



February 9, 2026

To: The Honorable Sean Duffy, Secretary of Transportation
U.S. Department of Transportation

From: Scott Curry, AICP, CNU-A; Luke Morin; Scott Correll, AICP; Nick Foster, AICP, RSP₁; Josh Hurst, PE, PTOE, LEED AP; Justin Bansen, PE

RE: **Garrison LEARNS Corridor Project: BUILD Grant Application
Benefit-Cost Analysis Memorandum**

Introduction

This memorandum summarizes the assumptions, methodologies, and results of the benefit-cost analysis (BCA) completed for the Better Utilizing Investments to Leverage Development (BUILD) Grant Application for the Garrison Library, Education, Arts, Recreation, Nature, and Science (LEARNS) Corridor project.

With a benefit-cost ratio of 1.91, this BCA confirms the cost-effectiveness of the proposed Garrison LEARNS Corridor Project by verifying that the expected benefits will significantly exceed the expected costs.

This BCA has been conducted in accordance with the "USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs" (12/23/25 update). The narrative that follows describes the current baseline condition, the sources of data used to estimate the benefits of the proposed project, assumptions for quantifying benefits, and the values of key input parameters.

Project Highlights: The proposed project is focused on **improving safety, supporting multimodal connections,** and **enhancing economic competitiveness** in Gastonia. **Table 1** highlights the key impacts of the project and how those impacts translate into expected benefits.

Table 1 Summary of Benefits

| Current Condition | Proposed Change | Expected Impacts |
|--|---|--|
| <p>Safety: Deficient intersection design contributes to safety challenges that have resulted in 126 crashes over the past 3 years, including 1 fatal and 3 serious injury crashes.</p> | <p>Improvements along the corridor are focused on upgrading safety at intersections, calming traffic, and eliminating conflicts. The addition of a traffic signal at Garrison Boulevard and Laurel Lane will improve safety and access at a location with documented safety challenges.</p> | <p>Reduced fatal and serious injury crashes.</p> <ul style="list-style-type: none"> Total benefit of reduced crashes estimated at \$17.9M¹ |
| <p>Multimodal Connections: Poor access management, sidewalk gaps, missing pedestrian crossings, a lack of connections to the existing Avon/Catawba Creeks greenway, and no bike facilities make Garrison Boulevard a challenging corridor to navigate for all modes of travel.</p> | <p>Access management improvements, a new pedestrian hybrid beacon (HAWK signal) between the Schiele Museum and the Gaston County Library, new sidewalks and bike lanes, and improved crosswalks will enhance accessibility and quality of life for residents and visitors.</p> | <p>Improvements to multimodal access, comfort, quality of life, and reduced roadway maintenance costs.</p> <ul style="list-style-type: none"> Total estimated health benefits of \$2.9M¹ Total estimated maintenance benefits of \$955K¹ Total estimated amenity benefits of \$1.9M¹ |
| <p>Economic Competitiveness: Despite significant growth pressure across the greater Charlotte, NC metropolitan region, deficient and antiquated transportation infrastructure along Garrison Blvd. contributes to vacant and underutilized properties along the project corridor.</p> | <p>Improvements to intersections, multimodal access, landscaping and lighting have the potential to attract new private sector investment that will generate jobs and economic activity.</p> | <p>Through an independent economic impact analysis of 30 vacant / underdeveloped parcels along the project corridor, the total impact of potential new development is estimated at ~4,000 jobs and ~\$640M of economic activity.²</p> |

¹ Total discounted benefit.

² See "Economic Impact Analysis" section on page 4. (NOTE – per USDOT guidance, these impacts were not included in the BCA spreadsheet and calculation of the estimated benefit-cost ratio. However, they are important to understanding how the Garrison LEARNS Corridor Project will enhance Gastonia's economic competitiveness.

Project Context & Overview: The Garrison Boulevard corridor is a key part of Gastonia’s transportation network, providing critical east-west mobility through the greater Charlotte, NC metropolitan region and acting as a parallel route to I-85 and US 74 (Franklin Boulevard). The proposed project corridor extends from Fern Forest Drive to New Hope Road and directly serves 3,000 residents and 3,500 jobs.

Garrison Boulevard is also home to the most significant concentration of civic anchors outside Gastonia’s downtown core. Those civic anchors include the Schiele Museum of Natural History, Grier Middle School, the Gaston County Library, Lineberger Park, and the Avon/Catawba Creeks Greenway. The corridor is known throughout the greater metropolitan region for these recreational, cultural, and educational facilities.

- The Schiele Museum of Natural History hosts over 100,000 visitors per year and provides educational programming to students and teachers through the James H. Lynn Planetarium & Science Theater.³
- In 2025 Gaston County Schools opened a new Grier Middle School campus on Garrison Boulevard. This 155,000 square foot, \$60M school facility will house up to 1,200 students and serves as a “showplace for learning in the heart of Gastonia.”⁴
- The Gaston County Library is a critical resource for promoting early literacy and strengthening workforce readiness.
- The Avon/Catawba Creeks Greenway is Gastonia’s premier greenway.⁵ It is a 4.5-mile segment of the broader Carolina Thread Trail network which is planned to connect over 1,600 miles of greenway trails across North Carolina and South Carolina.⁶ The Avon/Catawba Creeks Greenway crosses Garrison Boulevard at Lineberger Park, but it lacks adequate on-street connections to the community anchors on Garrison Boulevard.
- In addition to the key civic anchors mentioned above, the Garrison LEARNS Corridor hosts other significant multimodal generators including two large churches, several healthcare services, and a variety of local businesses.

