Bridging the Gap: Multimodal Connections on I-35 over the Oklahoma River

Oklahoma Department of Transportation

Multimodal Project Discretionary Grant Application

August 21, 2023

BENEFIT COST NARRATIVE

OKLAHOMA Transportation

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Executive Summary

This Benefit Cost Analysis (BCA) supports Oklahoma Department of Transportation's (ODOT's) Fiscal Year (FY) 2023 and 2024 Multimodal Project Discretionary Grant (MPDG) funds from the National Infrastructure Project Assistance grants program (Mega) or the Nationally Significant Multimodal Freight and Highways Projects grants program (INFRA) to replace the I-35 NB and SB bridges, I-35 ramp Bridge, rehabilitate the I-35 bridge over the Stillwater railroad, and construct a new "shared use" multimodal bridge adjacent to the I-35 SB bridge (the Project).

The Project will provide new, safer, and geometrically improved bridges over the Oklahoma River. The main vehicular bridge replacement will deliver major safety benefits to a very high crash-prone river crossing, while adding vehicular capacity through travel lane expansion and the provision of safety lanes in both directions, which are currently functionally obsolete on the existing bridge.

The new multimodal bridge and enhancements to existing bike-ped trails along the Oklahoma River will provide multimodal access to nearby disadvantaged populations, while providing much enhanced access to the full regional bike and ped network. It will provide a much needed and currently absent downtown river crossing for active transportation users.

The BCA captures and monetizes four categories of benefits arising from the vehicular bridge project: life cycle cost savings, travel time savings, crash reduction benefits, and emissions benefits. Other benefits that have not been monetized (but are discussed below) include travel reliability and freight (truck) logistics/supply chain benefits. Economic benefits such as enhanced labor and business productivity (over and above those embodied in travel time savings) are also not included. However, the overall improvements in regional accessibility may generate benefits.

Benefits monetized in the BCA from the multimodal bridge improvements include benefits to existing and new bike commuters and recreational users and similar benefits to existing and new pedestrian commuters and recreational users. These benefits reflect populations within a one-mile radius of the bridge. In addition, a one-time option value benefit for nearby residents has been estimated, reflecting consistent research showing that proximity to a greenway or recreational trail generates an increase in house values relative to similar houses without proximity to such a facility.

Results: The Project yields an overall Benefit-Cost Ratio (BCR) of 1.31 and a Net Present Value of $31.4 million (**Table 10**). The preponderance of benefits is from crash reductions and vehicular travel time savings, with smaller but still significant shares due to life cycle cost savings, emissions reductions, and active transportation benefits (cyclist and pedestrian benefits) arising from the Project, as well as riverfront connections to the existing Oklahoma City Trail system.

Overview

This Benefit Cost Analysis (BCA) supports Oklahoma Department of Transportation's (ODOT's) Fiscal Year (FY) 2023 and 2024 National Infrastructure Project Assistance grants program (Mega) or the Nationally Significant Multimodal Freight and Highways Projects grants program

(INFRA) application. The BCA has been conducted following the USDOT's Benefit-Cost Analysis Guidance for Discretionary Grant Programs (January 2023.) The following general parameters and assumptions were used in the BCA:

- A real discount rate of 7 percent is applied to all costs and benefits except for carbon emissions reductions, which are discounted at 3 percent.
- The analysis covers a 20-year period of operation for upgraded infrastructure.
- Construction is assumed to commence in 2028 and end in 2030 with operation commencing in 2030 and extending to 2049.
- All costs and benefits are in 2021 constant dollars.
- The year 2021 was used as the base year for discounting; that is, 2021 is considered year zero for discounting.

Project Description

The Project, centrally located in downtown Oklahoma City, will provide a new, safer, and geometrically improved bridge over the Oklahoma River. The new I-35 bridges (northbound and southbound structures) would provide six 12-foot lanes in each direction, 12-foot inside shoulders, and outside shoulders varying between 12-foot-0-inches and 18-foot-10-inches. A new I-35 ramp bridge will be constructed, and the I-35 bridge over the Stillwater railroad will be rehabilitated. The Project also includes a separate multimodal bridge that connects to the Oklahoma River trails on both sides of the Oklahoma River.

The Project will deliver major safety benefits to a very high crash-prone crossing while adding vehicular capacity through travel lane expansion and the provision of safety lanes in both directions, which are currently functionally obsolete on the existing bridge. The bridge is an essential connecting link along I-35, a major north-south interstate route that provides passenger and truck freight connectivity from the Texas-Mexico border through the Dallas metro area, to Oklahoma City, and on to points north.

