Introduction & Summary

This memo summarizes the benefit-cost analysis (BCA) for the Multimodal Discretionary Grant Program application for the Yadkin River Pedestrian Bridge project. Project costs, described in the application, are those required to design and construct the new Yadkin River Pedestrian Bridge and accompanying greenway connectors that will build 5.33 miles of new trail and greenway paths, and connect to a 1,487-mile system that includes the Overmountain Victory Trail, and Mountains-to-Sea Trail. The benefits of this project are primarily for improved safety of nearby residents, with a high concentration of those residents considered to be within the low-to-moderate income levels. The net present value (NPV, i.e., direct benefits minus costs) is estimated at about $2 million, and the benefit-cost ratio (BCR) around 1.10.

This memo is accompanied by an Excel file (BCA Excel file) containing input values, assumptions, and calculations. The analysis follows the familiar procedures and parameters in USDOT's Benefit-Cost Analysis Guidance for Discretionary Grant Programs, 2022 update. The remainder of this appended memo includes:

- Section 2, describing the baseline condition,
- Section 3, outlining various assumptions used for the analysis,
- Section 4, summarizing the project costs as presented in the application and used as input for the BCA, and
- Section 5, the benefits estimates.

The BCA results are summarized in Table 1. Cost breakdowns are listed in the application and in the accompanying BCA Excel file. Nominal (generally 2022) dollars are adjusted to real 2020 dollars, then discounted to present 2020 dollars.

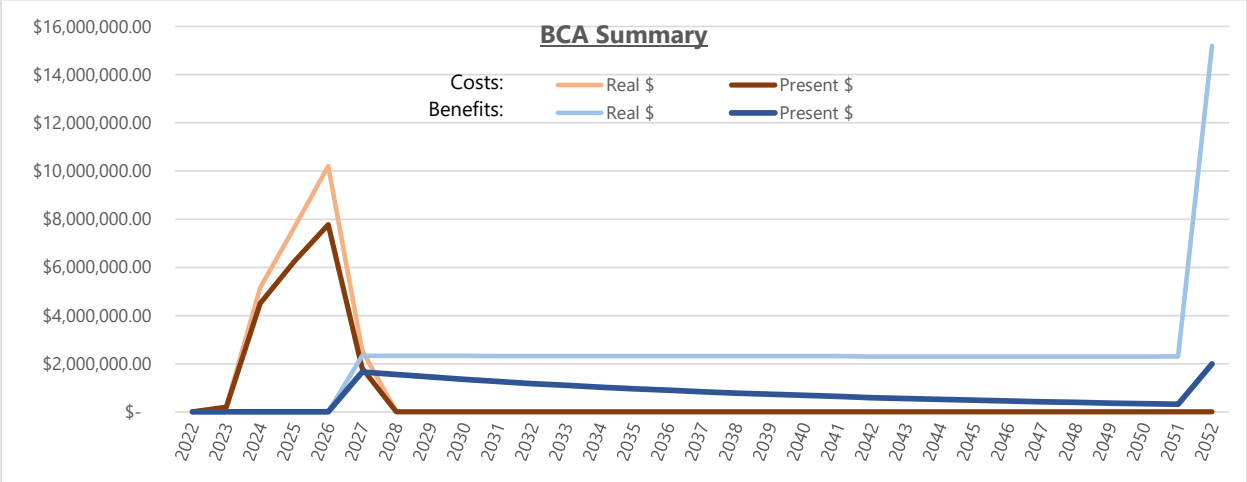
Table 1

Yadkin River Pedestrian Bridge Project
Multimodal Discretionary Grant Program Benefit-Cost Analysis (BCA)
May-22

	Nominal	Real 2020$	Present	$Million
Total Costs	$ 26,048,389	$ 25,790,484	$ 20,565,125	$ 20.57
Total Benefits		$ 73,031,894	$ 22,605,582	$ 22.61
		NPV	$ 2,040,457	$ 2.04
		B/C	1.10	

This BCA assumes a conservative estimate of benefits and provides a range of anticipated values, as explained in the remainder of this memo. The following graph shows both total costs and total benefits over time.