The cultural and educational importance of the Garrison Boulevard corridor is a key motivator for the community’s alignment behind the proposed Garrison LEARNS Corridor project.

Despite hosting these key civic anchors and traffic generators, the design of Garrison Boulevard does not adequately support safety, multimodal connections, and economic competitiveness. The Garrison LEARNS Corridor project will transform Garrison Boulevard and create a new civic heart for the City of Gastonia, NC by updating deficient and antiquated intersection designs, installing a new traffic signal and new pedestrian crossings, improving safety and access management, filling sidewalk gaps and adding bike lanes, calming traffic, improving greenway access, and incorporating new lighting and landscaping.

³ Schiele Museum. *Armed for Advocacy*. <https://www.schielemuseum.org/wp-content/uploads/2024/01/14-2022-Armed-for-Advocacy.pdf>

⁴ Ribbon Cutting Marks School’s Grand Opening. *Gaston County Schools*. <https://www.gaston.k12.nc.us/about-us/district-news1/details/~board/district-news-gaston-county-schools-5879/post/ribbon-cutting-marks-schools-grand-opening>

⁵ Avon and Catawba Creeks Greenway. 2026. <https://www.carolinathreadtrailmap.org/trails/trail/catawba-creek-greenway>

⁶ The Carolina Thread Trail. 2026. <https://www.carolinathreadtrail.org/>

Economic Impact Analysis: To further evaluate the potential economic development impact of the Garrison LEARNS project, the City of Gastonia hired an independent economic analysis firm to study the corridor. This economic development analysis concluded that “transportation improvements along the corridor can attract new private sector investment that will generate jobs and economic activity.”⁷ The analysis, based on an identification of vacant/underdeveloped parcels on the corridor, local land use regulations, and industry standards, showed that redevelopment along the proposed Garrison Boulevard project area could have the following impacts.

- **One-Time Construction Impacts:** New development that would support ~1,300 direct jobs and ~\$277 million in economic activity.
- **Ongoing Economic Impacts:** Supports ~2,600 permanent and continuous jobs in the larger Gastonia market area, creating ~\$130 million/year in new labor income and ~\$360 million/year in economic output.

NOTE - Per the “USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs,” the impacts described above are not permitted to be incorporated in the BCA spreadsheet and the calculation of the benefit-cost ratio for the proposed project. While these spillover benefits cannot be considered in the real estate calculation for the BCA, the outputs of this analysis signal the potentially significant economic benefit the Garrison LEARNS project would provide to the City of Gastonia and the broader region. These potential benefits are key to understanding how the Garrison LEARNS Corridor Project will enhance Gastonia’s economic competitiveness, and they are an important part of the overall goals and approach for the City of Gastonia, NCDOT, and other project partners.

Benefit-Cost Ratio: Even without including the significant economic benefits described above, the Garrison LEARNS Corridor Project will generate significant measurable benefits in key areas related to safety (expected crash reduction), reduced maintenance costs over time, improved health and quality of life outcomes, noise reduction, and increased property values. Using 2024 dollars and a 7.0% discount rate, the substantial positive impacts of the project are monetized at \$25.6 million in benefits, compared to \$13.4 million in costs.

As a result, **the project has an estimated benefit-cost ratio of 1.91, which represents a very favorable investment of federal funds and a significant benefit to the residents of Gastonia, NC and the greater metro region.**

⁷ *Economic Impact Analysis: Garrison Boulevard Redevelopment Opportunities. Gastonia, NC. Creative Economic Development Consulting. January 2026.*

Summary of Benefits

The benefits and costs associated with the projects are provided in **Table 2**. 2030 is the assumed project use start year, and benefits are calculated over a 20-year period of operation from 2030 to 2049 based on US Department of Transportation (USDOT) BCA Guidance for capacity expansion projects. Details for each calculation are provided in the following sections.