The Project will provide unique and needed access to the largely Hispanic Capitol Hill district, located on the south side of the Oklahoma River. For non-automobile owners located in this Historically Disadvantaged Community and Area of Persistent Poverty adjacent to and near the Project, the new multimodal bridge will provide walking and biking access to jobs, healthcare, and increased transit options on both sides of the river.

The Project will help complete the Oklahoma River trails network located north and south of I-35, connecting this rich cultural and recreational area of Oklahoma City to the entire Oklahoma City trails system that offers a network of 10 inter-connected trails that cover over 80 miles and can access almost every point in Oklahoma City.

Costs

Capital Cost (Capitol Cost Tab)

ODOT estimated costs based on estimated quantities and recent similar projects. The capital cost of the I-35 Bridge Component and associated road improvements has been estimated to total $145.7 million in 2022 dollars (**Table 1**). The cost of the Project and trail additions on the

riverbank, plus associated minor costs for active transportation infrastructure is estimated to total $19.9 million in 2022 dollars. The total cost is $165.7 million in 2022 dollars, which does not include any previously incurred costs. A 30 percent contingency was used to develop the Project budget.

Design and engineering are expected to take place in 2024 and 2025. Future year costs have been de-escalated from 2022 dollars to 2021 dollars based on the 2021-2022 Q2 over Q2 change in the GDP Price Deflator, as reported by the Bureau of Economic Analysis and the Federal Reserve.[1]

Table 1: Project Budget by Item (2022 $s)

Item	Total Cost
Roadway	
Construction	$27,500,000
Other Items (Traffic Control, Striping, etc.)	$4,000,000
30% Contingency	$9,450,000
I-35 Bridges	
I-35 SB over Oklahoma River	$47,400,000
I-35 NB over Oklahoma River	$33,900,000
I-35 Ramp over Oklahoma River	$20,700,000
I-35 over Stillwater RR Bridge Rehab	$2,800,000
Sub Total I-35 Roadway and Bridges	**$145,750,000**
Multimodal Bridge & Trail	
Multimodal Bridge over Oklahoma River	$13,200,000
Trail Improvements	$5,200,000
30% Contingency	$1,560,000
Sub Total Multimodal Bridge & Trail	**$19,960,000**
Total	**$165,710,000**

SOURCE: ODOT, (Q4 2022 DOLLARS)

Operations and Maintenance Costs

Routine maintenance costs for the No Build and Build are expected to be minor. However, significant additional major maintenance and rehab costs would be incurred under the No Build through the year 2060. These are avoided costs under the Build and are included in the analysis as Build benefits.

Vehicular Bridge Benefits

Four categories of benefits arising from the I-35 bridge replacement project have been captured and monetized in the BCA: life cycle cost savings, travel time savings, crash reduction

[1] https://fred.stlouisfed.org/series/GDPDEF/

benefits, and emissions benefits. Other benefits that have not been monetized (but are discussed below) include travel reliability and freight (truck) logistics/supply chain benefits. Economic benefits such as enhanced labor and business productivity (over and above those embodied in travel time savings) are also not included. However, the overall improvements in regional accessibility may generate benefits.

Life Cycle Cost Savings (Maintenance $ Cost Savings Tab)

As noted previously, the No Build bridge will require significant major rehabilitation and damage repair maintenance spending in the next 30 years. Much lower costs would be incurred under the Build. The basis of these savings is summarized in **Table 3**, below.

Table 2: Major Rehabilitation and Repair Costs (2022 $s)

Year	No-Build			Build	
	Major Bridge Rehab Costs	Bridge Damage Repair	TOTAL	Major Bridge Rehab Costs	TOTAL
2016	$0	$0	$0	$0	$0
2017	$0	$9,252	$9,252	$0	$0
2018	$0	$0	$0	$0	$0
2019	$0	$0	$0	$0	$0
2020	$0	$84,087	$84,087	$0	$0
2021	$0	$50,000	$50,000	$0	$0
2022	$0	$4,500	$4,500	$0	$0
2023	$0	$0	$0	$0	$0
2024	$0	$0	$0	$0	$0
2025	$0	$0	$0	$0	$0
2026	$2,000,000	$0	$2,000,000	$0	$0
2028	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0
2032	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0
2040	$3,000,000	$0	$3,000,000	$0	$0
2042	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0
2046	$0	$0	$0	$0	$0
2048	$0	$0	$0	$0	$0
2050	$0	$0	$0	$1,000,000	$1,000,000
2052	$0	$0	$0	$0	$0
2054	$0	$0	$0	$0	$0
2056	$0	$0	$0	$0	$0
2058	$0	$0	$0	$0	$0
2060	$3,000,000	$0	$3,000,000	$1,000,000	$1,000,000
TOTAL	**$8,000,000**	**$147,839**	**$8,147,839**	**$2,000,000**	**$2,000,000**

