Benefit Cost Analysis Documentation

RAISE GRANT PROGRAM 2021

FROM TRACKS TO TRAILS: RECONNECTING ATLANTA COMMUNITIES

SOUTHSIDE TRAIL

MODERN MOBILITY partners

CITY OF ATLANTA AND
ATLANTA BELTLINE, INC.
JULY 12, 2021

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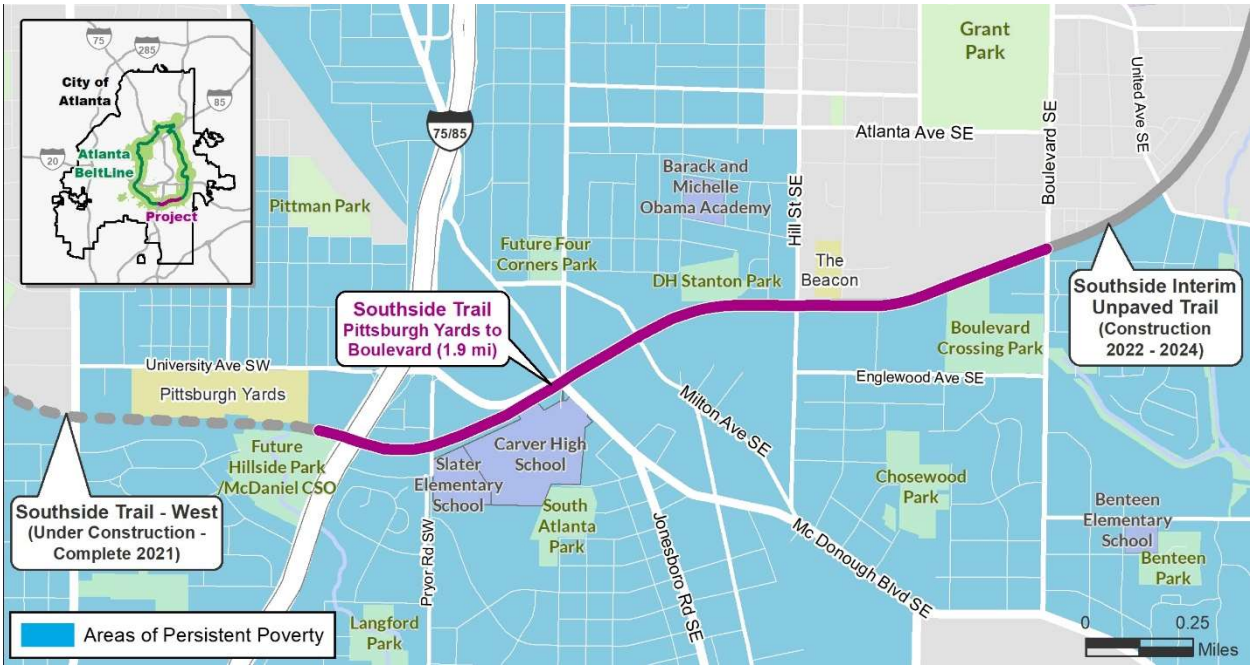
1. Introduction

This Benefit-Cost Analysis (BCA) report provides the technical background for the analyses conducted in support of the RAISE grant application for the Atlanta BeltLine Southside Trail (SST) project. The project map is shown in Figure 1.

Figure 1: Project Location Map – Southside Trail



The following information can be found in each section:

- Section 2 provides a breakdown of each tab in the BCA spreadsheet and what information can be found in each tab.
- Section 3 contains the approach and methodology for comparing the No-Build and Build scenarios.
- Section 4 provides the costs associated with the project.
- Section 5 reviews the benefits of the BCA including sources for calculations as well as methodology for demand estimation.
- Section 6 provides sensitivity analysis and provides alternative values that can be considered for the analysis.
- Section 7 provides unquantified and qualitative benefits associated with the project that were not part of the Benefit-Cost Ratio (BCR).
- Section 8 gives an overview of the BCA summary.

Additional information is provided within the BCA spreadsheet, including annual estimates of costs and benefits to assist the U.S. Department of Transportation (USDOT) in the review of this application.

2. Benefit-Cost Analysis Spreadsheet Instructions

The BCA spreadsheet that accompanies this report is broken into several tabs which present the methodologies, inputs, and data sources used to calculate the costs and benefits. Table 1 provides a breakdown of each tab in the spreadsheet.

Table 1: Benefit-Cost Analysis Spreadsheet Tab Information

Tab Name	Costs/Benefits Included	Overview
BCA Summary	All Costs/Benefits	Project summary of benefit-cost ratios for the no discount and 7% discounted values (3% for CO^2), as well as percentage break-down by category
Annualized Summary	All Costs/Benefits	Project summary of all costs and benefits over the project life, including their 7% discounted values (3% for CO^2)
Cost	Capital Costs and Operations & Maintenance (O&M)	Project calculations for costs from scoping to construction, as well as 30 years of O&M
Safety Benefits	Pedestrian/Bike and Vehicular Safety Benefits	Calculations for existing pedestrian/bike and vehicular crash rates within 800 meters of the project and their reductions with the completion of the project
Value of Travel Time Savings	Travel Time Savings	Project calculations for reduction in trip length for bike and ped commuters due to construction of the project and monetized benefits of travel time savings
Emissions Savings	Nitrogen Oxides (NOx) and Carbon Dioxide (CO^2) Benefits	Project calculations for reducing NOx and CO^2 and monetized benefits associated with their reductions
Quality of Life (Conservative Values)	Pedestrian/Bike Recreation and Health Benefits	Project calculations for existing and new bike and pedestrian users of the project and their associated monetized recreational and health benefits
Sensitivity Analysis – BCA	Quality of Life Benefits Modified for Sensitivity Analysis	Project summary of all costs and benefits with Quality of Life Benefits substituted for alternative values.
Sensitivity Analysis – QoL (Alternative Values)	Quality of Life Benefits with Alternative Values	Quality of Life Benefits calculations done with alternative values for sensitivity testing to compare against the conservative values used for the BCR.
Parameters 2021BCAGuidance	USDOT BCA Guidance Values	Provides values from the USDOT for calculating safety and emissions benefits, as well as inflating values to 2019 dollars

3. Approach and Methodology

In accordance with USDOT BCA guidelines,[1] the BCA analyzes the effects of implementing the proposed project (Build Scenario) compared to no improvements in the future (the No-Build scenario). The net benefits between the scenarios are compared to understand the project's expected impact.

3.1. Evaluated Scenarios

3.1.1. No-Build Scenario

Under the No-Build scenario, the paved trail does not exist, and thus the safety benefits associated with the grade separated trail could lead to a potential increase in vehicular accidents, emissions, and roadway maintenance costs to increase as the population growth would only be sustained by the existing roadway network with limited active transportation choices. Additionally, travel time savings for pedestrians and bicyclists would not be realized due to a lack of active transportation infrastructure. Finally, the potential health benefits and safe mobility options for bike and pedestrian commuters would not exist.

3.1.2. Build Scenario

The Build scenario assumes the construction of the SST. The proposed project will enhance vehicular safety at surrounding intersections and eliminate pollution emissions by inducing users to walk or bike instead of driving to their destinations. Reducing vehicles on the road will also reduce maintenance costs for roadway repairs. The proposed project is expected to reduce travel time for pedestrians and bicyclists in the area by connecting existing trail segments and cycle tracks. Additionally, the proposed project will improve health benefits by providing recreational facilities and increasing physical activity, while also providing a safe mobility option for commuters who walk or bike to work or school.

3.2. Analysis Period

Based on USDOT's guidelines, projects involving the initial construction or full reconstruction of highways or similar facilities should use an analysis period of 30 years. The Atlanta BeltLine received a Brownfield Cleanup grant from the Environmental Protection Agency for the SST in 2020. Currently, the project is a brownfield due to its use previous status as a freight railroad.[2] The site contains arsenic, one of the most commonly reported contaminants along rail corridors because of its use as an herbicide. The SST will construct entirely new stormwater drainage, utility duct banks, lighting, landscaping, ADA accessible access points, and the multi-use trail. This is in conjunction with brownfield remediation efforts to cleanup soil contamination from decades of freight usage.

The City of Atlanta purchased railroad corridor from CSX in 2018, and CSX removed the rail and ties. ABI improved the corridor by creating temporary access points, addressing some safety concerns, and adding gravel to the compacted ballast on the track bed, opening it to the public in 2019. The interim trail allows limited accessibility as shown in a ride along video filmed in May

[1] U.S. Department of Transportation (Feb. 2021). *Benefit-Cost Analysis Guidance for Discretionary Grant Programs*.

[2] Atlanta BeltLine (2020). https://beltline.org/2020/05/12/beltline-awarded-epa-brownfields-cleanup-grant/#:~:text=The%20Atlanta%20BeltLine%20has%20been,Pittsburgh%20Yards%20and%20Milton%20Avenue.

2021.[3] Based on the current status of the SST, as well as the proposed entirely new construction, Figure 2 showcases the existing SST as it stands today as an abandoned freight corridor.

Figure 2: The Existing Southside Trail Corridor

Per the Federal Highway Administration (FHWA), lifespan expectancy of the project based on Atlanta BeltLine's design standards of 6-inch-deep concrete trail sections are as follows:

- Concrete: Approximately 80 Years[4]

Additionally, the Atlanta BeltLine is working to reduce the permeability of concrete by adding pozzolanic materials and reinforcing mesh to reduce cracking and water infiltration into the trail. Based on the FHWA guidance and the BeltLine's commitment to building a long-lasting trail, the 30-year analysis period was chosen to reflect the intended long-lasting duration of the project.