Table 2 Summary of Benefits

| Benefits | Quantifiable Measure | Total Benefit | Present Value (7.0% Discount Rate) |
|---|--|---------------|---------------------------------------|
| Safety | | | |
| Crash Savings | Reduction in number and severity of crashes | \$47,656,102 | \$17,900,224 |
| Travel Time Savings | | | |
| Peak Hour Travel Time Savings | Change in travel time due to conversion of two-way left turn center lane to raised median (trip rerouting) and number of auto trips taken (shifting of some auto trips to walking/cycling trips) | -\$843,294 | -\$317,542 |
| Emissions Reduction | | | |
| Vehicle Emissions Savings/-Costs | Decrease in VOC, NOx, PM2.5, and SO2 emissions due to decreased SOV trips | \$23,417 | \$8,796 |
| Quality of Life | | | |
| Health Benefit | Mortality reduction benefit of induced active transportation | \$7,800,472 | \$2,929,954 |
| Economic Competitiveness | | | |
| Real Estate Value Increase | Increase in property values due to increased access to walking and cycling facilities | \$1,221,546 | \$813,968 |
| Operating Cost Savings | | | |
| Maintenance Savings | Decreased maintenance costs related to the construction of the project | \$1,351,665 | \$955,876 |
| Other Benefits | | | |
| Amenity Comfort Benefit | Change in pedestrian and bicyclist amenities including additional sidewalk, vehicular speed reduction, crossings, and bike lanes | \$5,024,915 | \$1,887,420 |
| Residual Value | Residual value of assets at the end of the analysis period | \$6,323,826 | \$1,165,160 |
| Noise and Congestion | Noise and congestion benefits from a decrease in auto vehicle usage | \$560,915 | \$210,687 |
| Total Benefits | | \$69,119,564 | \$25,554,543 |
| Total Costs | | -\$17,540,199 | -\$13,361,877 |
| Benefit/Cost Ratio | | 3.94 | 1.91 |

Baseline and Alternative

Consistent with the direction provided by the USDOT, the BCA compares the Baseline Condition with the Build Alternative.

BASELINE CONDITIONS

The Baseline, or No-Build, alternative maintains the existing conditions on Garrison Boulevard without any elements of this project. These conditions include:

- Five-lane roadway with a center two-way-left-turn-lane;
- No sidewalk for most of the south side of the corridor, and back-of-curb sidewalk of varying quality on the north side of the corridor;
- The posted speed is 45 mph, and vehicle operating speeds are even higher, contributing to an uncomfortable environment for pedestrians;
- No bicycle facilities;
- A lack of pedestrian crossing opportunities (average spacing between crossings = 1,700 linear feet) resulting in unsafe crossing conditions or significant out of direction travel for pedestrians;
- A greenway underpass that is continuously silted, wet, and impassable; and
- Higher than average driveway density.

The Baseline condition presents safety challenges and provides very limited infrastructure and connectivity for people walking and biking. This Baseline is used to compare the benefits of implementing the Build Alternative.

BUILD ALTERNATIVE

The Build Alternative includes the following elements to improve safety and mobility for all users along the corridor:

Table 3 Build Alternative Improvements

| Safety and Speed Management | Streetscape Improvements | Accessibility Improvements | Multimodal Improvements |
|---|---|--|---|
| <ul style="list-style-type: none"> • New traffic signal at Laurel Lane • Improved pedestrian crossings at four signalized intersections • Lane narrowing (lane diet) • Speed limit reduction • Improved lighting • Pedestrian countdown timers • Center median | <ul style="list-style-type: none"> • Landscaped medians • Roadway milling and resurfacing | <ul style="list-style-type: none"> • Repairing / widening sidewalks (north side) • Installing ADA curb ramps | <ul style="list-style-type: none"> • Improved Avon/Catawba Creeks Greenway underpass • Consistent bicycle lanes (both sides) • Bicycle crossing treatments • Fill in sidewalk gaps (south side) |

Together, these improvements will increase safety and multimodal connectivity along a vital transportation corridor for Gastonia and the region. Enhancements to mobility will result in safer transportation choices, reduce environmental impacts, increase real estate value, and support positive health outcomes for residents.

Methodology

The BCA was developed using the 2026 guidance provided by the USDOT. Analysis was completed as necessary to develop the benefits and costs of the Baseline and Alternative. Major components of the analysis include:

- Safety Benefits
- Travel Time Costs
- Emissions Reduction
- Health Benefits
- Real Estate Benefits
- Maintenance Cost Savings
- Amenity Benefits
- Residual Value
- Noise Reduction Benefits

In addition to the benefits listed above, unquantified benefits were also identified. These benefits describe the additional value of implementing the project beyond the quantified results of the BCA. These unquantified benefits are discussed later in this memorandum and in greater detail in the grant application narrative (**Factors Not Quantified**).

The BCA spreadsheet included in this application includes project inputs (Tab A), a summary of benefits (Tabs B & C), and the individual costs and benefits for each analysis (Tabs D through L). These analyses are discussed in more detail below.

BENEFIT COST ANALYSIS INPUTS

Inputs – Tab A

The primary inputs of the BCA consist of peak hour traffic delays, annual average daily traffic volumes, US Census- and traffic count-based mode splits, and monetization factors as recommended by USDOT guidance.

The AM and PM peak hour traffic analysis was completed using a 2024 existing year for the Baseline, as well as 2030 and 2050 Baseline and Alternative years. Signal timing updates are assumed to occur between now and 2030, and a compound annual growth rate of 0.25% is assumed for the facility based on historical and projected (regional travel demand model) trends. Combining the anticipated delay and

annual average daily traffic (AADT) volumes resulted in an estimate of total vehicle hours of delay along the Garrison Boulevard project limits under the Baseline and Alternative scenarios.