Figure 1



2.0 Baseline Condition

The analysis relies on current usage data for modes of transportation, capacity and volume counts at intersections, population, other available open source data to establish a baseline condition for future modelling. The forecasts and modeling includes rational assumptions that the project will result in Cost

Savings per trip, Health and wellness benefits, the values of Bicycle and Pedestrian facilities, crash reduction, and residual operation and maintenance.

Crashes

The Northwest Piedmont Rural Planning Organization (NWPRPO) collects rural crash data for the project area, including Elkin and Jonesville, and has been actively collecting this data since 2000. Data shows that 33 crashes have occurred since 2000.

Table 2

Rural Crash Data Since 2000	Jonesville	Elkin
O- No injury	3	0
C - possible injury	1	0
B - non-incapacitating injury	12	8
A - incapacitating	4	0
K - killed	2	1
U - Injured (severity unknowr	0	0
# Accidents Reported (unkno	0	2
Injury Crash	17	10
Fatal Crash	2	1
PDO per vehicle	3	0

3.0 Analysis Assumptions

Inflation

All dollar values are expressed in 2020 dollars. Nominal dollar values from different years are adjusted to real (2020) dollar values using the gross domestic product (GDP) implicit price deflator. The US Bureau of Economic Analysis and the Congre4ssional Budget Office provides historical and forecast values for this purpose, and adjustment factors are included in the USDOT's BCA guidance for many years. The proposed project costs are estimated in the current 2022 dollars, so for the BCA these are adjusted to 2020 dollars by a factor of about 0.97. No estimates for this project are beyond 2021 dollars, so no other inflation adjustments are needed for future nominal costs.

Discounting

Discount rates in economic analyses account for the time value of money, which is separate from inflation. Per USDOT guidance, the real discount rate to apply is 7% per year for future costs and benefits. Intermediate calculations are shown in nominal dollars (typically 2022), real 2020 dollars, and then discounted dollars. The Excel file includes a table of adjustment factors in the Assumptions tab and graphs illustrating these.

Analysis Period

The analysis time period is 30 years from 2022 to 2052. The BCA guidance suggests 20-30 years for projects like this, and the time frame works very well since the project begins in earnest in 2023. Benefits do not begin to accrue until 2027, the year of opening.

Other Assumptions

Volume & Usage

This project will develop infrastructure that encourages new trips. These trips and usage are implicit in the BCA modeling. Additionally, usage rates for cyclists and pedestrian users are assumed using a trend analysis based on available ACS 2020 data. The usage analysis is furthered by using a comparative analysis for a similar project within the State, the American Tobacco Trail. Volume usage rates are also prepared by investigating three intersections that are closest to the focus of the project area. These intersections have capacity and volume data that is forecast from 2010 to 2040 within the Elkin-Jonesville CTP (2013). The evidence of this data is instrumental in accurately depicting the usage and volume of the project's scope.