It is anticipated that the benefits which accrue from the project will be seen long after the initial 30-year analysis period as the Atlanta BeltLine continues to expand into its envisioned 22-mile loop around the city. The BCA analysis covers capital costs from scoping through construction and the subsequent 30 years of operation. The opening year will be 2027, with the final year of analysis concluding in 2056.

[3] gov.beltline.org
[4] FHWA (2013). https://safety.fhwa.dot.gov/ped_bike/tools_solve/fhwasa13037/chap6.cfm.

3.3. Inflation and Discounting Adjustments

The BCA analysis incorporates the USDOT's guidelines for inflation adjustments in the calculations of the benefits and costs. All benefits and costs are estimated in 2019 dollars with future dollars discounted in compliance with RAISE, using a 7% real rate for all categories except Carbon Dioxide CO^2 emissions, which will use a 3% real rate. Below are the assumptions that were applied in the BCA model to ensure costs and benefits were accurately reflected:

- The costs and benefits in this BCA analysis correspond to the effects of the full build-out of the SST project.
- Input prices are in 2019 dollars.
- Analysis begins in 2016 (Scoping) and ends in 2056. Project development and construction are assumed in 2016 – 2026, with O&M covering the entire 30-year period from 2027 – 2056.
- The first year of benefits is 2027 and no ramp-up benefits are assumed for 2026.
- A 7% real discount rate is assumed throughout the period of analysis, except for carbon dioxide (CO^2) emissions savings, which use a 3% real discount rate.
- Tree planting emissions benefits are not assumed for the first 10 years of the project, and will not start until 2037 to account for tree maturity.

3.4. Demand Estimation

3.4.1. Existing Demand

Existing trail usership along the Atlanta BeltLine Eastside and Westside trails is measured from automatic counters that have been recording activity on the Eastside trail since 2013 and Westside trail since 2017. Trip data is managed by Atlanta BeltLine and validated quarterly by EcoCounter data services. The data are used to estimate hourly trail pedestrian and cyclist traffic at several locations along each trail. Previous work conducted by staff from the Atlanta BeltLine employed intercept surveys to estimate the share of cyclists who use the trail for commuting.

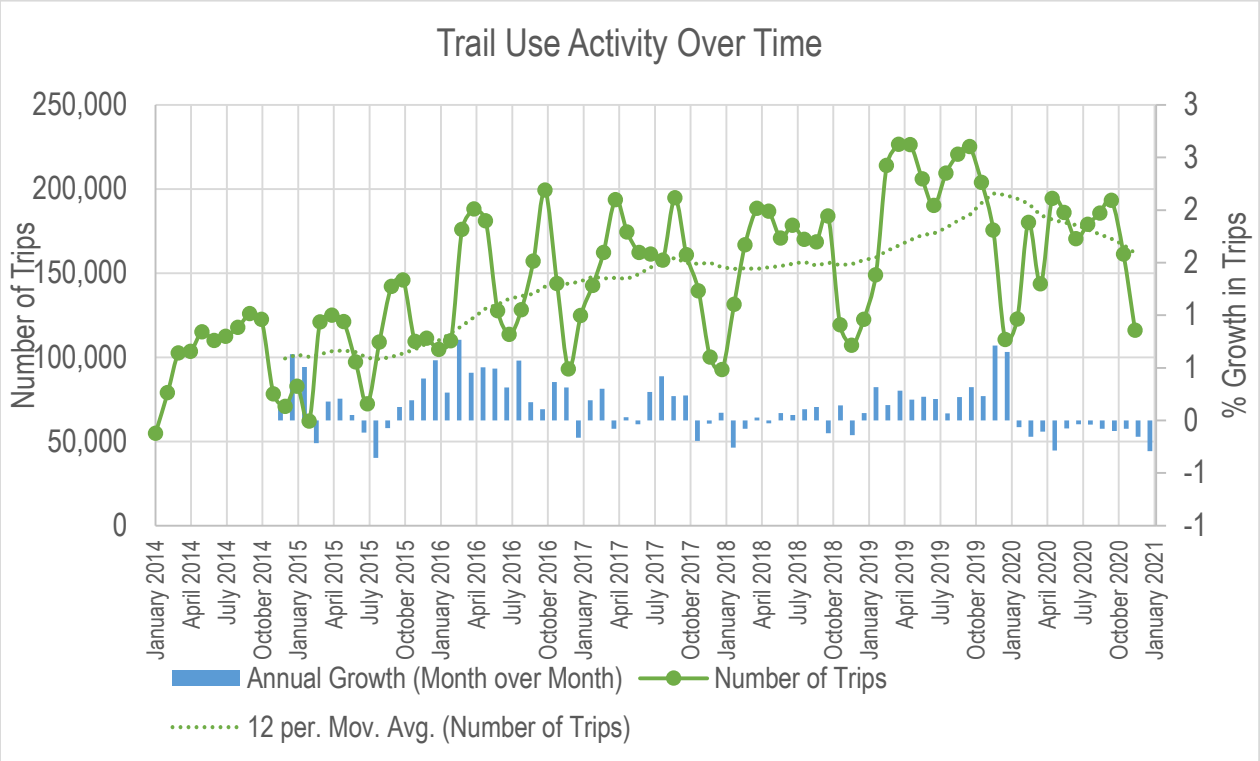
The Atlanta BeltLine has grown in popularity over the years as an enhanced mobility option, with the number of users growing well beyond the City of Atlanta's population growth rate from 2000 – 2019 (0.81%), as can be seen in Table 2 and Figure 3. Notably, there was a decrease in trail usership for 2020 compared to previous years. This was due to the COVID-19 pandemic, though for the months of January and February 2020, the number of users was higher than January and February of 2019, suggesting that more users were continuing to utilize the trail until the City of Atlanta went into lockdown and people started to stay home. However, even with the number of cautious people staying home, the trail still had more users in 2020 than it did in 2018, following a national trend for people getting outdoors for recreation during the pandemic.

Table 2: Historical Trail Demand on the Atlanta BeltLine's Eastside and Westside Trails

Year	Total Annual Trips – All Users	Average Daily Trips – All Users	Annual % Growth
2014 (Eastside Only)	1,193,111	3,269	-
2015 (Eastside Only)	1,300,331	3,563	9%
2016 (Eastside Only)	1,723,426	4,722	33%
2017	1,984,416	5,437	15%
2018	1,988,189	5,447	0%
2019	2,478,862	6,791	25%
2020	2,172,635	5,592	-12%

Source: EcoCounters at Ponce City Market (Eastside Trail) and Allene Avenue Southwest (Westside Trail)

Figure 3: Total Eastside and Westside Trail Activity Over Time



3.4.2. Forecasting Future Demand

Using the existing demand as a foundation, future demand for cyclists and pedestrians along the project is calculated using methodology from the *The National Cooperative Highway Research Program (NCHRP) Report 552: Guidelines for Analysis of Investments in Bicycling Facilities*[5] as well as from existing counters along the Atlanta BeltLine's Eastside and Westside trails. There are three parameters used to provide assumptions for statistics involving commuter and recreational demand for the new trail. The first focuses on the population within 400, 800, and 1,600 meters (.25, .5, and 1 mile, respectively) of the SST project to remain consistent with the NCHRP report. However, since the Atlanta BeltLine has existing counts along the abutting edges of the project, existing average daily counts were used to determine the existing users that would continue onto the project.

The NCHRP also provides assumptions for calculating the commuter statistics for pedestrians and cyclists. The report assumes that 80% of residents are adults, and based on national averages, 50% of adults commute which equates to 40% of the adult population commuting. These proportions are used to determine the bicycle and pedestrian commuters along the trail. To bring this calculation closer to City of Atlanta factors, U.S Census QuickFacts[6] data was used to determine that the adult population of Atlanta is 76.4%, and with 50% of adults commuting provides us with an estimate of 38.2% of Atlanta's population commuting to work. In preparation for the USDOT RAISE Grant, the Atlanta BeltLine conducted intercept surveys in 2021 along the Eastside and Westside BeltLine trail on May 18th, 20th, 22nd, and 23rd to determine the percentage of those using the BeltLine to commute. The sample size of 422 users, out of 1,841 average daily users, has a 95% confidence level with a 4% margin of error making the survey statistically significant. It was found that 11.7% of those surveyed used the BeltLine to commute to work. This is a conservative estimate as only those who volunteered to stop and be surveyed had their responses recorded, and the value is almost a quarter of what the NCHRP recommends using for the calculation.

Using the same Atlanta BeltLine intercept surveys, the bike commuter share is estimated to be 3.27% of the BeltLine users. This is close to the 2.7% estimate found based on Public Use Microdata Areas (PUMA) for the Fulton County (East) – Atlanta City (Southeast)[7] area that covers the project area. Similarly, the pedestrian commuter share is estimated to be 8.4% based on intercept surveys, which is close to the 7.28% estimate found based on the PUMA data. Using these percentages, it is estimated that there are currently 39 existing bike commuters and 100 pedestrian commuters within the project capture area. Had the NCHRP formulas been used without applying local data, there would have been 294 existing bike commuters and 794 existing pedestrian commuters, showcasing the conservative approach this analysis has taken. The Atlanta

[5] Krizek, K. J. (2006). *Guidelines For Analysis Of Investments In Bicycle Facilities* (Vol. 552). Transportation Research Board.
[6] United States Census Bureau (2021). *Atlanta city, Georgia; Georgia*. Retrieved from https://www.census.gov/quickfacts/fact/table/atlantacitygeorgia,GA/PST045219.
[7] United States Census Bureau (2021). *B08301: Means of Transportation to Work*. Retrieved from https://data.census.gov/cedsci/table?q=Means%20of%20transportation%20to%20work&text=B08301&g=7950000US1301007&tid=ACSDT1Y2019.B08301&hidePreview=true.