A mode shift was assumed based on induced demand from improved walk and bike facilities. The bike mode split was adjusted based on NCHRP Report 552. Previous grants have generally assumed a doubling in pedestrian traffic. A scaled back 10% increase in walk trips was assumed to be conservative following another grant application with similar proposed improvements to the Baseline. Mode share was calculated based on Gastonia's American Communities Survey (ACS) Commuting Characteristics Data (2022) as well as traffic count data collected in May 2023. Combining the AADT, the existing area mode split, and the assumed mode shift increase factor resulted in an estimate of bike and pedestrian volumes under the baseline and alternative scenarios. The remaining calculated benefits are based largely on the annualized delays, traffic volumes, and bicycle and pedestrian estimates.

The base year of the analysis is 2024, as specified by the latest *"USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs."* Design is expected to begin in 2027, and construction is expected to occur over two years starting in 2028. As the project is primarily addressing existing multimodal capacity issues, the 2026 USDOT guidance recommends that "projects aimed primarily at capacity expansion or to address other operating deficiencies should use an operating period of 20 years." A 20-year operating period of benefits was analyzed for the years following the completion of the project, from 2030 through 2049. The present value of all benefits and costs was calculated using 2024 dollars, per USDOT guidance. The overall BCA analysis was completed for a 23-year period (2027 to 2049).

Output Table and Summary – Tabs B & C

Tab B provides a summary of benefits by category, denoting the total monetized benefits, project costs, and benefits/costs ratio noted in **Table 2**. Tab C delineates these costs year-over-year from the design phase through 2049 operations.

Cost Estimate – Tab D1

The City has completed preliminary planning for the corridor. The grant application includes design and construction funds. Design is expected to begin as soon as grant funds are available. For the BCA analysis, design is assumed to begin in 2027 and last one year, while construction is assumed to begin in 2028 and last two years. Implementation of all project components is scheduled to be completed by 2030 with project use occurring the same year. Any temporary net benefits or indirect costs caused by the implementation of the project or travel time delays due to construction are assumed to be minimal and were excluded from the analysis.

The project costs include individual construction line items and percentages for project unknowns, design, right-of-way (ROW), and construction management. Project costs were developed using 2026 (current year) dollars. Costs were then adjusted to expenditure year dollars based on the anticipated engineering and construction schedule for the project as well as an estimated inflation rate of 4% per year. All expenditure year costs were then adjusted using the estimated inflation rate back to 2024 (base year) dollars per USDOT BCA guidelines. Based on the delivery schedule, the project costs in 2024 (base year)

dollars will be approximately \$17.5 million undiscounted and approximately \$13.4 million using a 7.0% discount rate. Calendar year 2030 is the first full year that benefits from the project are scheduled.

Residual Value – Tab D2

Due to the extent of construction, the Garrison LEARNS Corridor project is assumed to have a service life beyond the analysis period (i.e., a 30-year service life as compared to a 20-year analysis period). Because of this, a residual capital value was calculated for the Alternative, which was then applied as a benefit using linear depreciation. The total benefit associated with the residual value is approximately \$6.3 million undiscounted, or approximately \$1.2 million using a 7.0% discount rate.

Safety – Tab E

The Alternative improves safety by installing a new traffic signal at a location with known sight distance issues and documented safety concerns, replacing existing two-way left turn lanes with a raised median, improving pedestrian crossings, adding sidewalks, providing bike lanes, lowering speed limits by 10 miles per hour (MPH), reducing travel lane width, and improving lighting. These measures will reduce the propensity and severity of crashes involving vehicles, pedestrians, and bicyclists.

Crash data along Garrison Boulevard for the three-year period from November 2022 to October 2025 was collected from the North Carolina Department of Transportation (NCDOT) Traffic Engineering Accident Analysis System (TEAAS) and reviewed within the project study limits. A total of 126 crashes occurred along the corridor during the review period. Of those crashes, one crash resulted in a fatality (K), three crashes resulted in serious injury (A), 34 crashes resulted in minor injury (B) or possible injury (C), and 88 crashes involved no apparent injury (O).

The one fatality along the corridor involved a pedestrian and occurred at the intersection of Garrison Blvd. and Churchill Dr. An eastbound driver was described as traveling “at a high rate of speed” and failed to stop at a red light. At the same time, a pedestrian was legally crossing the east leg of the intersection and was struck by the driver at approximately 55 mph. The pedestrian was pronounced deceased at the scene by the responding emergency personnel. The location of this fatal crash is at the heart of pedestrian activity along Garrison Boulevard. The intersection of Garrison Blvd. and Churchill Dr. is a crossing location for between the Gaston County Public Library and the Schiele Museum. Multiple proven safety countermeasures proposed in this project will reduce the likelihood of similar fatal or serious injury crashes occurring on Garrison Blvd.

This project will include a variety of countermeasures to improve safety along the corridor. Based on a review of the FHWA Crash Modification Factors (CMF) Clearinghouse, five CMFs were chosen for the BCA as seen in **Table 4**. The benefits of the project were quantified by applying CMFs for replacing a two-way left turn lane with a raised median, installing dynamic speed feedback signs, converting 12-foot lanes to 11-foot lanes, installing a pedestrian hybrid beacon (PHB), and installing a traffic signal. CMFs with at least a 3-star rating were selected. The safety countermeasures were applied to certain segments of the project site, depending on where the improvements were made.