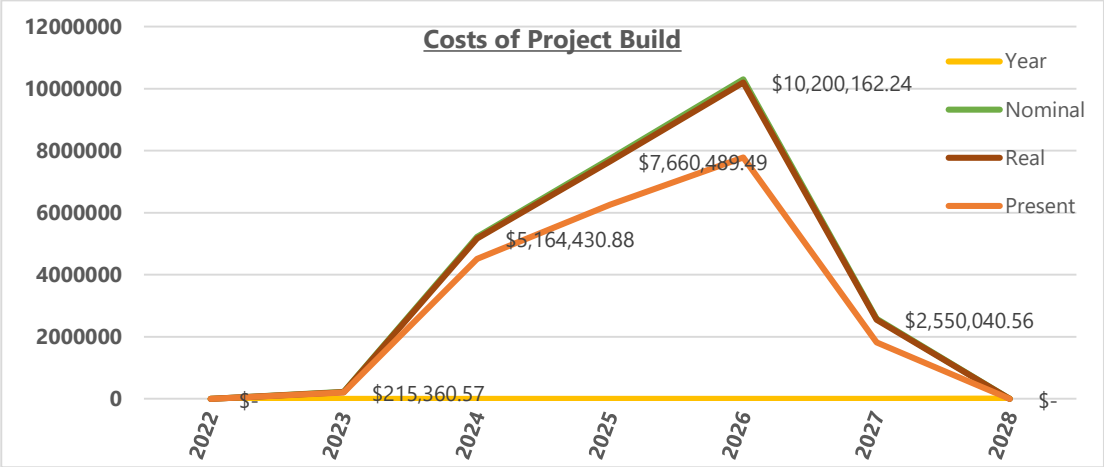
Fatalities, Injuries, and Crashes

Using historical and forecast information on crash statistics within the project area, an analysis was conducted to capture the full costs required to attain the benefits of a vision zero project and initiative like this. The BCA Excel Sheet assumes that 33 crashes and injuries will be prevented as a result of the project and compares the ratio of value among those historical crashes with the forecasted data.

4.0 Project Costs

Project costs are described in the proposal and assigned to years of expenditure commensurate with the project schedule. Costs are estimated in nominal 2022 dollars, deflated to real 2019 dollars, and discounted to present values. A summary of costs over time is shown in the following graph.

Figure 3



Project costs begin in 2023, peak in 2026, and conclude by 2028. Project costs consider 2% Right of Way, 30% Design, 3% Utilities, 65% Construction, and 20% Contingency. Additionally, this BCA model only takes into consideration project costs associated with the federal share of funds. Ongoing operations and maintenance costs are accounted for as disbenefits rather than costs.

O&M Cost and Residual Value

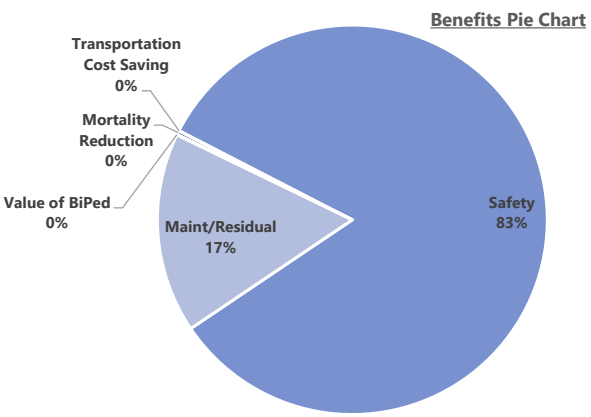
The USDOT BCA guidance is clear that operations and maintenance (O&M) cost changes are to be accounted for in the numerator of the B/C. Because this project adds new infrastructure where there was none before, net O&M increases and is thus a disbenefit. These costs include electrical and communications, bridge management, greenway vegetation, and surface management.

Residual value – also accounted for as a benefit – at the end of the analysis period (2052) assumes a 60-year service life for the overall project. The applicant is following NCDOT guidance that typically assumes 60-75 years for service life of new infrastructure like this project offers.

Figure 4

5.0 Project Benefits

Quantifiable and monetized direct project benefits for BCA include travel time savings, crash reduction (safety improvement), and residual value. Operating cost savings are negligible and assumed to be zero in the base case. Increased ongoing O&M is deducted as a disbenefit and combined with residual value in Figure 7 for illustration (O&M disbenefit is much smaller than residual value).



Health Cost Reduction

Based on the BCA guidance, a mortality reduction benefit of induced active transportation is applied to this project's benefits. The BCA guidance indicates a recommended value per induced trip (2020$) of $7.08 for walking and $6.31 for cycling. The current and forecast assumptions for cyclist and pedestrian users of the facility are used in this analysis.

