APPENDIX A:

BENEFIT COST ANALYSIS TECHNICAL MEMORANDUM

2019 BUILD GRANT APPLICATION

RURAL OPPORTUNITY TO ADVANCE DEVELOPMENT (ROAD) PROJECT

Submitted by:

City of Wagoner

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TABLE OF CONTENTS

LIST OF TABLES

EXECUTIVE SUMMARY

An economic benefit-cost analysis (BCA) was conducted for the Rural Opportunity to Advance Development (ROAD) project (Project), which is a multi-modal revitalization of a three-quarter mile stretch of roadway in Wagoner, Oklahoma. The BCA was conducted using a model developed by WSP that follows USDOT's December 2018 Benefit-Cost Analysis Guidance for Discretionary Grant Programs. The period of analysis corresponds to 33 years and includes 3 years of construction and 30 years of benefits after operations begin in 2023.

The City of Wagoner, INCOG, and ODOT are partnering to enhance safety and to improve mobility and access for the diverse population of multimodal travelers along the three-quarter mile stretch of the Cherokee Street and the Oklahoma State Highway 51 (SH-51) corridor. The Project will improve the economic vitality of the area through roadway resurfacing, installing a multi-modal trail, intersection improvements for pedestrians, including sidewalks and crosswalks, utility relocation, and ensuring that the corridor is Americans with Disabilities Act (ADA) compliant.

Costs

The costs reflected in the Project's BCA are the capital costs of construction and the operating and maintenance costs to support state of good repair after project completion. The total capital costs of the Project amount to $12.6 million (2017 dollars) and $10.0 million (2017 dollars, discounted at 7 percent). In FY2020 the Project team will conduct a topographic survey ($0.02 million 2017 dollars) and complete the Project design ($0.96 million 2017 dollars). Construction is scheduled to begin in FY 2020 and scheduled to be completed in FY 2023. The capital costs of construction are described by spending category and amount in Table 1. Operations and maintenance costs (O&M), which were considered in the numerator of the benefit-cost ratio as determined by the benefit-cost analysis, are projected to average $9,779 (2017 dollars) pear year. Over the entire 30-year benefits analysis period, these costs accumulate to $293,385 (2017 dollars), or $86,524 when discounted at 7 percent.

Table 1. *Project Costs by Spending Category (2017$, millions)*

Spending Category	Amount (2017$)
Corridor Improvements	$ 7.9
Utility Relocation	$ 1.5
South Trail installation	$ 0.7
Contingency	$ 2.0
Contract Administration	$ 0.6

Benefits

In 2017 dollars, the Project is expected to generate $14.46 million in discounted benefits using a seven percent discount rate. The key benefits of the Project include safety benefits—through a reduction in traffic and pedestrian accidents—and travel time savings for pedestrians—through a reduction in distance and time traveled via the South Trail installation. The travel time savings realized will help to improve the economic competitiveness of the corridor and city. Table 2 summarizes the quantified project benefits and describes the way in which the Project addresses key challenges in the current conditions. There are additional benefits

the Project realizes that are not quantified in the benefit-cost analysis, including state of good repair, quality of life, and environmental sustainability. These benefits will be discussed in section 4 of the report.

***Table 2**. Project Impacts and Benefits Summary (2017$)*

Current Status/Baseline & Problem to Address	Change to Baseline/Alternatives	Type of Impact	Population Affected by Impact	Summary of Results (at 7% discount rate)	Page Reference in BCA
Lack of an even and well-maintained roadway surface contributes to vehicular crashes in the Project area, averaging 66 collisions a year. Lack of crosswalks, sidewalks, and ADA compliant pedestrian features result in pedestrian collisions, including one fatality in the past five year. Lack of proper stormwater mitigation measures along the roadway contribute to weather-related collisions.	The Project will address vehicular traffic accidents by improving the roadway surface and installing left turn lanes. The Project will address pedestrian collisions by installing crosswalks, side-paths, sidewalks, signage, ADA compliant safety features, and the installation of the South Trail to facilitate safety along the corridor. The Project will address safety for travelers in wet and rainy conditions.	Safety	Vehicular traffic & Pedestrians	$15,438,950	15
Lack of a trail connecting US-69 to SH-51 requires that pedestrians travel via the roadway, adding mileage and travel time to their route.	The Project will install a trail connecting US-69 and SH-51, reducing distanced traveled and travel time for pedestrians seeking to access the grocery store in the area.	Travel Time Savings	Pedestrians & No-vehicle households	$37,351	15

Table 3 further illustrates the quantitative benefits by category over the lifecycle of the Project.