Table 4 Crash Modification Factor Methods

| CMF Name | CMF ID | CMF | Star Quality | Crash Severity | Crash Type | Project Application |
|---|--------|------|--------------|----------------|------------|--|
| Replace Two-Way Left Turn Lane with Raised Median | 2514 | 0.77 | 3 | All | All | Garrison Blvd. from Fern Forest Dr. to New Hope Rd. |
| Convert 12-Foot Lanes to 11-Foot Lanes | 7825 | 0.76 | 3 | All | All | Garrison Blvd. from Fern Forest Dr. to New Hope Rd. |
| Install Dynamic Speed Feedback Sign | 6885 | 0.95 | 4 | All | All | Garrison Blvd. from Fern Forest Dr. to New Hope Rd. |
| Install Pedestrian Hybrid Beacon (PHB or HAWK) with Advanced Yield or Stop Markings and Signs | 9022 | 0.82 | 4 | All | All | Mid-Block Crossing Between Schiele Museum and Gaston County Public Library |
| Install a Traffic Signal | 7848 | 0.61 | 4 | All | All | Intersection of Garrison Blvd. and Laurel Ln. |

Vehicle Crash Modification Factors (CMF): Crash Modification Factors Clearinghouse. www.cmfclearinghouse.org

The historic crash data were segmented to apply the correct countermeasures to the applicable portions of the project corridor. **Table 5** describes the segmentation of the crashes, the applicable countermeasures for the improvements, and the countermeasures used.

Application of CMFs was limited to three per segment to avoid overestimating the crash reduction. While not captured by the CMFs, additional safety benefit is expected from installing high-visibility crosswalks at signalized intersections, installing sidewalk on the south side of the corridor, installing bicycle lanes, enhancing roadway lighting, improving the Avon/Catawba Creeks Greenway underpass, and adding pedestrian countdown timers to all signalized pedestrian crossings. These treatments were not quantified because current Highway Safety Manual (HSM) guidance recommends not combining more than three CMFs at a single site, a CMF was not available for the proposed safety improvement, and/or there is not a reported crash history that would be addressed by the applicable CMF. These treatments are discussed further in the Factors Not Quantified section.

Table 5 Safety Analysis Segments

| Segment Location | Applied CMF(s) | Combined CMF | Number of Crashes | BCA Tab |
|--|------------------|--------------|-------------------|---------|
| Garrison Blvd: Fern Forest Dr to New Hope Rd | 2514; 7825; 6885 | 0.56 | 115 | E-1 |
| Intersection of Garrison Blvd and Laurel Ln | 7848 | 0.61 | 4 | E-2 |
| Mid-Block Crossing Between Schiele Museum and Gaston County Public Library | 9022 | 0.82 | 7 | E-3 |

NC DOT Traffic Engineering Accident Analysis System (TEAAS)

The USDOT guidance includes monetization values for crashes following the KABCO severity levels. These values are provided in **Table 6**.

Table 6 USDOT Guidance on Crash Severity Monetization Value

| KABCO Level | | Monetized Value (2022 \$) |
|-------------|--------------------------------|---------------------------|
| K | Killed | \$13,700,000 |
| A | Incapacitating | \$1,302,300 |
| B | Non-Incapacitating | \$256,300 |
| C | Possible Injury | \$122,400 |
| O | No Injury/Property Damage Only | \$5,500 |
| U | Injured (Severity Unknown) | \$238,500 |

USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs 2026

The average annual number of crashes was calculated based on the available crash data. The cost per entering vehicle on the corridor based on crash severity was developed applying USDOT guidance and AADT estimates.

The rate of annual crashes was assumed to remain constant over time and consistent with the historical corridor performance. Based on these factors, over a 20-year operating period, the total safety benefits, which can be monetized at \$47.7 million, or \$17.9 million at a 7.0% discount over the full analysis period, can be seen in **Table 7**.

Table 7 Monetized Safety Benefit

| Segment | Total Benefit | Present Value (7.0% Discount Rate) |
|--------------|---------------|------------------------------------|
| 1 | \$28.2M | \$10.6M |
| 2 | \$384K | \$144K |
| 3 | \$19.1M | \$7.2M |
| Total | \$47.7M | \$17.9M |

Travel Time – Tab F

The Alternative will affect travel time along the facility by providing a new traffic signal at Laurel Lane and by restricting driveway turning movements with a center landscaped median, which will result in some traffic rerouting and an increase in left- and U-turns at traffic signals. In addition, the posted speed limit along the facility is planned to decrease from 45 MPH to 35 MPH. As a result, the Alternative is expected to marginally increase weekday AM and PM peak hour delay. Based on historical traffic volume data, the number of annual vehicle trips was assumed to increase at a 0.25% compound annual growth rate for both the Baseline and Alternative. While providing a safety benefit to the corridor, the result of slower-moving traffic in the Alternative is quantified as a cost, rather than a benefit, relative to travel time.