Household Transportation Cost Savings

A reduction in car travel expenses has also been calculated as a benefit for this project. With the assumed increase of more pedestrian and cycling travel that would come as a result of this project's build, a minimal benefit is scheduled to occur. This analysis uses the universal lessening of vehicles on roadways and the cost per trip permitted in the BCA guidance, Table A-5: Vehicle Operating Costs.

Monetized Value of BiPed Facility

The monetization of bicycle and pedestrian facility frequency was also used as a calculated benefit for this project. Per BCA guidance, Table A-8 and Table A-9, a maximum value of expanded sidewalks of 0.86 miles is eligible for application and a cycling path with At-Grade crossings capped at 2.38 miles is eligible for application. The project involves the deployment of 5.33 miles and can easily utilize both of these monetization values.

Crash Reduction

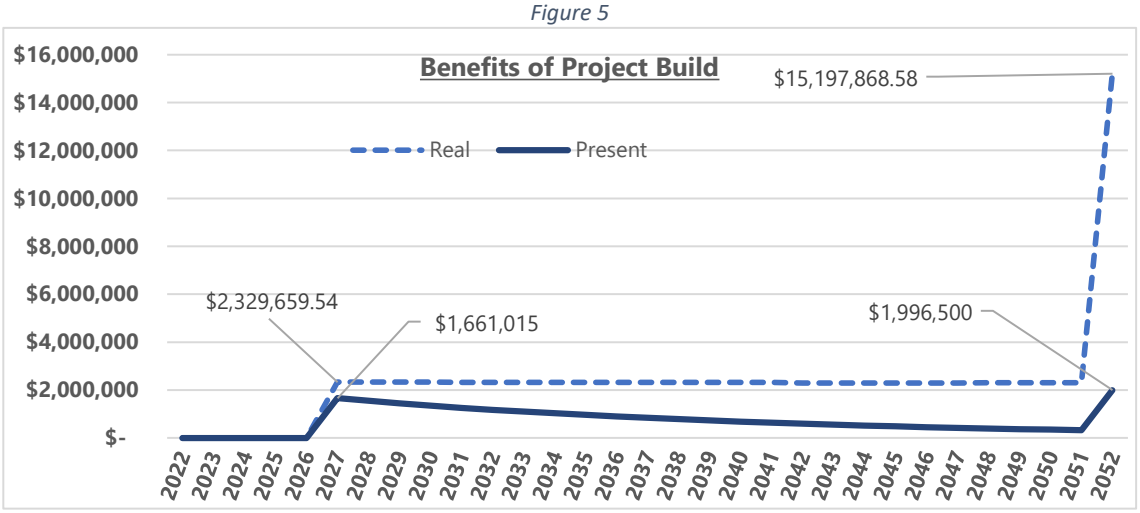
As repeated above, using historical and forecast information on crash statistics within the project area, an analysis was conducted to capture the full costs required to attain the benefits of a vision zero project and initiative like this. The BCA Excel Sheet assumes that 33 crashes and injuries will be prevented as a result of the project and compares the ratio of value among those historical crashes with the forecasted data.

The BCA Excel Sheet utilizes the BCA guidance values of Crash Types to monetize the direct benefit of the project. For the sake of this calculation, the excel sheet assumes the project will reduce 1.1 crashes annually. Historical crash data was used to forecast the type of crashes that would occur over a 30-year period if this project is not implemented.

Benefits Summary and Other Qualitative Benefits

The following figures show a summary of quantified benefits over the analysis period. The summary values are shown in the accompanying Excel file.

Figure 5



Other Benefits

The BCA strives to quantify only direct impacts and does not consider other economic, health, and vibrancy impacts that will result from this project. Therefore, please also consider the economic, societal, and connectivity benefits that this project will encourage as well. Building 5.33 miles of greenway and a pedestrian bridge to connect to over 1,487 miles of trail is an immeasurable benefit for the rural communities within Surry and Yadkin Counties.