Table 3. *Project Impacts for ROAD Project, Cumulative 2021-2053*

Category	Unit	Quantity	Direction
Vehicle-Hours Traveled	VHT	6,556	▼
Fatalities	#	3	▼
Injury crashes	#	155	▼
Property Damage Only (PDO)	#	267	▼

BCA Results

The estimated costs and benefits were compared for the 33-year analysis period to calculate annual net benefits. At a discount rate of seven percent, the project yields a BCR of 1.45 and has a NPV of $4.5 million, as shown in Table 4.

Table 4. *BCA Results Overview (Millions of dollars)*

BCA Metric	Project Lifecycle	
	Undiscounted	**Discounted (7%)**
Total Benefits	$49.9	$15.4
Safety	$50.06	$15.4
Travel Time Savings	$0.14	$0.04
Total Costs	$12.6	$10.0
Net Present Value (NPV)	$37.3	$5.4
Benefit Cost Ratio (BCR)	4.0	1.5
Internal Rate of Return (IRR)	12%	N/A
Payback Period (Years)	16.40	16.65

1. INTRODUCTION

A benefit-cost analysis (BCA) was conducted for the **Rural Opportunity to Advance Development (ROAD)** (Project) for submission to the United States Department of Transportation (USDOT) as a requirement of a discretionary grant application for the 2019 BUILD program. The following section describes the BCA framework, evaluation metrics, and report contents.

1.1. BCA Framework

A BCA is an evaluation framework to assess the economic advantages (benefits) and disadvantages (costs) of an investment alternative. Benefits and costs are broadly defined and are quantified in monetary terms to the extent possible. The overall goal of a BCA is to assess whether the expected benefits of a project justify the costs from a national perspective. A BCA framework attempts to capture the net welfare change created by a project, including cost savings and increases in welfare (benefits), as well as disbenefits where costs can be identified (e.g., project capital costs), and welfare reductions where some groups are expected to be made worse off because of the proposed project.

The BCA framework involves defining a Base Case or "No Build" Case, which is compared to the "Build" Case, where the grant request is awarded, and the project is built as proposed. The BCA assesses the incremental difference between the Base Case and the Build Case, which represents the net change in welfare. BCAs are forward-looking exercises which project the incremental change in welfare over a project life-cycle. The importance of future welfare changes are determined through discounting, which is meant to reflect both the opportunity cost of capital as well as the societal preference for the present.

The analysis was conducted in accordance with the benefit-cost methodology as recommended by the USDOT in the 2018 Benefit-Cost Analysis Guidance for Discretionary Grant Programs.[1] This methodology includes the following analytical assumptions:

- Assessing benefits with respect to each of the outcomes defined by the USDOT including safety, state of good repair, economic competitiveness, environmental sustainability, and quality of life;
- Defining existing and future conditions under a No Build base case as well as under the Build Case:
- Estimating benefits and costs during project construction and operation, including 30 years of operations beyond the Project completion when benefits accrue;
- Using USDOT recommended monetized values for fatalities, injuries, property damage, travel time savings, and emissions, while relying on best practices for monetization of other benefits;
- Presenting dollar values in real 2017 dollars. In instances where cost estimates and benefits valuations are expressed in historical or future dollar years, using an appropriate Consumer Price Index (CPI) to adjust the values;
- Discounting future benefits and costs with real discount rates of seven percent consistent with USDOT guidance;

1.2. Report Contents

Section 2 of this Appendix contains a description of the ROAD Project elements, information on the general assumptions made in the analysis, and a description of the base case compared to the build case. Section 3

[1] https://www.transportation.gov/sites/dot.gov/files/docs/mission/office-policy/transportation-policy/14091/benefit-cost-analysis-guidance-2018.pdf

provides a summary of the anticipated project costs. Section 4 reviews the expected economic benefits the project would generate, including a review of the assumptions and methodology used to calculate these benefits. Finally, Section 5 reports the high-level results of the benefit-cost analysis.