Regional Commission's (ARC) *Walk.Bike.Thrive! Report,*[8] indicates that the greater Atlanta area had a 4.7% pedestrian commute rate and a 0.8% bike commute rate. Based on these values, the PUMA value approximations are practical considering the density of the project area.

The growth rates of both pedestrians and cyclists along the trail were determined by analyzing the change in pedestrian and bike commuters between the American Community Survey (ACS) 2015 5-Year Commuting Characteristics by Sex and ACS 2019 5-Year Commuting Characteristics by Sex[9] values. This resulted in a 12.6% increase in bike commuters and 3.6% increase in pedestrian commuters. However, to remain conservative, the project area's population growth rate of 0.14% was assumed for the increase in cyclists and pedestrians.

Additional demand estimates were taken from the ARC's regional Travel Demand Model associated with the current Regional Transportation Plan (RTP), *The Atlanta Region's Plan*. This model was calibrated and validated using the latest Regional Household Travel Survey and the Regional On-Board Transit Survey. It was further determined by FHWA's Travel Model Improvement Program (TMIP) in the peer review, which was conducted on the 28th and 29th of September 2017, as a state-of-the-art model for forecasting future travel patterns and demands. The ARC's model was used to estimate the average trip lengths (excluding interstates) within 1,600 meters of the project for the models 2020 horizon year. This value was calculated to be 6.51 miles per trip. However, this average includes trips taken in suburban areas of Atlanta. Thus, the value was halved to 3.25 miles per trip to account for the urban setting of the SST. Finally, it was assumed that active transportation commuters will bike or walk 160 days out of the year. This was calculated by taking the number of working days, 260, and subtracting 25 days for holidays and vacations and 75 days for rain/inclement weather based on historical weather information.[10] Table 3 summarizes the key information for the input data.

Table 3: Key Assumptions

Key Assumptions		Values	Source
Project Users	Existing Adult Daily Users	1,841	Atlanta BeltLine Intercept Surveys in May 2021 on the Eastside and Westside BeltLine Trail
	New Adult Daily Users	1,512	
	Existing Adult Daily Commuters	215	
	New Adult Daily Commuters	176	

[8] Atlanta Regional Commission (2020). *Walk.Bike.Thrive! A Regional Vision for a More Walkable, Bikeable, and Livable Metropolitan Atlanta*. [PDF File]. Retrieved from https://cdn.atlantaregional.org/wp-content/uploads/2016/05/walkbike-thrive-part-2-final-web-.pdf

[9] United States Census Bureau (2020). *S0801: Commuting Characteristics by Sex*. Retrieved from https://data.census.gov/cedsci/table?q=commute&tid=ACSST5Y2018.S0801&vintage=2018.

[10] National Centers for Environmental Information (2021). *Global Summary of the Month Location Details*. Retrieved from https://www.ncdc.noaa.gov/cdo-web/datasets/GSOM/locations/FIPS:13121/detail.

Key Assumptions	Values	Source
Project Users Commuter Percentage	11.7%	Atlanta BeltLine Intercept Surveys in May 2021 on the Eastside and Westside BeltLine Trail)
Adult Bike Commuter Percentage	3.27%	
Adult Pedestrian Commuter Percentage	8.4%	
Project Area Population Growth	0.14%	ACS 2000 – 2019 Block Group Population Data Surrounding Southside Trail
Average Trip Length (in miles)	6.51	ARC RTP Model
Conservative Trip Length (in miles)	3.25	ARC RTP Model
Weekday Peak Vehicular Occupancy (in persons)	1.48	USDOT BCA Guidelines
Days Commuting by Biking or Walking	160	Average Vacation/Holiday Time and National Centers for Environmental Information

4. Costs

4.1. Capital Expenditures

The capital expenditures are the primary expenditures for this analysis. The costs for the project include scoping and preliminary engineering, right-of-way (ROW) acquisition, utility relocation, and an estimated $39 million for construction.

The project will require an estimated $57,998,748 in expenditures in which $5,533,222 has been expended in scoping and preliminary engineering; $10,831,225 has been committed for right-of-way acquisition; $2,768,560 has been committed for utility relocation; and $38,865,641 for construction between 2024 and 2026. All preconstruction and construction activities are the responsibility of the City of Atlanta and Atlanta BeltLine. The SST schedule of expenditures is summarized in Table 4.

Scoping and preliminary engineering includes NEPA clearance, National Pollutant Discharge Elimination Systems (NPDES), and Stormwater Permits. The construction category includes all construction costs for the trail as well as project advertisements and biddings.

Table 4: Atlanta BeltLine Southside Trail Cost Categories Schedule

Cost Categories	Scoping, PE	ROW	Utility	Construction	Total
2016	$885,420.36	$1,969,065.00	-	-	$2,854,485.36
2017	$885,420.36	$1,969,065.00	-	-	$2,854,485.36
2018	$885,420.36	$1,969,065.00	-	-	$2,854,485.36
2019	$885,420.36	$1,969,065.00	-	-	$2,854,485.36

Cost Categories	Scoping, PE	ROW	Utility	Construction	Total
2020	$885,420.36	$1,969,065.00	-	-	$2,854,485.36
2021	$916,963.20	$785,900.00	$1,710,00	-	$3,412,863.20
2022	$126,171.00	$200,000.00	$1,058,560		$1,384,731.00
2023	$63,086.00	-	-		$63,086.00
2024	-	-	-	$9,000,000.00	$9,000,000.00
2025	-	-	-	$20,600,000.00	$20,600,000.00
2026	-	-	-	$9,265,641.00	$9,265,641.00
Total	**$5,533,222**	**$10,381,225**	**$2,768,560**	**$38,865,641**	**$57,998,7478**

The City of Atlanta and Atlanta BeltLine staff have already identified the majority of the funds as outlined in Table 5 for the creation of this project.

Table 5: Atlanta Beltline Southside Trail Construction Funding Sources

Proposed Funding Sources	Fund Name	Construction Expense ($2020)	% Financed by Source
RAISE	2021 RAISE Discretionary Grant	$22,000,000	57%
Other Federal Funds	Transportation Improvement Program (TIP) Federal Formula Funding	$4,000,000	10%
	House Transportation and Infrastructure Member Designated Project or Congressionally Directed Spending	$5,000,000	13%
Non-Federal Funds	Atlanta BeltLine Tax Allocation District (TAD)	$865,641	2%
	Atlanta BeltLine Multi-Use Trail Special Service District (SSD)	$3,500,000	9%
	Atlanta BeltLine Partnership – Philanthropic Community	$3,500,000	9%
Total Project Budget		$38,865,641	100%

4.2. Operations and Maintenance

The operations and maintenance (O&M) costs were provided by the City of Atlanta as they oversee the O&M for the Eastside and Westside Trails. The historical costs for O&M of the existing trails are based on acreage, with the trail containing a total of 21.4 acres. Historically, the first two years of O&M cost $15,000 per acre, with each subsequent year costing $4,500 - $5,000 per acre.

For this BCA analysis, the O&M costs in the subsequent years costs were increased and are higher than the historical data to cover future capital improvements (10%), overhead for managing maintenance (15%), and covering a higher level of service (25%). Based on these assumptions the

subsequent years (year 3-30) of O&M along the SST will cost $6,700 per acre. The resulting O&M costs are represented in Table 6.

Table 6: Operations & Maintenance Cost

Cost Category	2027 – 2028 (Per Year)	2029 – 2056 (Per Year)	Total 30 Year O&M
Operations & Maintenance	$321,000	$143,380	$4,656,640

5. Benefits

The SST BCA is based on proven national research conducted in previous studies related to multi-use and recreational trail benefits, while also incorporating statistically significant findings, proven methodologies, and national averages from the U.S. Census, American Community Survey, and other data sources relevant to the City of Atlanta.

The BCA approach monetizes the annual benefits, including safety benefits, travel time savings, environmental benefits, and quality of life benefits that will result from completion of the project, summarizes the annual benefits over 30 years, adjusts for inflation, and then discounts the values to present value. The present value benefits and associated costs were then compared to determine the BCR and Net Present Values (NPV).

There are two primary documents used during this analysis to define the benefits to immediate users of the trail. The first is *NCHRP: Report 552,* which details demand calculations as well as monetizes the associated benefits and provides formulas and assumptions for calculating the benefits related to recreation, health, and safety. The second document is the 2021 USDOT's *Benefit-Cost Analysis Guidance for Discretionary Grant Programs*, which provides recommended values for vehicular emissions and safety benefits.

Based on the available information, the value from constructing the SST and quantifiable benefits included in the analysis are:

- Safety Benefits
  - Reduction in Vehicular Crashes
  - Reduction in Bike and Pedestrian Crashes
- Travel Time Savings
  - Reduction in Trip Length
- Environmental Benefits
  - Reduction in Emissions from Mode Shift
  - Reduction in Emissions from Tree Planting
- Quality of Life Benefits
  - Reduction in Mortality Rates
  - Increase in Bike and Pedestrians Users

The project is expected to generate benefits for both trail users (including cyclists, pedestrians, and shared mobility devices) and non-users (including remaining road users, local businesses, and

property owners). Only benefits to pedestrian and cyclist trail users are estimated in this analysis due to incomplete information on the number of additional users by scooter and their value of mobility. It is thought, though, that their usage of the trail would substantially increase the value of the trail. The methodology and quantified benefits are listed below. An overview of the benefits and their anticipated discounted values in the opening and final year of analysis are provided are listed in Figure 4.