SOURCE: ODOT AND POE ENGINEERING

Crash Reductions (tab Crash Reduction $ Benefit)

Project Area Crash Data

Oklahoma Department of Transportation (ODOT) uses crash data from the Oklahoma Highway Safety Office (OHSO) because it provides in-depth crash data for specific project locations. OSHO produces publications and problem identification data including in-depth analysis of crash numbers, rates, and locations. The OHSO crash data is used by highway safety professionals across Oklahoma to evaluate traffic safety priority areas and propose potential solutions.

Crash data were obtained from the OHSO to determine the nature and frequency of collisions along the interstates and ramps. Collision history was evaluated for the entire interchange area, extending 2 miles north of the bridges and 1.5 miles south of the bridges along I-35, 0.75 miles north of the interchange along I-235, 1.25 miles west of the interchange along I-40, and 1 mile west of the interchange along Oklahoma City Boulevard. The collision information was collected and analyzed over a 10-year period 1/1/2012 to 12/31/2021, which is the latest available data.

As shown in **Table 4**, a total of 4,371 collisions were recorded involving 1,686 injured persons and 24 fatalities. This is the equivalent of 1.2 collisions per day over 10 years. Of those injuries, 110 were of sufficient severity that the injured person was incapacitated.

Table 3: I-35/I-40 Interchange Collisions

Type of Collision	Fatality	Injury	Property Damage	Total
Rear-End	3	646	1,656	2,305
Head-On	4	4	1	9
Right Angle	1	64	81	146
Angle Turning	1	54	149	204
Other Angle		1	3	4
Sideswipe Same Direction	1	137	934	1,072
Sideswipe Opposite Direction	1	5	4	10
Fixed Object	6	143	226	375
Pedestrian	2	6		8
Pedal Cycle		1		1
Animal			1	1
Overturn/Rollover	1	38	23	62
Other Single Vehicle Crash		7	29	36
Other		24	114	138
Total	**20**	**1,130**	**3,221**	**4,371**

SOURCE: OKLAHOMA HIGHWAY SAFETY OFFICE

The most prevalent collision type within the interchange was rear-end (front to rear) collisions, accounting for over half (2,305 of the 4,371 total) of all collisions. These types of crashes are commonly observed with congested roadways where stopped traffic occurs in the driving lanes and sudden deceleration from vehicles traveling at higher rates of speed is required. The

limited bridge travel lane capacity, reduced shoulders, and merging of travel lanes directly south lead to conditions that cause traffic stopping and weaving.

The replacement bridges for I-35 NB and SB would have six lanes each as well as adequate shoulder widths. This would allow for the I-35 NB bridge to have a dedicated lane for I-40 WB and the I-35 SB bridge to have an additional lane from I-40 WB. South of the I-35 SB bridge, the proposed roadway would narrow to four lanes instead of three; this is an additional lane from the current configuration. The additional lane should help reduce the number of rear-end collisions by reducing the backup at the interchange during peak hours which, in turn, increases the capacity of the interchange. The addition of a SB through-lane would lessen some of the weave movements which occur today.

The next most common collision type found was sideswipe same direction at nearly 25 percent. The reduction of the five-lane bridge to three lanes south of the bridge causes a weaving movement on both sides of the roadway for I-35 SB and causes a significant number of sideswipe collisions as drivers seek to merge. The I-35 bridge replacement would provide an additional lane and would eliminate the weaving movement on the inside of the roadway and help reduce the number of sideswipe collisions.

Additionally, the I-35 bridge replacement would restore the inside and outside shoulders to adequate widths. Full shoulders are important for the safety of a bridge because they allow for broken-down cars to pull off to the shoulder rather than blocking a lane of traffic. The shoulders also permit emergency vehicles to bypass stopped traffic to access the scene of a crash or incident more quickly, allowing injured persons to receive medical attention sooner.