2. PROJECT OVERVIEW

2.1. Description

The City of Wagoner, Oklahoma is requesting $10.3 million in Better Utilizing Infrastructure to Leverage Development (BUILD) funds for a $13.9 million rural roadway transportation improvement project, the Rural Opportunity to Advance Development (ROAD) (Project), that will enhance safety, mobility, and access for multimodal travelers—particularly disabled travelers with physical disabilities—along the Cherokee Street/Oklahoma State Highway 51 corridor in Wagoner, Oklahoma (OK).

The Project is necessary to improve safety and access for vehicular traffic, pedestrians, and bicyclists on the main thoroughfare in the rural City of Wagoner. The improvements will create a safe multi-modal travel environment, which will facilitate access to employment, healthcare services, emergency services, the town library, cultural destinations, commercial stores, and the only grocery store in the city. Additionally, the improvements will make alternate forms of transportation available to and safe for travelers and residents of Wagoner, such as biking and walking, serving to improve community health. The project will greatly improve the quality of life of the rural residents of Wagoner.

The project is scheduled to complete the National Environmental Policy Act (NEPA) phase and design by 2020 and 2021, respectively. Project construction is scheduled to begin in 2022 and complete in 2023, with the corridor being fully usable to all users in 2023.

2.2. General Assumptions

The BCA evaluation period begins in 2020, with the design and preparation for construction and ends in 2053, following thirty years of Project operations. The City of Wagoner has assumed that the Project elements will improve safety along the Cherokee Street Corridor for motorists, pedestrians, and bicyclists. Additionally, the City of Wagoner has assumed that the South Trail installation will reduce the travel distance and travel time for pedestrians traveling to services along the corridor.

The benefit cost analysis compares the Build Scenario, including all Project elements, to the No-Build Scenario, which is the base case assumption. This assumes that the existing collision rates and travel times will continue unchanged into the future.

3. PROJECT COSTS

3.1. Capital Costs

For the purposes of this BCA, total capital costs were estimated to be $12.6 million in 2017 dollars. When discounted, these costs total $10.0 million dollars. These costs are based on a spending schedule over the three-year construction period as depicted in Table 5.

Table 5. *Project Schedule and Costs, 2017$*

Variable	Unit	Value
Construction Start	year	2021
Construction End	year	2023
Construction Duration	years	2.5
Project Opening	year	2023
Capital Cost – 2020 (Design)	$	991,254
Capital Cost – 2021	$	7,380,241
Capital Cost – 2022	$	3,806,168
Capital Cost – 2023	$	1,438,736
Total Capital Cost	$	13,616,399

3.2. Operations and Maintenance Costs

Under the build case, there are no estimated changes in annual operations and maintenance (O&M) costs. O&M costs are currently $9,779 (2017 dollars) per year for the three-fourth mile project area, and is absorbed by Oklahoma Department of Transportation. In total, the O&M costs are $293,385 (2017 dollars) over the 30 year BCA analysis period, assuming O&M costs begin in 2024, the first full year of operations.

4. PROJECT BENEFITS

The Project generates quantitative benefits in two primary ways:

- Improving safety through roadway resurfacing, installing left turn lanes, installing pedestrian crosswalks at intersections along the corridor, installing the South Trail, and implementing stormwater mitigation measures; and
- Improving economic competitiveness of the region by reducing travel times for pedestrians by installing the South Trail.

Each of these benefits are monetized in the sub-sections that follow, and the assumptions used to calculate the monetary values of the benefits are also described.

Additionally, the Project generates benefits that have not been quantified within the BCA, however, these benefits still provide value to the residents of Wagoner. These benefits include:

- Improved quality of life for residents due to increased transportation choices and improved connectivity;
- Environmental sustainability due to stormwater mitigation measures implemented along the corridor; and
- Improved state of good repair due to stormwater mitigation measures implemented along the corridor.

These benefits will also be discussed in the sections below.

4.1. Safety

These safety benefits include a reduction in fatalities, injuries and property damage (PDO) crash costs. The safety benefits are realized across vehicular traffic, wet and rainy weather, and pedestrian collisions due to the Project elements, which are described below:

- **Vehicular traffic safety** will be improved by roadway resurfacing and installing left turn lanes along the corridor.
- **Wet and rainy weather conditions safety** will be addressed by stormwater mitigation measures.
- **Pedestrian safety** will be addressed by installing pedestrian crosswalks at intersections along the corridor and installing the South Trail.