Figure 4: Associated Project Benefits

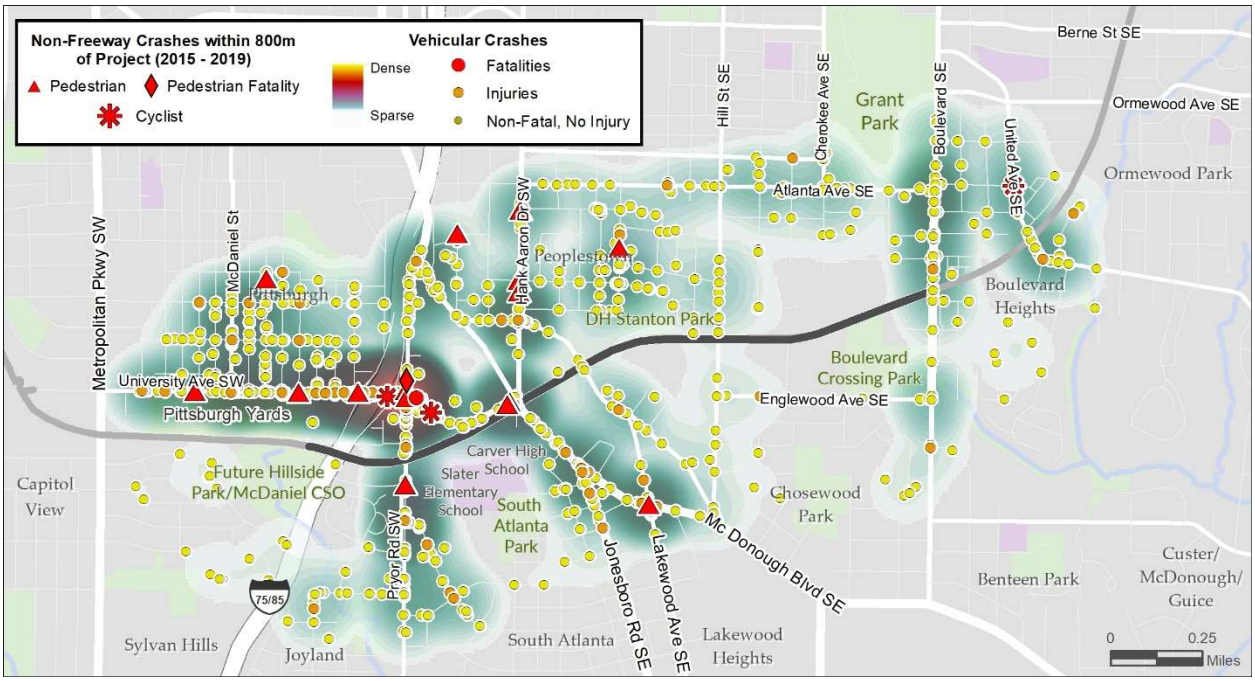
USDOT Benefit Category	Local Issue/ Concerns	Project Area Addressed	Type of Impact	Affected Population	Summary of Benefits*
Safety - Reduced Vehicular Accidents 	Vehicular safety on local roads	Induce drives to active modes of transportation	Reduces risk of vehicular accidents	Vehicles on the local road network	**Vehicle crash reductions:** • $5.6 K year 2027 • $0.8 K year 2056
Safety - Reduced Cyclist and Ped Accidents 	Cyclist and pedestrian safety on local roads	Provide off-road trail as part of a larger network	**Improves safety** for active transportation modes	Existing and new cyclists and pedestrians	**Cyclist and pedestrian crash reductions:** • $1.8 M year 2027 • $253 K year 2056
Travel Time Savings 	Travel time for cyclist commuters	Reduced distance for multi-modal transportation	**Improves** cyclists travel time	All multi-modal travelers, but only commuting cyclists calculated	**Travel time savings:** • $292 K year 2027 • $41 K year 2056
Emissions Reduction 	Emission reductions from vehicles and landscape	Increase active transportation and improve landscape	**Reduces** number of vehicles and **improves** the air quality	All travelers along corridor, nearby residents, and recreational visitors	**Emission reductions:** • $4.1 K year 2027 • $2.0 K year 2056
Quality of Life - Biking Recreation 	Lack of bicycle facilities and recreation	Provide off-road trail for bike recreation	Provides new source of recreation and **increases** cycling	Existing and new cyclists	**Biking recreation:** • $1.07 M year 2027 • $155 K year 2056
Quality of Life - Walking Recreation 	Lack of pedestrian facilities and recreation	Provide off-road trail for walking recreation	Provides new source of recreation and **increases** walking	Existing and new pedestrians	**Pedestrian recreation:** • $2.7 M year 2027 • $399 K year 2056
Quality of Life - Reduced Mortality 	Health of residents	Trail usage improves health of residents	**Improves** long-term health of users	New cyclists and pedestrians	**Reduced mortality:** • $139 K year 2027 • $20.4 K year 2056

** Future year benefits are appropriately discounted to the recommended dollar year (2019) using a 7% discount rate (3% for CO2) to allow for comparisons with other BCA elements*

5.1. Safety Benefits

Currently, most cyclists in the project area travel along sidewalks or ride on busy streets due to a lack of bike lanes in the area. At the same time, pedestrians must cross busy intersections, many of which are unsignalized. Figure 5 presents a map of crashes (by mode) recorded within 800 meters of the project extent in the last five years. Expanding to a slightly larger extent, Figure 6 overlays high-risk intersections found in the City of Atlanta's High-Injury Network (HIN)[11] with stressful routes identified by local cyclists through the Ride Report app.[12] The map underscores that the proposed trail would address an urgent need for a safe east-west connection across Atlanta's Southside for pedestrians and cyclists traveling to work, school, commercial nodes, and recreational opportunities. Figures 4 and 5 also highlight that the project would prove to be a safer option for both cyclists and pedestrians as it provides a mode choice separated from traffic. A key factor in the success of the existing Atlanta BeltLine's Eastside and Westside trails today is their safety from vehicular traffic, which helps to explain the trails high demand forecasts.

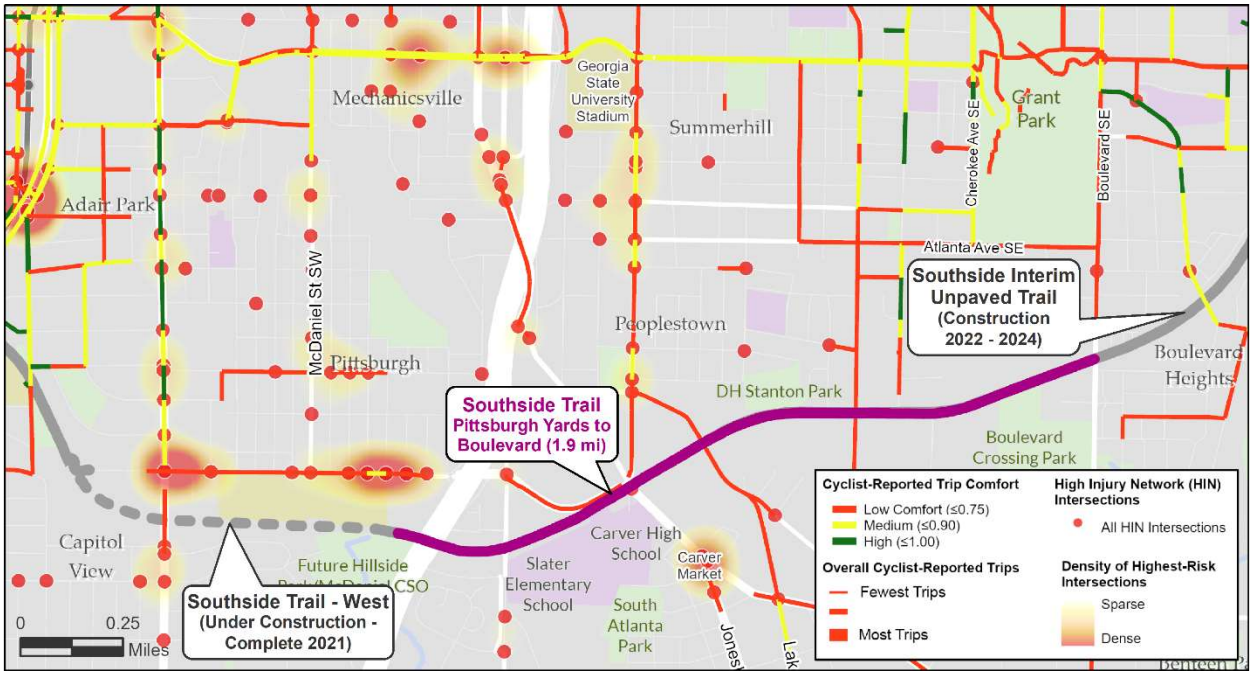
Figure 5: 5-Year Crashes Within 800m of the Project



[11] City of Atlanta (2018). *Atlanta's Transportation Plan: Final Report*. PDF retrieved from https://www.atlantaga.gov/home/showpublisheddocument/48083/637353603332230000.

[12] Street segments indicated in red represent routes rated as below-average by Atlanta-area cyclists through the Ride Report smartphone app. In the underlying heat map, "hot spots" indicate concentrations of HIN intersections but are also weighted by the severity of the intersection's risk score (high, higher, and highest).