Crash Reduction Factors

The FHWA Desktop Reference for Crash Reduction Factors (CRF) was used to determine how each of the proposed safety improvements would impact crash rates.

Lane Increase: The CRF for increasing the number of travel lanes on a bridge is .25, meaning that after the improvement, crashes would be at 75 percent (the equivalent CMF) of their pre-improvement level. However, increasing the number of lanes has a greater impact on rear-end and sideswipe collisions reducing them by approximately 40 percent and 35 percent respectively. As shown above, these are the two most common accident types making up over 75 percent of the total collisions found on the roadway extent. Accordingly, the CRF for adding lanes, given the prevalence of rear end crashes, is estimated to be .35 due to the lane increase.[2]

Shoulder Widening: Based on additional research from the CRF Desktop Reference, it was found that widening the shoulders on the bridge from 4’ to 12’ will result in a CRF of .20. This means that the application of shoulder widening will result in a post-application crash level equal to 80 percent of the pre-application condition.[3]

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[2] FHWA Desktop Reference pages.61, 62, all areas and all types, 0,25 CRF multiple citations. Microsoft Word - Divider Pages with Intro_Desktop Reference 09102007.doc (dot.gov)

[3] FHWA Desktop Reference, p. 68, for all areas, widen shoulder initially less than 3 ft. Microsoft Word - Divider Pages with Intro_Desktop Reference 09102007.doc (dot.gov)

To ensure a conservative estimate of benefits, we utilize only the CRF for Lane Increase of 0.35. A 35% reduction in crashes of each type is assumed in the analysis.

In summary, the I-35 bridge replacements would help enhance safety and operation, protecting motorized travelers by reducing the number of accidents in the I-35/I-40 interchange area by almost 50 percent.

Crash Reduction

Estimated crash reductions in 2030 (first year of operation) are shown in **Table 5**.

Table 4: 2030 Crash Reductions

Year	2030
Average Project-wide No Build Crashes (grow at rate of AADT growth from Look Up	
PDO	322.10
Serious Injury	11.30
Non Capacitating Injury	33.90
Possible Injury	67.80
Fatal	2.00
Projected Annual Crashes (Build)	
PDO	209.37
Serious Injury	7.35
Non Capacitating Injury	22.04
Possible Injury	35.26
Fatal	1.30
Crashes Reduced	
PDO	112.74
Serious Injury	3.96
Non Capacitating Injury	11.87
Possible Injury	32.54
Fatal	0.70

SOURCE: EBP

The Project will generate very significant savings in the human costs of crashes. Over the 20 years, it is estimated that 14 lives will be saved, and another 1,000 injury-crashes will be avoided.

Travel Delay Savings (TT $ Benefits Tab)

Table 6 summarizes current and projected AADT for the I-35 bridge-interchange complex and provides the estimated per trip times across the approximately 2-mile bridge and approach road span under the No Build and Build scenarios. Trip times are anticipated to improve with the new bridge by between one and two minutes per crossing during peak congested periods.

In the first year of operation, there will be an estimated 181,000 person hours saved and another 7,600 truck hours saved.

Table 5: Current and Forecast AADT for the I-35 Bridge

AADT - Current and Forecast (I-35)		Daily	AM			Daily	PM					
		NB Daily	AM NB peak	SB Daily	AM SB peak	NB Daily	PM NB peak	SB Daily	PM SB peak	peak trip time No Build	peak trip time Build	time savings per trip (minutes)
2022 AADT	autos	64,384	4,024	55,493	3,468	64,384	4,024	55,493	3,468			
	trucks	4,846	282	4,177	243	4,846	282	4,177	243			
2030 AADT	autos	74,894	4,681	64,552	4,035	74,894	4,681	64,552	4,035	3.4286	2.1818	**1.247**
	trucks	5,243	328	4,519	282	5,243	328	4,519	282			
2040 AADT	autos	84,165	5,260	72,540	4,534	84,165	5,260	72,540	4,534	4.0000	2.1818	**1.818**
	trucks	6,335	368	5,460	317	6,335	368	5,460	317			
truck share	7.00%											

SOURCE: ODOT, EBP

Air Emissions Reductions (Emissions $ Benefits Tab)

Vehicle hour savings derived from above were multiplied by vehicle emissions rates per delay hour for each pollutant type (as calibrated by INCOG utilizing the MOVES3 model) to estimate emissions reductions. Emissions forecasts also assume significant growth in the electric vehicle (EV) share between now and 2051. A consensus of reviewed EV market forecasts led to an assumption that the EV share would grow from the current level of about 2 percent to 40 percent by 2051. Because of the assumed growth in the EV share consistent in the No-Build and Build scenarios, and because the Project results in no change in VMT, the emissions savings are relatively small over time.