The reduction in fatalities were calculated using the observed number of collisions in the Project corridor, provided by the Indian Nation Council of Governments (INCOG), which is the local metropolitan planning organization (MPO). With respect to vehicular traffic safety benefits, two crash modification factors (CMFs) were selected to reflect the benefits of roadway resurfacing ("Resurface Pavement," 0.95) and the installation of left turn lanes ("Install Left Turn Lane," 0.88). The two CMFs were factored together to realize a cumulative CMF of 0.83, which was applied to annual traffic conditions in non-rainy conditions. The application resulted in a 17% reduction in annual average traffic accidents.

With respect to pedestrian safety elements, two key safety factors were considered: installation of crosswalks at intersections and the installation of the South Trail. To account for the benefits realized by the installation of crosswalks an average of two CMFs was taken to identify the reduction in pedestrian collisions. The reason for averaging the two CMFs was selected as a method in order to remain conservative in the rate of reduction in pedestrian crashes given that the applicable CMFs ("Install high-visibility crosswalk, 4123," 0.6 and "Install

high-visibility crosswalk, 4124," 0.81) address the intersection improvements in the Project, but are situated in urban settings. The resulting CMF was 0.7. To determine the benefits associated with the installation of the South Trail, it was assumed that pedestrian collisions would reduce by a CMF of 0.25 given that the trail will enable the average pedestrian to travel 75% of the distance to the grocery store away from traffic and out of harm of any traffic collisions. The two CMFs, identified through research and basic assumptions, were averaged together to yield a CMF of 0.48. A key assumption adopted in averaging the two CMFs is the assumption that pedestrian collisions are equally likely to occur when individuals are crossing the roadway as they are when individuals are walking alongside (or in) the roadway. The results of this portion of the safety benefits analysis resulted in a 52% reduction in pedestrian collisions.

With respect to safety improvements in wet and rainy conditions, the analysis assumed that there will be a 50% reduction in traffic collisions in wet and rainy conditions as a result of the stormwater mitigation measures. A 50% reduction was assumed given the fact that a robust body of research, including national weather-related crash statistics,[2] indicate that wet and rainy conditions greatly contribute to the prevalence of traffic crashes across the US. It was reasonable to assume, particularly given the recent prevalence of inundation in the City of Wagoner, that stormwater improvements will greatly improve driving conditions for travelers on the West Cherokee Street corridor.

Table 6 provides an overview of the reduction in average annual collisions the Project will realize.

Table 6. *Reduction in Traffic and Pedestrian Collisions*

Collision Type	Number of Annual Accidents – No Build	Number of Annual Accidents after Project Implementation	Difference Between No Build and Build
Traffic Crashes			
PDO	33.40	27.8	5.60
Injury	25.00	20.8	4.20
Fatality	0	0	0
Pedestrian Crashes			
Injury	0.4	0.19	0.21
Fatality	0.2	0.10	0.10
Wet/Rainy Condition Crashes			
PDO	6.00	3.00	3.00
Injury	1.20	0.60	0.60
All Collisions	66.20	46.73	19.47

Cumulatively, the Project will realize a 21% reduction in in total collisions (traffic, wet conditions, and pedestrian) and yield $15.4 million (2017 dollars, discounted at seven percent) in safety benefits. **Table 7** provides an overview of monetized value of the safety estimation of benefits.

[2] "How do Weather Events Impact Roads?" US DOT <https://ops.fhwa.dot.gov/weather/q1_roadimpact.htm>

Table 7. *Safety Estimation of Benefits, Millions of 2017 Dollars*

Benefit	Project Opening Year		Project Lifecycle	
	Undiscounted	Discounted (7%)	Undiscounted	Discounted (7%)
Fatality Reduction	$1.00	$0.72	$31.10	$9.59
Injury Reduction	$0.39	$0.28	$17.81	$5.49
Property Damage Reduction	$0.04	$0.03	$1.15	$0.35
Total Safety Benefits	$1.43	$1.02	$50.06	$15.44

4.2. Economic Competitiveness

The Project will contribute to increasing the economic competitiveness of the Project area and the City of Wagoner through improvements in the mobility of goods, people, and services via travel time savings. Cherokee Street is the main entry way into the City of Wagoner's central business district (CBD) and the US-69 corridor is a major freight corridor and a part of the National Highway System. The current conditions of the infrastructure along the corridor contribute to traffic collisions and congestion, create an unsafe environment for pedestrians and bicyclists, and reduce access to goods and services within the CBD. The Project will improve congestion, decrease collisions, and improve connectivity for travelers to propagate economic vitality and growth. The Project will improve access to jobs and services along the corridor, including several major employers such as Unarco Industries and the Wagoner and Coweta school facilities.