Recommended Hourly Values of Travel Time Savings (2024 dollars per person-hour) were provided by the USDOT guidance as \$21.80 for all purposes and \$37.20 for truck drivers. An average vehicle occupancy for passenger vehicles during the weekday peak was provided by USDOT guidance of 1.34. Commercial vehicle occupancy was assumed to be 1.0. The heavy vehicle percentage of the facility is estimated to be 7.0%, as indicated by traffic counts collected along the facility in May 2023. The average annual weekday peak delay, average vehicle hours traveled (VHT) savings, and average person delay savings for passenger vehicles and trucks can be seen in **Table 8**. Negative values indicate a cost instead of a savings.

Table 8 Travel Time Savings Values

| Annual Weekday Peak Delay | | | |
|---------------------------|-----------------------------|------------------------------|--------------------------|
| Mode | Avg. VHT Savings (Vehicles) | Avg. Delay Savings (Persons) | Total Delay Savings (\$) |
| Passenger Vehicle | -26,343 | -35,300 | -\$769,534 |
| Heavy Vehicle/Truck | -1,983 | -1,983 | -\$73,761 |

Based on these factors, over a 20-year operating period, the total vehicle travel time cost was monetized at approximately \$843,000, or \$318,000 using a 7.0% discount rate, over the full analysis period.

Emissions Reduction Benefits – Tab G

The overall reduction in the number of single-occupant vehicles (SOVs) on the corridor is expected to reduce emissions. Emissions reductions based on the reduction in the number of SOVs were calculated based on the annual vehicle miles traveled (VMT) savings using VMT projections from the year 2030 through the year 2049. In the Alternative, the increased network connectivity is expected to result in a total of approximately 1.8M fewer miles traveled over the analysis period.

The delay time was conservatively assumed to be spent at idle to only include the minimum amount of emission reduction possible in the Alternative. Mileage-dependent emissions rates were obtained from the Environmental Protection Agency’s (EPA) Idling Vehicle Emissions for Passenger Cars, Light-Duty Trucks, and Heavy-Duty Trucks for nitrogen oxides (NOx), particulate matter (PM2.5), and sulfur dioxide (SO2). Damage costs for pollutant emissions from USDOT guidance were used to calculate savings in the Build Alternative.

The total benefit associated with the emissions reduction was monetized at approximately \$23,000, or \$9,000 using a 7.0% discount rate, over the full analysis period.

Health Benefit – Tab H

The use of active transportation can lead to positive health outcomes for users, such as improved cardiovascular health. A key health outcome produced by the USDOT guidance is a reduction in mortality risk for users that are induced to active transportation modes, such as walking and biking, from inactive modes, such as driving.

The USDOT guidance provides a recommended value for monetizing reduced mortality risks associated with increased walking and biking for included trips as seen in **Table 9**. The values are only applicable to populations within certain age ranges. A national average proportion was applied to the bicycle and walking trips. The reduced mortality benefits are only applied to the number of users switching from non-active transportation modes to active transportation modes.

Table 9 Mortality Reduction Benefits of Induced Active Transportation Values

| Mode | Recommended Value per Induced Trip (2024 \$) | Applicable Age Range | Proportion of Expected Users Falling into the Age Range |
|-----------|--|----------------------|---|
| Walking | \$8.36 | Ages 20-74 | 68% |
| Bicycling | \$7.45 | Ages 20-64 | 59% |

USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs 2026

The Alternative improves active transportation by providing new bike lanes, new sidewalks, and new and enhanced crossings in the project area. This will result in an increase in people walking and biking. The increase in average annual daily trips, average annual trips, and average induced trips in the applicable age range for bicycle and pedestrian modes can be seen in **Table 10**.

Table 10 Total Increase in Active Transportation Trips

| Mode | Total AADT Increase | Total Annual Trips | Total Induced Trips in Age Range |
|-----------|---------------------|--------------------|----------------------------------|
| Walking | 1,450 | 529k | 360k |
| Bicycling | 3,587 | 1.3M | 773k |

Over a 20-year operating period, the total health benefit was monetized at \$7.8 million, or \$2.9 million using a 7.0% discount rate, over the full analysis period.

Maintenance Cost Savings – Tab I

The City of Gastonia provided estimated maintenance costs for the Baseline and Alternative. Reconstructing Garrison Boulevard will provide overall maintenance expenditure savings over the analysis period. The largest savings comes from needing one less mill-and-pave asphalt rehabilitation within the analysis period. The elimination of the existing two-way-center-left-turn lane in the Alternative also reduces asphalt and striping maintenance costs. Increased maintenance costs associated with the

Alternative include the maintenance of an additional signal at Laurel Lane, pavement markings for bicycle symbols, new pavement associated with U-turn bulbs, and maintaining the planted median. These increases are more than offset by the previously noted savings. Over a 20-year operating period, the total maintenance costs benefit was monetized at \$1.4 million, or \$956,000 using a 7.0% discount rate, over the full analysis period.

Amenity Comfort Benefit – Tab J

Improvements to pedestrian and cycling facilities often provide amenities that can improve the quality or comfort of journeys made by active transportation users. Per USDOT BCA Guidance, the rule of half was applied to these amenity comfort values for the induced pedestrian and bicycle use. Over a 20-year operating period, the total pedestrian and bicycle benefits were monetized at \$5.0 million, or \$1.9 million using a 7.0% discount rate, over the full analysis period.