Active Transportation Benefits (tabs Bike and Ped Lane $ Benefits)

The ability to fully measure the benefits of the Multimodal bridge is limited by a lack of current and comprehensive bike and pedestrian utilization data, as well as by limited methods to fully estimate the new demand. However, to the extent possible, this analysis endeavors to capture those benefits based on techniques available in the NCHRP literature related to prospective bike and pedestrian use of new and/or improved bike-ped facilities. The analysis also considers the nature of the facilities being developed as part of the I-35 bridge replacement project, connectivity to the overall regional Oklahoma City Trail system, proximity to downtown and nearby cultural and commercial centers of activity, and the width and length of the new facilities.

Pedestrian and Cycling Benefits

To begin our analysis, we obtained data on the potential market for bike-ped facilities, comprised of the residential population in Census tracts located within an approximately one-mile radius of the bridge. Those data are shown below in **Table 7**.

Table 6: Active Transportation -Eligible Population by Census Tracts

POPULATION ELIGIBLE FOR INDUCED HEALTH BENEFIT	CENSUS TRACT 1039	CENSUS TRACT 1053	CENSUS TRACT 1073.05	CENSUS TRACT 1095	CENSUS TRACT 1097	TOTAL
WALKING (AGES 20-74)	2,465	2,044	806	2,519	1,666	**9,500**
CYCLING (AGES 20-64)	2,299	1,970	742	2,237	1,376	**8,624**
	CENSUS TRACT 1039	**CENSUS TRACT 1053**	**CENSUS TRACT 1073.05**	**CENSUS TRACT 1095**	**CENSUS TRACT 1097**	**TOTAL**
TOTAL WALKING POPULATION	2,465	2,044	806	2,519	1,666	
TOTAL CYCLING POPULATION	2,299	1,970	742	2,237	1,376	
NO-BUILD WALKING RATE (CENSUS TRACT RATES)	2.70%	0.40%	0.90%	1.10%	8.7%	
NO-BUILD CYCLING RATE (CENSUS TRACT RATES)	0.00%	0.00%	0.00%	0.00%	0.5%	
NO-BUILD EXISTING COMMUTER PEDESTRIANS	67	8	7	28	145	**255**
NO-BUILD EXISTING COMMUTER CYCLISTS	-	-	-	-	7	**7**
ANNUAL TRIPS (52 WEEKS * 5 ROUND TRIPS)	520	520	520	520	520	
NO-BUILD WALKING TRIPS	34,609	4,252	3,772	14,409	75,370	**132,411**
NO-BUILD CYCLING TRIPS	-	-	-	-	3,578	**3,578**
	CENSUS TRACT 1039	**CENSUS TRACT 1053**	**CENSUS TRACT 1073.05**	**CENSUS TRACT 1095**	**CENSUS TRACT 1097**	**TOTAL**
TOTAL WALKING POPULATION	2,465	2,044	806	2,519	1,666	
TOTAL CYCLING POPULATION	2,299	1,970	742	2,237	1,376	
BUILD WALKING RATE (OKLAHOMA COUNTY RATES)	1.60%	1.60%	1.60%	1.60%	1.60%	
BUILD CYCLING RATE (OKLAHOMA COUNTY RATES)	0.30%	0.30%	0.30%	0.30%	0.30%	
BUILD INDUCED COMMUTER PEDESTRIANS	39	33	13	40	27	**152**
BUILD INDUCED COMMUTER CYCLISTS	7	6	2	7	4	**26**
ANNUAL TRIPS (52 WEEKS * 5 ROUND TRIPS)	520	520	520	520	520	
BUILD WALKING TRIPS	20,509	17,006	6,706	20,958	13,861	**79,040**
BUILD CYCLING TRIPS	3,586	3,073	1,158	3,490	2,147	**13,453**
	CENSUS TRACT 1039	**CENSUS TRACT 1053**	**CENSUS TRACT 1073.05**	**CENSUS TRACT 1095**	**CENSUS TRACT 1097**	**TOTAL**
TOTAL WALKING POPULATION	2,465	2,044	806	2,519	1,666	
TOTAL CYCLING POPULATION	2,299	1,970	742	2,237	1,376	
BUILD RECREATIONAL WALKING RATE (NATIONAL RATES)	35.00%	35.00%	35.00%	35.00%	35.00%	
BUILD RECREATIONAL CYCLING RATE (NATIONAL RATES)	11.00%	11.00%	11.00%	11.00%	11.00%	
BUILD INDUCED RECREATIONAL PEDESTRIANS	17	14	5	17	11	**64**
BUILD INDUCED RECREATIONAL CYCLISTS	5	4	2	5	3	**18**