Travel Time Savings

Travel savings benefits apply to pedestrians, who will experience a reduction in passenger hours traveled along the corridor as a result of the South Trail installation. The existing conditions require that pedestrians utilize the roadway to access goods and services along the corridor, particularly to access any establishments located along US-69, west of the Project area. The trail will reduce the distance pedestrians have to travel to access these establishments by 0.3 miles round trip, resulting in six minutes saved round trip per pedestrian. Accounting for the percent of households within the Project area and surrounding census block groups who do not have a vehicle, and the projected population growth, as described in Table 8, the analysis concluded that the Project will yield $37,351 (2017 dollars, discounted at 7 percent) in travel time saving benefits over the course of the Project lifecycle.

Table 8. *Time Savings Benefits Calculations Metrics & Justification*

Category	Unit	Metric	Justification
Total Number of Households in Project Area	#	1378	Sum of households in the Census Block Groups surrounding the Project area (Block Group 2 & Block Group 3). Values identified in US Census data (2017).
Average % No-Vehicle Households	%	2.40	Average % no-vehicle households in Project area (Block Group 2 & Block Group 3). Values identified in US Census data (2017).
Projected Annual Population Growth	%	1.34	Based on historical population growth data. Average of the annual population growth rate over 2015-2017.
Average Number of Trips to Grocery Store Per Year	#	52	Assumed that households make at least on trip per week to the grocery store.

Table 9 provides an overview of the assumptions and sources utilized in the analysis to develop benefits estimates.

Table 9. *Travel Time Savings Assumptions and Sources*

Variable	Unit	Value	Source
Value of Travel Time Savings - Personal, Local	2017$ per person hour	$14.80	US DOT Guidance, December 2018
Value of Travel Time Savings - Business, Local	2017$ per person hour	$26.50	US DOT Guidance, December 2018
Value of Travel Time Savings - All Purposes, Local	2017$ per person hour	$16.10	US DOT Guidance, December 2018
Value of Travel Time Savings - Personal, Intercity	2017$ per person hour	$20.70	US DOT Guidance, December 2018
Value of Travel Time Savings - Business, Intercity	2017$ per person hour	$26.50	US DOT Guidance, December 2018
Value of Travel Time Savings - All Purposes, Intercity	2017$ per person hour	$21.94	US DOT Guidance, December 2018
Value of Travel Time - Real Growth Rate	Annual Rate	1.20%	US DOT Guidance, 2014

A summary of the travel time savings benefits is included in Table 10.

Table 10. *Travel Time Savings Estimation of Benefits, Millions of 2017 Dollars*

Benefit	Project Lifecycle	
	Undiscounted	Discounted (7%)
Travel Time Savings – Pedestrians	$0.14	$0.04

Flood Mitigation & Reliability

The mobility of freight, automobile travel, and pedestrians along the corridor are compromised because of flooding, rain events that force the four-lane thoroughfare down to two lanes (one lane in either direction), thereby increasing congestion, hindering travel time, diminishing safety, and impairing mobility for all users. Reducing congestion and flood conditions on the SH-51 freight corridor, Wagoner's designated truck route, is key to the long-term economic competitiveness of the City of Wagoner. The Project improvements address the causes of flooding and reduce the likelihood of congestion, not only improving freight movement through the City and improving traffic flow for all commuters, but also improving travel time reliability, which is especially important to freight traffic.

4.3. Quality of Life

Although not quantifiable, the Project elements will improve quality of life for all citizens and individuals living in and passing through Wagoner by increasing transportation choices and improving connectivity for residents to jobs, health care, and the only grocery store in the area.

Increased Transportation Choices

The Project increases transportation choices to meet the needs of the community and ensures the safe movement of people, including those with disabilities. The roadway resurfacing and stormwater improvements will improve the usability of the roadway, making it easier for travelers to utilize the Cherokee Street corridor. The trail head and multi-use path coupled with the dedicated pedestrian and bike trail will provide infrastructure to facilitate active modes of transportation, providing residents various modal options for how to access jobs, essential services, and the grocery store. An added benefit of the active transportation infrastructure is that it will provide additional opportunities for outdoor fitness.