Figure 6: City of Atlanta High-Injury Network Intersections in Last 5 Years



The number of vehicular and pedestrian/cyclist crashes avoided due to the project were calculated using the 2021 USDOT's *Benefit-Cost Analysis Guidance for Discretionary Grant Programs* for monetized values of injury and fatal crashes. Crash data within 800 meters of the project for the last five years (2015 – 2019) was averaged for fatal, injured, and property damage only. Crash data for 2020 was not utilized in this analysis since it was not available. The total accidents were 2,063 for the study area after removing accidents associated with the I-75/I-85 freeway, as seen in Table 7. Using this data, the five-year average for pedestrians, cyclists, and vehicles were calculated in Table 8.

Table 7: 5-Year Crash Averages (2015-2019)

Crashes	Pedestrian	Cyclists	Vehicle
Fatal	1	0	1
Injury	11	1	462
Others	3	1	1,583

Source: Numetric[13]

Table 8: 5-Year Crash Rates (2015-2019)

Crash Rate by Type	Pedestrian	Cyclists	Vehicle
Fatal	0.2	0	0.05
Injury	2.2	0.2	23.71
Others	0.6	0.2	81.23

[13] Numetric (2021). Retrieved from https://gdot.numetric.com/signin?returnUrl=%2Fcrash-query.

For pedestrian and cyclist crashes, the analysis assumes a 100% crash reduction rate since pedestrians and cyclists will no longer travel along local roads to reach destinations and will utilize the grade separated trail. For vehicular crashes, the crash rates were reduced by the "Reduced Miles Per Year" growth rate from 2030 to 2050. The crashes avoided by mode are seen in Table 9 for 2030 and 2050. No growth was assumed for pedestrian or cyclist crashes, and thus these crash rates will remain consistent over the SST project life. Only the crash rates for vehicles will change over the project as these values are based on mode shifts over time.

Table 9: Crashes Avoided by Mode

Crash Type	No Growth Assumed Pedestrian/Cyclists	2030 Vehicles	2050 Vehicles
Fatal	0.20	0.00	0.00
Injury	2.40	0.03	0.03
Others	0.80	0.10	0.11

Applied to the 2021 USDOT's *Benefit-Cost Analysis Guidance for Discretionary Grant Programs* cost per accident values of $12,071,000 for fatalities, $284,100 for injuries, and $4,500 for others, the value of the crashes avoided are presented in Table 10.

Table 10: Value of Crashes Avoided in $2019

Crash Type	No Growth Assumed Pedestrian/Cyclists	2030 Vehicles	2050 Vehicles
Fatal	$2,414,200	$784	$807
Injury	$681,840	$8,529	$8,771
Others	$3,600	$463	$476
Total	**$3,099,640**	**$9,776**	**$10,053**

The following benefits were realized for cyclists and pedestrians, as well as vehicles, in Table 11.

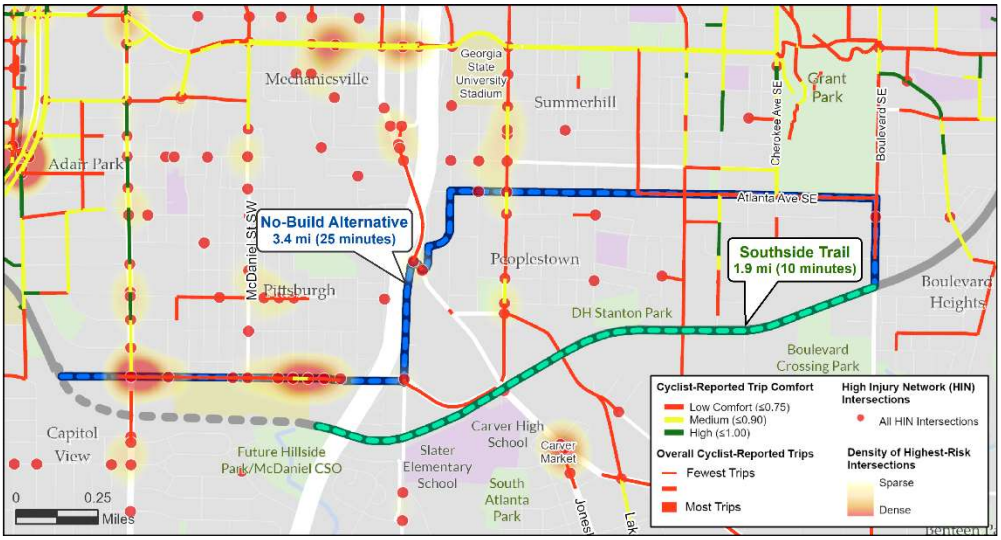
Table 11: Reduced Cyclist/Pedestrians and Vehicular Accidents Benefits

	In Project Opening Year (2027)	Over Project Lifecycle (2027 -2056)	
		In Constant Dollars	Discounted at 7%
Reduced Cyclist/Pedestrian Accident Costs	$3,099,640	$92,989,200	$23,953,180
Reduced Vehicular Accident Costs	$9,730	$298,060	$76,270
Total Safety Benefits	**$3,109,370**	**$93,287,260**	**$24,029,450**

5.2. Travel Time Savings

By constructing the SST project, trip lengths for pedestrians and bicyclists will be shortened. Currently, for users to go from the Eastside trail to the Westside trail, they have to take the No-Build route shown in Figure 7. The path was determined using Google Maps to find the shortest pathway and shows that there are currently no bike lanes along the route. The starting location for the No-Build scenario was determined to be at the existing Atlanta BeltLine connection to University Avenue since there is no direct connection from the western segment of the trail's origin to the local roadway network. This assumes that existing commuters know the trail ends and would get off at the connection which would provide them with the shortest path instead of doubling back from the dead-end of the current trail section.[14] The map also highlights the high-injury network indicating that the No-Build pathway is highlighted by several HIN intersections.

Figure 7: Eastside to Westside Trail Pathway Scenarios



The methodology for calculating the annual travel time savings is as follows:

*Annual Travel Time Savings = Marginal Detour Time * Daily Users * Hourly Value of Time * Annualization Factor*

The construction of the SST, or the Build scenario, would consist of a trip length of 1.9 miles. Without the SST, the trip from the Eastside to the Westside trail would take 3.4 miles. Thus, the marginal detour time is 1.5 miles. There was no local data available for average bicyclist travel speeds, so a national average was evaluated. It was found that typical bicyclist speeds within an urban setting are 12 – 18 miles per hour (mph)[15], though 11.8 mph was selected based on the

[14] City of Atlanta (2021). *Cycle Atlanta: Phase 1.0 Study: A Supplement to the Connect Atlanta Plan*. https://www.atlantaga.gov/Home/ShowDocument?id=18426.

[15] Bernardi, Silvia and Federico Rupi. *An Analysis of Bicycle Travel Speed and Disturbances on Off-Street and On-Street Facilities* (2013).

calculations from the USDOT hypothetical BCA example.[16] 2.38 mph was used for the pedestrian commuter speed, which comes from the *Manual of Uniform Traffic Control Devices* (MUTCD).[17]

Table 12: Marginal Detour Time

Inputs	Values
No-Build Distance	3.4 miles
Build Distance	1.9 miles
Difference	1.5 miles
Bicyclist Speed	11.8 mph
Pedestrian Speed	2.38 mph

To ensure there is no double-counting of benefits applied to users of the SST, the daily users were calculated by only taking into consideration those who would use it for commuting. To remain conservative, no growth was assumed for bicycle or pedestrian commuters over the life of the project.

Table 13: Daily Users

Commuter Details	Number of Commuting Bicyclists	Number of Commuting Pedestrians
Existing Adult Commuters*	60	155

Source: *Table 22 in Cyclist and Pedestrian Recreation Benefits

The hourly value of time was taken from 2021 USDOT's *Benefit-Cost Analysis Guidance for Discretionary Grant Programs Table A-3: Value of Travel Time Savings*, which estimates cycling at $33.00 per hour. The annualization factor was calculated in Table 3, which found that commuters would walk or bike 160 days out of the year.

Using the described formula, the benefits from travel time savings were carried over for the duration of the analysis period and are summarized in Table 14. On a yearly basis, the SST would save 1,235 bicycle and 13,986 pedestrian person hours for commuters in Atlanta.

Table 14: Total Travel Time Savings

	In Project Opening Year	Over Project Lifecycle (2027 -2056)	
		In Constant Dollars	Discounted at 7%
Total Travel Time Savings	**$502,288**	**$15,068,641**	**$3,881,540**

[16] USDOT (2021). *Preparing a Benefit-Cost Analysis for RAISE Grants.* https://www.transportation.gov/sites/dot.gov/files/2021-05/RAISE%2BGrants%2BPreparing%2Ba%2BBenefit-Cost%2BAnalysis%2B5-6-21.pdf.

[17] MUTCD (2009). Chapter 4E Pedestrian Control Features. https://mutcd.fhwa.dot.gov/htm/2009/part4/part4e.htm.

