, Project construction is also likely to result in a loss of 50 to 120 FTEs in indirect jobs and a loss of 10 to 20 FTEs in induced jobs. The total annual employment loss within Pitkin County during the 3-year or 4-year construction period is expected to be between 180 and 450 FTEs.

As expected, the loss in regional employment would be accompanied by decreased levels of labor income within Pitkin County (Table 3-11). The Project construction phase is expected to result in annual direct labor income losses ranging between \$7.5 million and \$18.8 million. The loss in annual indirect labor income is estimated to be about \$3.0 million to \$7.8 million, and the loss in annual induced labor income is estimated to be between \$0.6 million and \$1.5 million. The loss in total annual labor income within Pitkin County is estimated to be about \$11.1 million to \$27.8 million. All estimates are in 2024 dollars.

Potential Impacts to Tax Revenues

The potential impacts to tax revenues were estimated at the county level using the Pitkin County IMPLAN model assuming a 2% and a 5% reduction in tourism-related business. Pitkin County is expected to lose between \$0.3 million and \$0.7 million in annual sales tax revenues during the Project construction phase because of disruption to the tourism industry. The lower value of this range corresponds to the assumed reduction of 2% in tourism-related business reduction, and higher value corresponds to the 5% reduction in tourism-related business.

Some of the estimated increases in jobs and earnings in the construction industry will likely be filled by Aspen residents. While impacts on the tourism sector are reported for the County, a majority of the impacts would likely affect businesses in Aspen

because that is where the effects of the construction related traffic delay will be experienced. Impacts to sales tax revenues are reported for the County. It is expected the City would experience a reduction in sales tax revenues if there were a decrease in business activity related to the construction of the Project; the potential impacts would likely be less than those reported for the County.

4. Summary

Project Construction would generate a range of short-term effects during the construction phase. The Three-lane Faster alternative would be constructed over a 3-year period, whereas the Three-lane Shifted alternative would take 4 years to complete. Annual construction-related delay is expected to be similar for each alternative but would last longer for the Three-lane Shifted alternative. The construction delay would result in additional travel time for all-purpose and commercial vehicles, resulting in approximately \$6 million per year of added travel time. Nearly 98% of the additional delay is expected to be for all-purpose vehicles.

The Project would also have regional economic impacts associated with construction spending and potential impacts on local and regional business activity. A survey of local businesses helped inform the potential impact on business activity. Some businesses reported concerns that the Project construction would have adverse impacts on sales, whereas other businesses suggested the Project would not impact their revenues. A range of 2 to 5% reduction in sales was analyzed to illustrate the potential impact. The estimated annual regional economic impacts include the following:

- For the Three-lane Faster alternative, the construction sector will experience an additional 10 to 20 jobs annually and \$0.8 million to 1.6 million in labor income. These direct jobs and income in the construction sector generate 10 secondary² jobs and \$0.5 million to \$1.0 million in secondary labor income, annually in Pitkin County.
- For the Three-lane Shifted alternative, the construction sector will experience an additional 10 jobs annually and \$0.5 to \$1.0 million in labor income. These direct jobs and income in the construction sector generate 10 secondary jobs and \$0.3 million to \$0.7 million in secondary labor income annually, in Pitkin County.
- For both alternatives, the tourism sector will experience an annual decrease in direct employment of 120 to 310 jobs, resulting in an annual reduction of direct labor income of \$7.5 to \$18.8 million. These annual direct reductions in employment and labor income in the tourism-related sectors result in secondary employment losses of 60 to 140 jobs and secondary labor income losses of \$3.6 million to \$9.0 million, annually in Pitkin County.
- Reductions in sales tax revenue range from \$0.3 to \$0.7 million.

² Secondary = indirect + induced

Based on the results of the traffic analysis that show relatively low levels of additional travel delay when compared to existing conditions, the impacts on tourism and tax revenues are anticipated to be on the lower end of the range reported in this analysis.

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Attachment 1: Annual Vehicle Delay Hours During Construction

Direction	Morning Peak Period ^[a]	Evening Peak Period ^[a]	Off-peak Period ^[a]	Morning Peak Hour ^[b]	Evening Peak Hour ^[b]	Off-peak Hour ^[b]	Weekday Delay Hours	Weekend Adjustment Factor	Estimated Weekend May 2024 ADT	Weekend Delay Hours	Delay Hours Per Day (May 2024)	Annualization Adjustment Factor	Delay Hours Per Day (Annualized)	Annual Vehicle Delay Hours
Inbound	2,891	1,300	5,146	300	20	20	277	48%	4,524	25	205	132%	270	98,681
Outbound	1,275	2,437	5,783	20	300	20	242	47%	4,503	25	180	132%	238	86,817
Total														185,498

ADT = Average Daily Traffic

ATR = Automatic Traffic Recorder

^[a] May 2024 weekday count from ATR

^[b] Added delay (sec) from July 2024 Vissim model

Steps

- 1 Peak hour delay from VISSIM (July 2024) to apply for the 2.75 hour AM peak and 2.5 hour PM peak period.
VISSIM found 149 seconds of AM delay, and negative delay for the PM. Since City of Aspen suggests there will be impact, we assumed 5 minutes of delay in the AM and PM peaks due to the speed reduction.
- 2 Estimate off-peak delay from off-peak direction in Vissim.
- 3 Apply delay to May 2024 weekday counts.
- 4 Use May 2024 weekday versus weekend counts from Colorado Department of Transportation Online Transportation Information System (OTIS) (Location 000236 on State Highway 82, several miles north of study).
- 5 Estimate average daily delay for May 2024.
- 6 Use 2022 bridge data by month to convert to annual delay.