Improved Connectivity

The Project also improves connectivity and eliminates service gaps along the corridor. The improved connectivity increases opportunities for employment as well as makes businesses along the corridor and west of US-69 more accessible. Quality of life for Wagoner benefits further by improving connectivity and access to healthcare services, community centers, and the only source of fresh food and produce in the city. The Project also improves connectivity by improving safety for pedestrian travelers, particularly disabled travelers, by installing crosswalks, sidewalks, and the South Trail, including the two pedestrian bridges to connect the trail to the roadway corridor.

4.4. Environmental Sustainability

Although, not quantifiable, the Project will yield benefits related to environmental sustainability by installing stormwater mitigation and increasing the availability of active transportation alternatives. The roadway storm drainage improvements will reduce the peak rate of runoff, alleviate flooding and reduce the exposure of flood waters to roadway contaminants, and improve water quality. In addition to controlling storm water flow and improving water quality, this Project will increase the presence of vegetation along the corridor by installing street trees and landscaping.

Furthermore, with the mobility and connectivity improvements achieved by sidewalk and multiuse path construction, it is expected that some Wagoner residents will choose to walk and bike to perform daily tasks, rather than use their vehicle. This would result in a reduction in energy consumption, pollution, and greenhouse gas emissions. Though no studies have been completed yet to measure local interest in choosing to walk or bike, according to the American Community Survey 2016 5-year estimates approximately 9.1% of Wagoner households in the Project corridor do not have access to a vehicle and 4% of Wagoner residents over the age of 15 “walk” as their means of transportation to work. In fact, walking has seen a significant increase over the past six years, as less than 1% of ACS respondents walked to work in 2010. This provides some insight into the potential usage of these facilities and the present need.

4.5. State of Good Repair

Although not quantifiable, the Project will have benefits to the state of good repair of the Cherokee Street Corridor. To-date, minor maintenance and temporary repairs have been routinely conducted to extend the service life of the roadway. This approach has been of limited value and it is no longer cost effective moving forward. In addition to this, the corridor has numerous sidewalk gaps with few ADA compliant sidewalks, no sidewalk curb ramps, eroding curbs, and decaying and undefined driveway access points. Further, the decayed state of the corridor’s infrastructure is exacerbated by frequent, corridor-wide flooding. The Project will improve state of good repair by implementing stormwater mitigation measures, including the installation of adequate storm sewer systems that can tolerate moderate to heavy rain events. The Project will also install ADA compliant sidewalks. After the installation of these components, the City of Wagoner will partner with ODOT to install news curbs and resurface the roadway, given that ODOT would then be eligible to receive federal funds for rehabilitation improvements. The stormwater mitigation measures and roadway resurfacing will have state of good repair benefits for the Project area.

5. SUMMARY OF RESULTS

5.1. Evaluation Measures

The benefit-cost analysis converts potential gains (benefits) and losses (costs) from the Project into monetary units and compares them. The following common benefit-cost evaluation measures are included in this BCA:

- Net Present Value (NPV): NPV compares the net benefits (benefits minus costs) after being discounted to present values using the real discount rate assumption. The NPV provides a perspective on the overall dollar magnitude of cash flows over time in today's dollar terms.
- Benefit Cost Ratio (BCR): The evaluation also estimates the benefit-cost ratio; the present value of incremental benefits is divided by the present value of incremental costs to yield the benefit-cost ratio. The BCR expresses the relation of discounted benefits to discounted costs as a measure of the extent to which a project's benefits either exceed or fall short of the costs.

5.2. BCA Results

Table 11 presents the evaluation results for the project. Results are presented undiscounted and discounted at seven percent as prescribed by the USDOT. All benefits and costs were estimated in constant 2017 dollars over an evaluation period extending 30 years beyond system completion in 2023. At a discount rate of seven percent, the project yields a BCR of 1.5 and has a NPV of $4.5 million.

Table 11. *Benefit Cost Analysis Results, 2017 Millions of Dollars*

BCA Metric	Project Lifecycle	
	Undiscounted	Discounted (7%)
Total Benefits	$49.9	$15.4
Total Costs	$12.6	$10.0
Net Present Value (NPV)	$37.3	$5.4
Benefit Cost Ratio (BCR)	3.7	1.5
Internal Rate of Return (IRR)	12%	N/A
Payback Period (Years)	16.40	16.65