Utilizing this information and unit values provided in the USDOT BCA guidance (**Table 8**), estimates of benefits for existing and potentially induced ped and cyclist users per trip and per year were developed. Those benefits are summarized for the first year of operation (2030) in **Table 9**.

Table 7: US DOT Guidance Values for Pedestrian and Cycling Facilities

PEDESTRIAN FACILITY IMPROVEMENTS REVEALED PREFERENCE VALUES	
IMPROVEMENT TYPE	**RECOMMENDED VALUE PER PERSON-MILE WALKED (2021 $)**
EXPAND SIDEWALK (PER FOOT OF ADDED WIDTH)	$0.11
REDUCING UPSLOPE BY 1%	$1.05
REDUCING TRAFFIC SPEED BY 1 MPH (FOR SPEEDS ≤ 45 MPH)	$0.09
REDUCING TRAFFIC VOLUME BY 1 VEHICLE PER HOUR (FOR ADT ≤ 55,000)	$0.0009
IMPROVEMENT TYPE	**RECOMMENDED VALUE PER PERSON-MILE WALKED (2021 $)**
INSTALL MARKED-CROSSWALK ON ROADWAY WITH VOLUMES ≥ 10,000 VEHICLES PER DAY	$0.18
INSTALL SIGNAL FOR PEDESTRIAN CROSSING ON ROADWAY WITH VOLUMES ≥ 13,000 VEHICLES PER DAY	$0.48

CYCLING FACILITY IMPROVEMENT REVEALED PREFERENCE VALUES	
FACILITY TYPE	**RECOMMENDED VALUE PER PERSON-MILE CYCLED (2021 $)**
CYCLING PATH WITH AT GRADE CROSSINGS	$1.49
CYCLING PATH WITH NO AT GRADE CROSSINGS	$1.87
DEDICATED CYCLING LANE	$1.77
CYCLING BOULEVARD OR SHARROW	$0.28
SEPARATED CYCLE TRACK	$1.77

Table 8: Annual Bike and Pedestrian Benefits for Existing and Induced Users

Cycling			Pedestrians		
YEAR		2030	YEAR		2030
EXISTING CYCLIST TRIPS AND BENEFITS			**EXISTING PEDESTRIAN TRIPS AND BENEFITS**		
ESTIMATED EXISTING COMMUTER CYCLISTS	7	7	ESTIMATED EXISTING COMMUTER PEDESTRIANS	255	255
ANNUALIZATION FACTOR	365	365	ANNUALIZATION FACTOR	365	365
CYCLIST TRIP LENGTH	1.055	1.055	PEDESTRIAN TRIP LENGTH	0.86	0.86
ESTIMATED ANNUAL BIKE MILES	2696	2696	ESTIMATED ANNUAL WALK MILES	80045	80045
CYCLING PATH WITH NO AT GRADE CROSSING BENEFIT	$1.87	$1.87	SIDEWALK EXPANSION BENEFIT (10 FEET)	$1.10	$1.10
ANNUAL EXISTING CYCLIST BENEFITS		**$5,041**	**ANNUAL EXISTING PEDESTRIAN BENEFITS**		**$88,049**
INDUCED CYCLIST TRIPS AND BENEFITS			**INDUCED PEDESTRIAN TRIPS AND BENEFITS**		
ESTIMATED INDUCED COMMUTER CYCLISTS	26	26	ESTIMATED INDUCED COMMUTER PEDESTRIANS	152	152
ESTIMATED INDUCED RECREATIONAL CYCLISTS	18	18	ESTIMATED INDUCED RECREATIONAL PEDESTRIANS	64	64
ANNUALIZATION FACTOR	365	365	ANNUALIZATION FACTOR	365	365
CYCLIST TRIP LENGTH	1.055	1.055	PEDESTRIAN TRIP LENGTH	0.86	0.86
ESTIMATED ANNUAL BIKE MILES	16943.3	16943.3	ESTIMATED ANNUAL WALK MILES	67802	67802
CYCLING PATH WITH NO AT GRADE CROSSING BENEFIT	1.87	1.87	SIDEWALK EXPANSION BENEFIT (10 FEET)	1.10	1.10
ANNUAL INDUCED CYCLIST BENEFITS		$31,684	**ANNUAL INDUCED PEDESTRIAN BENEFITS**		$74,583
TOTAL CYCLIST BENEFITS		**$36,725**	**TOTAL PEDESTRIAN BENEFITS**		**$162,632**