5.3. Emissions Savings

By inducing commuters to active modes of transportation, the SST has the potential to reduce the number of vehicles on the road, which would improve air quality through the reduction in auto use. Additionally, through the planting of new trees, the SST has the potential to further reduce carbon dioxide (CO^2) and nitrogen oxide (NOx) emissions through sequestration. The methodology for the modal shift reduced CO^2 and NOx emissions is as follows:

*Reduction in Emissions = ((Annual Commuter Trips * Average Trip Length) / Conversion Factor) * Emission Rate by Mile / Weekday Peak Occupancy of Commuters*

The methodology for the tree planting reduced CO^2 and NOx emissions is as follows:

*Reduction in Emissions = (New Trees Planted – Old Growth Trees Removed) * Conversion Factor*

The new adult daily commuters were calculated in Table 22 for the cyclists and pedestrian demand calculations. Using the average trip length from Table 3, it is assumed that 56,464 annual vehicular commuter trips will be removed with the new trail, as can be seen in Table 15. The conversion factors to convert the emissions into their correct form, as well as the emissions rates per pollutant, can be found in Table 16 and Table 17, respectively.

Table 15: Emissions Reduction Inputs

Commuter Details	Modal Shift
New Adult Daily Commuters*	176
Annual Commuter Trips	56,464
Average Trip Length	6.51
Conservative Average Trip Length	3.25
Weekday Peak Occupancy of Commuters[1]	1.48

Source: *Table 22 in Cyclist and Pedestrian Recreation Benefits

Table 16: Conversion Factors

Grams in Metric Ton	1,000,000.00
Pounds in Metric Ton	0.000453592

Table 17: Emissions Rates per Mile

Vehicle Type	Auto Emissions (Grams per mile per car)
NOx Emissions per mile[18]	1.39
CO^2 Emissions per mile[18]	411

[18] United States Environmental Protection Agency (2020). Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks. PDF retrieved from https://nepis.epa.gov/Exe/ZyPDF.cgi/P100EVXP.PDF?Dockey=P100EVXP.PDF.

Source: United States Environmental Protection Agency (2020)

The 2021 USDOT's *Benefit-Cost Analysis Guidance for Discretionary Grant Programs Table A-6* for damage costs associated with CO^2 and NOx were used for calculating the emissions savings from reducing vehicular usage by inducing commuters to bike and walk to work. The values for dollars per metric ton are presented below in Table 18.

Table 18: Damage Cost Per Metric Ton of NOx and CO^2

Year	NOx	CO^2
2026	$17,000	$57
2027	$17,300	$58
2028	$17,500	$59
2029	$17,700	$60
2030	$18,000	$61
2031	$18,000	$62
2032	$18,000	$73
2033	$18,000	$74
2034	$18,000	$66
2035	$18,000	$67
2036	$18,000	$68
2037	$18,000	$69
2038	$18,000	$70
2039	$18,000	$71
2040	$18,000	$72
2041	$18,000	$73
2042	$18,000	$75
2043	$18,000	$76
2044	$18,000	$77
2045	$18,000	$78
2046	$18,000	$79
2047	$18,000	$80
2048	$18,000	$81
2049	$18,000	$83
2050	$18,000	$84

Source: 2021 USDOT's *Benefit-Cost Analysis Guidance for Discretionary Grant Programs*

The Atlanta BeltLine aims not only to improve transportation, but also to improve the natural landscaping surrounding the project. Tree planting data for the project was calculated by each tree type and inserted into the iTree Tree Planting software to determine the estimated sequestration of CO^2 and reduction in NOx after taking the delta between the No-Build and Build

tree scenarios. Benefits for trees were only taken starting in 2037 to account for the growth in tree diameters to benefit emissions reductions. Table 19 displays the increase in emissions reduced with the scheduled tree plantings.

Table 19: Tree Planting Emissions Reduction between No-Build and Build Scenarios

Per Year Emissions	NOx Reduced (in pounds)	CO^2 Sequestered (in pounds)
No-Build (Per Year)	93.30	126,701
Build (Per Year)	138.37	142,419
Increase in Emissions Reduced Per Year	45.07	15,719

Based on the reduced vehicular trips and tree plantings, the project is estimated to save 0.20 metric tons of NOx and 59.17 metric tons of CO^2, as can be seen in Table 20.

Table 20: Annual Emissions Reduction by Pollutant

Year	Modal Shift - 2030 (Metric Tons)	Tree Plantings - 2037 (Metric Tons)
NOx emissions	0.18	0.02
CO^2 emissions	52.04	7.13

Using the project areas projected growth rate of 0.14% to grow the modal shift values, but not the tree planting values, the benefits from reduced emissions were carried over for the duration of the analysis period and are summarized in Table 21.

Table 21: Total Reduced Emissions Savings

	In Project Opening Year	Over Project Lifecycle (2027 -2056)	
		In Constant Dollars	Discounted at 7% (3% for CO^2)
Total Reduced Emissions Savings	**$6,040**	**$232,465**	**$91,350**

5.4. Quality of Life Benefits

The proposed SST project is expected to achieve three of the USDOT's quality of life guidelines:

- Increased Recreational Cyclists
- Increased Recreational Pedestrians
- Increased Health Benefits from Active Transportation

The proposed methodologies used for each are described in the following sections.

5.4.1. Cyclist and Pedestrian Benefits

The number of new recreational cyclists and pedestrians expected to use the proposed trail were analyzed to determine the recreational benefits for these groups. The NCHRP 552 Report provided the following formulas for calculation:

*Number of Adult Commuters = R * 0.4*
*Daily Existing Commuters = R * C * 0.4*
T(moderate) = 0.4 +1.2C
*Existing Users = R * T * C*
Ld = Distance from Project (L(400m) = 2.93, L(800m) = 2.11, L(1600m) = 1.39)
*New Adult Users = ∑ (Existing Adult Users * (Ld - 1)*
*New Commuters = ∑ (Existing Commuters * (Ld - 1)*
New Recreational Users = New Adult Users - New Commuters

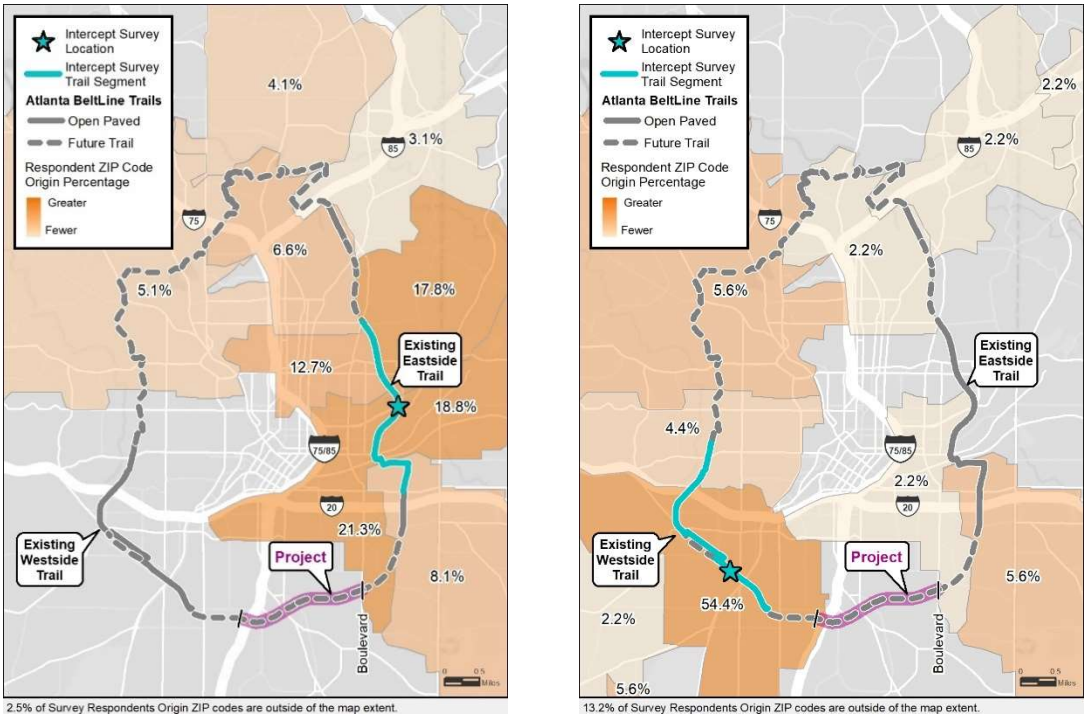
Where:

- R = Population in Buffers of 1600, 800, 400 Meters from the Project
- C = Commuter Share (Cyclists or Pedestrians)
- T = Total Adult Bicycling Rates by Low, Moderate, or High Rates (Moderate was used for this analysis)
- Ld = Likelihood Multiplier for Determining Project Usage Based on Distance

As noted in the key assumptions section, the formula assumes that 80% of the population are adults and 50% of them commute to work, and thus 40% of the population commutes to work. To bring this calculation closer to City of Atlanta factors, U.S Census QuickFacts[19] data was used to determine that the adult population of Atlanta is 76.4%, and with 50% commuting provides us with an estimate of 38.2% of Atlanta's population commuting to work. In preparation for the USDOT RAISE Grant, the Atlanta BeltLine conducted intercept surveys along the Eastside and Westside BeltLine trail on from May 18th to 23rd. It was found that 11.7% of those surveyed used the BeltLine to commute to work (C). This is a conservative estimate as only those who volunteered to stop and be surveyed had their responses recorded, and the value is almost a quarter of both what the NCHRP recommends and the City of Atlanta's adult population that commutes. Figure 8 displays the zip code origins of those surveyed as part of the intercept surveys. As can be seen, more than half of those surveyed live next to and use the trail system.

[19] United States Census Bureau (2021). *Atlanta city, Georgia; Georgia*. Retrieved from https://www.census.gov/quickfacts/fact/table/atlantacitygeorgia,GA/PST045219.