- *Pedestrian Facilities:* The increased comfort of specific pedestrian infrastructure can be assessed as a valued benefit. New sidewalks, speed reduction, the greenway underpass, and the pedestrian hybrid beacon (PHB) are key facilities that directly affect the comfort, convenience, and safety of the facility for pedestrian use.

Per USDOT guidance, the estimated value per projected pedestrian trip should be capped at 0.86 miles, the average length of a walking trip in the 2017 National Household Travel Survey. The Alternative provides 1.37 miles of new 5-foot-wide sidewalks, a 10 MPH speed limit reduction, and new pedestrian crossings. These new facilities provide a \$1.3 million value in pedestrian comfort over the study period.

- *Cycling Facilities:* Dedicated cycling facilities can improve journey quality and comfort for cyclists. The estimated value per projected cyclist on a proposed facility should be capped at 2.38 miles, the average length of a cycling trip in the 2017 National Household Travel Survey.

New bicycle facilities for the Alternative include 1.37 miles of bike lanes on both sides of Garrison Boulevard between Fern Forest Drive and New Hope Road. These new facilities provide a \$3.7 million value in cyclist comfort over the study period.

Noise & Congestion – Tab K

Noise pollution occurs from high levels of environmental sound that may annoy, distract, or harm people and animals. The Alternative will lower levels of noise generated by current transportation activity by reducing roadway noise from a decrease in average annual daily automobile trips and decreased speed. Monetized values for noise and congestion reduction are provided by the USDOT Guidance and shown in **Table 11**.

Table 11. External Highway Use Costs: Noise and Congestion Values

| Vehicle Type and Location | Recommended Value of Cost per Vehicle Mile Traveled (2023 \$) | |
|-----------------------------|---|----------|
| | Congestion | Noise |
| Light-Duty Vehicles – Urban | \$0.147 | \$0.0021 |
| Buses and Trucks – Urban | \$0.367 | \$0.0465 |

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The Alternative improves noise and congestion by decreasing the annual auto trips and vehicles miles traveled. For vehicular trips, Garrison Boulevard is assumed to serve more cross-town trips (with vehicles traversing the entire corridor length) than local trips (with vehicles traversing just a portion of the corridor). Because of this, a trip distance of 1.1 miles, or roughly 80% of the project length, was assumed for a one-way trip, and 2.2 miles for a two-way trip. Over a 20-year operating period, the total noise and congestion reduction benefit was monetized at approximately \$561,000, or \$211,000 using a 7.0% discount rate, over the full analysis period.

Real Estate – Tab L

An improved multimodal network to access many of the City of Gastonia’s key civic destinations is likely to increase adjacent property values for nearby parcels. The proposed improvements to walking and biking facilities, reduced speeds, and crossing improvements will create a more livable environment and will make these areas more accessible for people walking, biking, and accessing important community anchors.

While this will create a one-time increase in the value of property adjacent to the corridor, precisely quantifying the anticipated increase in property value is a challenging task based on the variation in conclusions across available research. There are multiple studies that quantify the impact of multimodal improvements on adjacent properties in the greater Charlotte metropolitan region. For example, one study shows property value increases of up to 56% for adjacent commercial and multi-family properties⁸, while another study shows more modest land value increases of approximately 4% for residential properties.⁹

To avoid overestimating the one-time impact of the Alternative on adjacent land values, a conservative estimate of a 10% increase in land value was applied. Further, this 10% increase was applied only to mixed-use and commercial sites immediately adjacent to the study area (33 parcels). Tax appraisal data was obtained for these 33 parcels from Gaston County. Over a 20-year operating period, the total real estate benefit was monetized at \$1.2 million, or \$814,000 using a 7.0% discount rate, over the full analysis period.

⁸ *Return to Nature Yields Returns in the Community. Little Sugar Creek Greenway. Charlotte, NC. LandDesign. 2012.*
<https://landdesign.com/project/little-sugar-creek-greenway/>

⁹ *The Potential Economic Impacts of the Proposed Carolina Thread Trail. Catawba Lands Conservancy & EcoConsult Corporation. 2007.*
https://www.carolinathreadtrail.org/wp-content/uploads/2018/08/CTT_Economic_Study.pdf

Factors Not Quantified

Several factors were not quantified as part of the analysis but provide additional benefits beyond those quantified above. Unquantified benefits of the corridor project include:

- **Safety:** There are several safety benefits associated with the project that were not quantified in the safety benefit analysis. These treatments were not quantified because current Highway Safety Manual (HSM) guidance recommends not combining more than three CMFs at a single site, a CMF was not available for the proposed safety improvement, and/or there is not a reported crash history that would be addressed by the applicable CMF. Additional features of the project expected to provide a safety benefit include:
 - Pedestrian countdown timers – There is a CMF for installing pedestrian countdown timers, however it applies to converting full intersections. The proposed project only includes spot improvements to include pedestrian countdown timers at all signalized pedestrian crossings, so to be conservative, the CMF was not used.
 - Bike lanes – The CMF for adding bike lanes also includes lane narrowing, so to not double count benefits, only the CMF for lane narrowing was used. The bike lanes provide the additional benefit of improving pedestrian safety and comfort by providing more distance from moving vehicles. This benefit was also not quantified.
 - A complete sidewalk network – There is a CMF for adding sidewalk, but there have not been any reported crashes in the last three years that would be affected by the sidewalk addition, so the benefits of preventing future crashes could not be quantified.
 - Enhancing roadway lighting – There are several CMFs for enhancing roadway lighting which show that improving lighting reduces nighttime crashes. This benefit was not quantified to avoid combining more than three CMFs at a single site.
 - Installing high-visibility crosswalks – There are CMFs for installing high-visibility crosswalks, although they are typically included as a part of a suite of improvements. This benefit was not quantified to avoid combining more than three CMFs at a single site.
 - Improving the Avon/Catawba Creeks Greenway underpass – The current Avon/Catawba Creeks Greenway underpass beneath Garrison Blvd. has a deficient design, which means it is perpetually silted, wet, and unusable. This improvement effectively creates a new, grade-separated crossing of Garrison Blvd. There are high-quality CMFs for installing grade-separated pedestrian crossings (overpasses or underpasses), however, due to the proximity to the existing pedestrian crossing at Chestnut St., and the inclusion of other CMFs at this location, this benefit was not quantified to avoid overestimating crash reduction.
- **Accessibility** Reconstruction of curb ramps, repairing/adding sidewalk, and adding APS devices to comply with ADA and PROWAG guidelines along the corridor will improve accessibility for people with disabilities.
- **Landscaping:** The addition of landscaping in the medians and buffer spaces will further reduce emissions beyond those quantified in the environmental benefits. More pervious area will reduce the amount of stormwater runoff and help reduce urban heat island effects.

- **Lighting:** The proposed project assumes a complete reinstallation of new lighting. As previously mentioned, this new lighting is expected to provide safety benefits for pedestrians, cyclists, and motorists. Additionally, replacing existing roadway lighting with more energy efficient lighting is expected to reduce maintenance costs.
- **Economic Development:** Multimodal improvement projects such as this have helped to spur economic development in similar contexts in other cities. This includes infill development and redevelopment of properties adjacent to the corridor. This is a benefit to adjacent property owners, local business owners, developers, and the future tax base.

To further evaluate the potential economic development impact of the Garrison LEARNS project, the City of Gastonia hired an independent economic analysis firm to study the corridor. This economic development analysis concluded that “transportation improvements along the corridor can attract new private sector investment that will generate jobs and economic activity.”¹⁰ The analysis, based on an identification of vacant/underdeveloped parcels on the corridor, local land use regulations, and industry standards, showed that redevelopment along the proposed Garrison Boulevard project area could have the following impacts.

- One-Time Construction Impacts: New development that would support ~1,300 direct jobs and ~\$277 million in economic activity.
- Ongoing Economic Impacts: Supports ~2,600 permanent and continuous jobs in the larger Gastonia market area, creating ~\$130 million/year in new labor income and ~\$360 million/year in economic output.

NOTE - Per the “USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs,” the impacts described above are not permitted to be incorporated in the BCA spreadsheet and the calculation of the benefit-cost ratio for the proposed project. While these spillover benefits cannot be considered in the real estate calculation for the BCA, the outputs of this analysis signal the potentially significant economic benefit the Garrison LEARNS project would provide to the City of Gastonia and the broader region. These potential benefits are key to understanding how the Garrison LEARNS Corridor Project will enhance Gastonia’s economic competitiveness, and they are an important part of the overall goals and approach for the City of Gastonia, NCDOT, and other project partners.

Local Match

Because the application is being submitted in the rural category, no local cost share is required. However, the project sponsors are committing to a local cost share of \$ 1,284,532.80 (expenditure year dollars) to make the project more competitive. This local cost share is intended to cover the landscaping and lighting costs from the project cost estimates. Per the USDOT BCA Guidance, this proposed local cost share has not been removed from the project cost calculations. The BCA calculations provided in this memo and the accompanying spreadsheet include all costs regardless of who bears the burden of specific costs items.

¹⁰ *Economic Impact Analysis: Garrison Boulevard Redevelopment Opportunities. Gastonia, NC. Creative Economic Development Consulting. January 2026.*

BCA Results

The results of the BCA conducted for the Garrison LEARNS Corridor are presented in terms of a benefit-cost ratio (BCR) and a net present value (NPV). A BCR greater than 1.0 and NPV greater than \$0 mean that quantified project benefits outweigh project costs. The larger the BCR and NPV, the greater the quantified benefits of the project.

The results of the BCA for the project, calculated using the methodology described above, are presented in the table below. The results are shown both without any discount applied and with a 7.0% discount. As can be seen in **Table 12**, there are substantial benefits associated with the project.

Table 12 BCA Results

| | Benefits | Costs | Benefit-Cost Ratio | Net Present Value |
|--------------|----------|---------|--------------------|-------------------|
| Undiscounted | \$69.1 | \$17.5 | 3.94 | \$51.6M |
| 7% Discount | \$25.6M | \$13.4M | 1.91 | \$12.2M |