Option Value - New Bike and Ped Facilities

In addition to Project benefits potentially realized by existing and induced bike and ped users for commuting and recreational purposes, there is substantial research indicating that proximity to high quality and well-connected recreational trails carries significant *option* value that may be reflected in higher housing values.[4] Typical of these research studies is one conducted in North Carolina indicating that houses adjacent to a regional greenway sold for a premium of about $5,000 above comparable homes that were not located nearby. Similar studies found premiums in land values per acre and in property tax revenues associated with proximity to recreational trails and bikeways.

To capture the potential benefits of the much-enhanced bike-ped access arising from the Project, we have gone back into the Census data from the one-mile radius tracts around the bridge to determine the number of housing units that may experience a benefit. The Census indicates over 6,000 housing units located within the one-mile radius. As a conservative estimate, this analysis assumes about 1,000 of those 6,000 housing units are close enough to the bike and ped enhancements to see significant property value impacts. The analysis estimates a modest one-time aggregate option value boost (as reflected in house value increases) of $5,000,000 in year 2030, assuming a similar $5,000 per unit value premium.

Benefits Not Included in the BCA

Travel Reliability

Traffic data provided by ODOT indicates that indices of travel time variability would be significant for limited windows of time during peak-of-peak periods. However, the data are not

[4] Rails to Trails Conservancy, "The Economic Benefits of Recreational Trails", online research monograph: https://www.srs.fs.usda.gov/factsheet/pdf/rectrails.pdf

sufficient to estimate potential buffer times that truckers and drivers might build into their trips to avoid excessively late arrivals. In addition, because these periods of high variability are limited, we have not estimated these benefits, which are likely minor relative to other benefit categories.

Freight Logistics Savings/Supply Chain Benefits

Like reliability, supply chain benefits were not estimated due to limitations in data and the likelihood the benefits are relatively minor compared with the other benefit categories included in the BCA. However, these benefits, when considered over longer stretches of I-35, would be significant as it relates to corridor-wide I-35 improvements, which are underway by ODOT.

BCA Results (tab Results)

Based on the assumptions, methodology, and other information presented earlier, the I-35 river bridge replacement project yields an overall Benefit-Cost Ratio of 1.31 and a Net Present Value of $31.4 million (**Table 10**). The preponderance of benefits is from crash reductions, with smaller but still significant shares due to life cycle cost savings, emissions reductions, and active transportation benefits (cyclist and pedestrian benefits) arising from the new multimodal bridge, as well as riverfront connections to the existing Oklahoma City Trail system.

Table 9: BCA Results

Discounted Costs	**Present Value**
Build Capital Costs	
Vehicular Bridge and Approach Roads	$89,625,515
Pedestrian/Bike Improvements	$12,316,399
Discounted Benefits	
Vehicular Bridge Benefits	
Maintenance and Rehab (Life Cycle) Cost Savings	$1,053,053
Value of Vehicular Travel Time Savings	
auto	$22,300,410
truck	$1,684,091
Value of Vehicle Related Crash Reductions	$103,403,804
Value of Emissions Reductions	
CO2	$786,322
Other Emissions	$188,183
Total Discounted Benefits - Vehicular Bridge and Approaches	**$129,415,862**
Bike and Ped Facility Enhancement Benefits	
Salvage Value	$0
Active Transportation Benefits	
Pedestrian	$1,002,756
Cyclist	$226,437
Option Value - Home Price Appreciation	$2,719,669
Total Discounted Benefits - Bike and Ped Facilities	**$3,948,862**
Summary	
Benefit Cost Ratio - Full Project	**1.31**
Net Present Value - Full Project	**$31,422,809**

SOURCE: EBP