Figure 8: Eastside and Westside Intercept Survey – Zip Codes of Users



Using the same Atlanta BeltLine intercept surveys, the bike commuter share is estimated to be 3.27% of the BeltLine users. This is close to the 2.7% estimate found based on PUMA for the Fulton County (East) – Atlanta City (Southeast) area that covers the project area. Similarly, the pedestrian commuter share is estimated to be 8.4% based on intercept surveys, which is close to the 7.28% estimate found based on the PUMA data.

Figure 9: Eastside BeltLine Users in Winter

NCHRP 552 assumes a series of calculations to get the adult bicycling and pedestrian rates. Since the Atlanta BeltLine has permanent trip counters at over eight locations along the Eastside and Westside BeltLine, the trip counts directly abutting the east and west ends of the project at Allene Boulevard and Wylie Street were utilized instead. To calculate the growth for new adult users, the historical growth rate for the trail segments abutting the project were used. Based on the counts, the total existing users and commuters, as well as new users and commuters, are summarized in Table 22. An estimated 1,841 daily trips were recorded on the Atlanta BeltLine's Eastside and Westside trails in 2020. Despite the pandemic, there was a 48% increase in trail users from 2019 to 2020, showcasing the BeltLine's vitality and value to the community. With the new project, it is estimated there will be an additional

1,512 new adult users on this new section of the Atlanta BeltLine, which is conservative compared to historical values.

Table 22: Adult Cyclist and Pedestrian Demand

Daily Users	2019 Values	
	Bike	Pedestrians
Existing Adult Users	516	1,326
New Adult Users	423	1,089
Existing Adult Commuters	60	155
New Adult Commuters	49	127
New Adult Recreationalists	**374**	**962**

The new adult recreationalists for bikes and pedestrians were calculated by taking the difference between the new adult users and the new adult commuters. Based on the ACS 2015 and 2019 5-Year Commute to Work data, it was found that there has been a 12.6% growth in cyclists and a 3.6% growth in pedestrians over the last five years. However, the analysis remains conservative and uses the US Census Block Groups population data for the SST project area from 2000 to 2019 which assumes a 0.14% growth in cyclist and pedestrian commuters for the area. Due to the construction of this project, it is assumed that the bike and pedestrian growth in the area will be higher, similar to the historic trends along the Atlanta BeltLine's Eastside and Westside trails (historical growth rates from 2018 to 2019 of 32% pedestrians and 21% cyclists between both trails).

Figure 10: Eastside BeltLine Users in Summer

The NCHRP 552 Report utilizes a value of $10 for every hour of recreation per new adult recreationalists, multiplied by 365 days in a year. As the NCHRP 552 Report value is from 2004, it was adjusted for inflation based on the 2021 USDOT's *Benefit-Cost Analysis Guidance for Discretionary Grant Programs* to $13.24. Applying the population growth rate to the number of new adult recreationalists over the 30-year project analysis, along with the value per recreationalist, the following benefits were realized for cyclists and pedestrians in Table 23. To show how conservative our estimates are utilizing the locally applied data, which misses information due to intercept surveys not capturing all users, the recreational values

calculated using the NCHRP guidance are shown below as well. Section 6 highlights the sensitivity analysis used to arrive at these values.

Table 23: Adult Cyclist and Pedestrians Recreational Benefits

	In Project Opening Year	Over Project Lifecycle (2027 -2056)	
		In Constant Dollars	Discounted at 7%
Value to Recreational Cyclists	$1,825,830	$55,901,410	$14,304,110
Value to Recreational Pedestrians	$4,694,980	$143,746,470	$36,781,340
Total Recreational Benefits – Conservative Values	**$6,520,810**	**$199,647,880**	**$51,086,100**
Total Recreational Benefits – Alternative Values	**$17,366,220**	**$531,702,210**	**$136,052,510**

5.4.2. Health Benefits

The NCHRP 552 Report uses a health benefit calculation that takes the new adult recreationalists calculated above to determine the annual benefit from the project. The formula for carrying out this calculation is as follows:

*Annual Health Benefit = Total New Recreationalists * $128*

Based on the demand calculations in the Cyclist and Pedestrian Recreational benefits section above, the new recreationists were multiplied by the health benefit of $128. The $128 value was determined as the median value between 10 studies conducted to determine the value that a trail provides. As this value was determined in 2001, it was inflated to $177.29 to reflect 2019 dollars. These values are calculated from the assumption that providing the ability for residents to live a healthy lifestyle will reduce healthcare costs for the population. As the project area has limited recreational opportunities, this facility will enable residents to bike or walk to Grant Park, Piedmont Park, or just along the trail itself for miles. Table 24 contains the health benefits assumed for this project and showcases the conservative nature of the estimated benefits when compared to the calculations given from the NCHRP formulas. Section 6 highlights the sensitivity analysis used to arrive at these values.

Table 24: Health Benefits per Recreational User

	In Project Opening Year	Over Project Lifecycle (2027 -2056)	
		In Constant Dollars	Discounted at 7%
Total Health Benefit – Conservative Values	**$239,190**	**$7,323,340**	**$1,873,900**
Total Reduced Mortality Rate – Alternative Values	**$637,020**	**$19,503,550**	**$4,990,600**

6. Sensitivity Analysis

To remain conservative, several calculations throughout the BCA had their values reduced. This section provides a comparison between the values used in the analysis and their alternative values that would lead to a higher BCR. The alternative values are derived from federal and local data sources. The comparison can be seen in Table 25.

Table 25: Sensitivity Analysis - Key Assumptions Comparisons

Key Assumptions	Conservative Values	Alternative Values	Conservative Source	Alternative Source
Project Users Existing Adult Users	1,841	1,295	Atlanta BeltLine Intercept Surveys in May 2021 on the East and Westside BeltLine	NCHRP 552 T(moderate) Formula
New Adult Users	1,512	4,441		
Existing Adult Commuters	215	1,088		
New Adult Commuters	176	883		
Project Users Commuter Percentage	11.7%	40% (NCHRP) 36.2% (US Census)		NCHRP 552 and US Census Bureau
Adult Bike Commuter Percentage	3.27%	2.7%		2019 ACS PUMA
Adult Pedestrian Commuter Percentage	8.4%	7.28%		
Project Area Population Growth	0.14%	12.6% (Cyclists ACS)	ACS 2000 – 2019 Block Group Population Data	ACS 2015 – 2019 Commute to Work Data and Atlanta

Key Assumptions	Conservative Values	Alternative Values	Conservative Source	Alternative Source
		21% (Cyclists Atlanta BeltLine) 3.6% (Pedestrians ACS) 32%(Pedestrians Atlanta BeltLine)	Surrounding Southside Trail	BeltLine Historical Growth 2018-2019 from Permanent Counters
Average Trip Length (in miles)	3.25	6.51	Halved ARC RTP Model Values	ARC RTP Model

The alternative values listed would benefit all sections within this BCA. For Safety Benefits, the increased trip length would reduce emissions further for trips reduced due to modal shift. For Travel Time Savings, increased estimates for bicyclist commuters would provide additional savings in travel time. For Emissions Savings, increased growth rate would decrease emissions from more users shifting to multi-modal options. And for the Quality of Life Benefits, increased users would assume increased benefits for recreation and health. The remainder of this section will focus on the Quality of Life benefits as this category is most sensitive to user inputs.

As described in Section 5, Quality of Life Benefits, this analysis utilized permanent counters and intercept surveys along the existing Atlanta BeltLine trail that abuts both the east and west sides of the SST. For estimating the number of existing and new users for a trail, NCHRP 552 assumes that existing users adjacent to the new trail will be inclined to use the new pathway. Their willingness to use the new trail is based on their distance from the trail, which assumes distances of 0-400 meters, 400-800 meters, and 800-1600 meters, which those living closer having a higher likelihood of using the trail. The formulas for calculating this demand are highlighted in Section 5. Refer to the Sensitivity Analysis - QoL tab in the BCA spreadsheet for the step-by-step calculations.

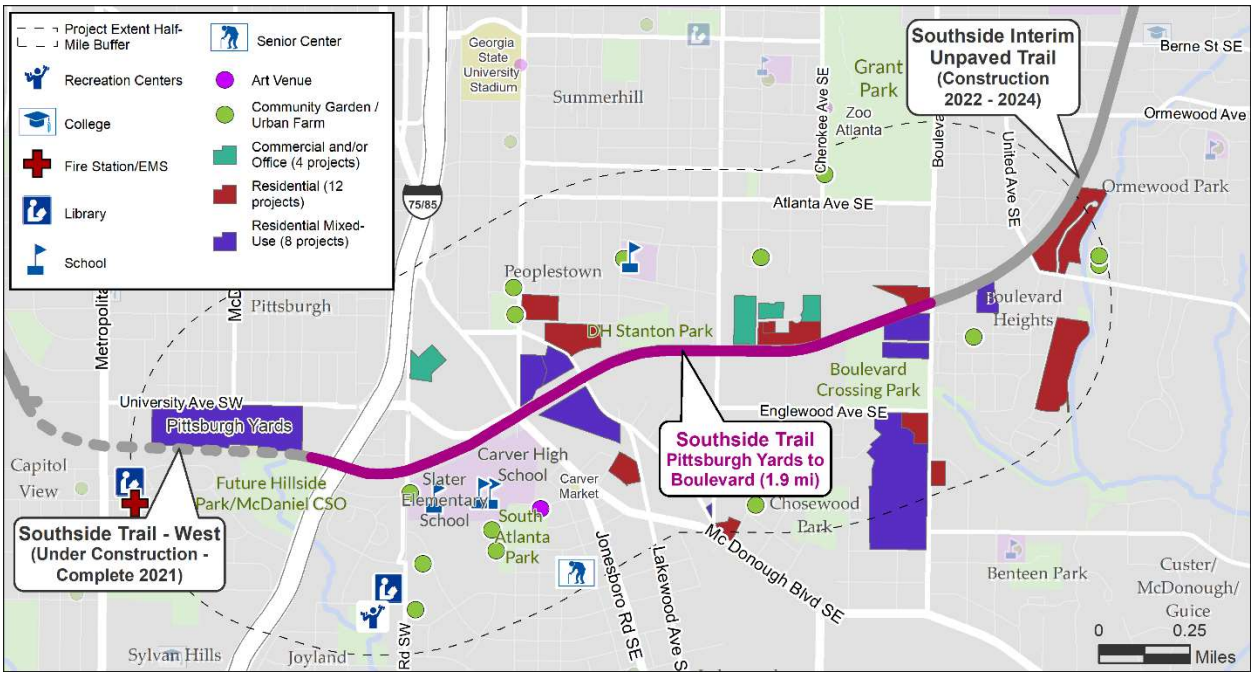
Utilizing the population data from the ARC model for 2020, the residents living within the specified distances from the SST were identified. Plugging these values into the NCHRP 552 formulas, the following values were calculated for the SST, as seen in comparison to the conservative values, in Table 26.

Table 26: Sensitivity Analysis - Adult Cyclist and Pedestrian Demand Comparison

Users	Conservative 2019 Values		Alternative 2019 Values	
	Bike	Pedestrians	Bike	Pedestrians
Existing Adult Users	516	1,326	319	976
New Adult Users	423	1,089	1,093	3,348
Existing Adult Commuters	60	155	294	794
New Adult Commuters	49	127	238	645
New Adult Recreationalists	**374**	**962**	**854**	**2,704**

The values for the population data are based on the region's MPO (ARC). For the alternative values, a 0.14% population growth was assumed based on historical population for the area, which is primarily single-family residential. However, this does not consider the proposed developments that are planned for the SST, which can be seen in Figure 11.

Figure 11: Proposed Development and Amenities Around the BeltLine



Since 2015, Atlanta BeltLine's Design Review Committee reviewed 22 significant developments and redevelopments within a half-mile of the project extent, together proposing over 4,000 residential units including 1,200 units of affordable workforce housing, more than 180,000 square feet of commercial, office, and light industrial space, and approximately 123 acres of

infill development. Over 70% of these projects have been proposed since 2019 alone, spurred in large part by the anticipation of the Southside Trail. Six developments have sought permits for over 1,900 units of housing since March 2020, and several more began construction over the same time period, suggesting that COVID-19 has not dampened private development within a half-mile of the proposed project extents. Table 27 displays the proposed or completed developments for the SST.

Table 27: Proposed or Completed SST Development Projects

Year of Development	Office Square Footage (sq ft)	Commercial Sq. Ft.	Residential Units
2017	20,000	-	-
2018	-	99,867	-
2019	-	-	-
2020	61,000	-	319
2021	-	-	320
2022	-	-	908
2023	-	-	1,242
Total	**81,000**	**99,867**	**2,789**

This recent growth has vastly expanded the supply of office, commercial, and multifamily housing in Southside neighborhoods. Prior to 2015, the area within a half-mile of the proposed project housed only 185,000 square feet of retail and office space, with no new buildings coming online since 2006. This included 12,000 square feet of in facilities classified as "Class A" in CoStar's Building Rating System. Since 2015, the study area has seen over 180,000 square feet of new office and retail built out, including approximately 119,000 square feet in Class A buildings.

On the multifamily side, residents have traditionally benefited from a robust supply of naturally occurring affordable housing within a half-mile of the proposed project. Until recently, there had been very little new construction to accommodate population growth at a variety of income levels. That began to change in large part due to anticipation of the SST. According to CoStar, the estimated 2,789 units of housing either recently delivered or in the development pipeline will more than double (163% increase) the supply of multifamily housing within a half-mile of the proposed project.

For local communities, these new private developments bring safe sidewalks and streetscape enhancements, which must be compliant with BeltLine Zoning Overlay standards, as well as new retail, job opportunities, and affordable housing. Together, these recent and planned redevelopments help redress decades of disinvestment, depopulation, and a shrinking tax base

that disproportionately harmed Black Atlantans in communities south of Interstate 20 (I-20). They also help achieve densities of jobs and housing necessary to support high-capacity transit; reverse decades of carbon-intensive land use patterns; and attract crucial businesses and services, like grocery stores, that have historically located north of I-20. This is particularly timely as communities in the project study area prepare for the arrival of both light rail transit on the BeltLine and, more immediately, MARTA's planned Summerhill BRT line that will deliver frequent transit service between the SST and downtown Atlanta. With the proposed developments, the expected growth in trail users and decline in vehicular trips due to mixed-use developments can further be expected to enhance the benefits of the SST.

Additionally, Table 25 shows that the permanent BeltLine counters showed a 21% increase in cyclists and 32% increase in pedestrians from 2018 to 2019, with ACS data for Fulton County (East) – Atlanta City (Southeast) showing a 12.6% increase in cyclists and 3.6% increase in pedestrians. Assuming the yearly growth in users for the conservative or alternative approach were increased at either of these rates, the recreational and health benefits would significantly improve.

Based on the alternative values, Table 28 displays the recreational benefits and Table 29 displays the health benefits.

Table 28: Sensitivity Analysis - Adult Cyclist and Pedestrians Recreational Benefits Comparison

	In Project Opening Year	Over Project Lifecycle	
		In Constant Dollars	Discounted at 7%
Total Recreational Benefits – Conservative Values	**$6,520,810**	**$199,647,880**	**$51,086,100**
Total Recreational Benefits – Alternative Values	**$17,366,220**	**$531,702,210**	**$136,052,510**

Table 29: Sensitivity Analysis - Health Benefits per Recreational User Comparison

	In Project Opening Year	Over Project Lifecycle	
		In Constant Dollars	Discounted at 7%
Total Health Benefit – Conservative Values	**$239,190**	**$7,323,340**	**$1,873,900**
Total Health Benefit – Alternative Values	**$637,020**	**$19,503,550**	**$4,990,600**

Though the addition of alternative values would improve all benefits associated with this BCA, this section only modified values to Quality of Life Benefits. Utilizing these alternative values, Table 30 displays the results of the conservative analysis with the sensitivity analysis.

Table 30: Sensitivity Analysis - Summary of Project Cost and Benefits Comparison

	Conservative Analysis - 7% Discount Value (3% for CO^2)	Sensitivity Analysis - 7% Discount Value (3% for CO^2)
Total Benefits	**$80,962,370**	**$169,045,440**
Net Present Value (NPV)	**$35,147,039**	**$123,230,109**
Benefit-Cost Ratio	**1.77**	**3.69**

7. Unquantified Benefits

Aside from the benefits mentioned already in this document, there are several impacts that were not calculated in this BCA that will likely have positive impacts from the SST project.

7.1. Students Walking and Biking to School

Figure 12: Student Using the BeltLine

The first unquantified benefit is the use of the trail by children, or those under 18 years old. There are two schools less than 100 yards from the project trail, T.H. Slater Elementary School and Carver High School. The student populations for both schools are 573 and 654,[20] respectively. Both schools have attendance zones that overlap the project, though Carver High School's attendance zone incorporates a larger area of the project. Since the Atlanta Public School System does not offer bus service to elementary school students within 1 mile or high school students within 1.5 miles of the school, it is estimated that several students will commute to school by walking or biking, of which the SST would provide a new, safer mode to do so. However, as the NCHRP 552 Report formulas only assume quantified benefits for adult commuters and recreationalists, these benefits were not incorporated into the BCA. With the addition of children using the project for safe routes to school as well as recreation, it can be assumed that the project's benefits in safety, recreation, and health would increase.

[20] Atlanta Public Schools (2021). Retrieved from https://www.atlantapublicschools.us/.

7.2. Reduced Pavement Maintenance

The second unquantified benefit is the reduced maintenance costs for roadways surrounding the SST. Per USDOT BCA Guidelines, pavement maintenance costs were calculated using the Highway Cost Allocation Study[21] (HCAS) pavement costs for Autos/Urban Interstate. As the users induced by the project to walk or bike to work have already been calculated in this study, it was found that there would be a benefit of $34,826 in constant dollars for the project. However, since most of the local roadways surrounding the project endure heavy truck use from the industrial facilities that once surrounded this project, it is anticipated that several of these roads will be re-paved with the construction of new developments with bike lanes. These projects would negate the immediate need for roadway maintenance and, thus, the benefit.

7.3. Utility and Stormwater Improvements

Another unquantified benefit is the BeltLine's innovative project delivery and design that aims to reduce stormwater runoff as well as enter into a public-private partnership (P3) to design and deploy a communications network within the construction that consists of a multi-duct and fiber optic network system.[22] The BeltLine is a regional leader in stormwater management, featuring urban fresh water reservoirs, native or native-adapted plantings, geowebs to allow stormwater infiltration, on-site collection and filtration of stormwater runoff from land embankments with bio-filtration swales or other sustainable practices. It is anticipated that the SST project will feature the following total onsite retainage volume as seen in Table 31.

Table 31: SST Total Onsite Retainage Volume

Stormwater Retainage	In Project Opening Year	Over Project Lifecycle
Underground Storage (ft^3)	**102,373**	**3,071,185**
Enhanced Swales (ft^3)	**36,432**	**1,092,958**
Above Ground Bioretention Ponds (ft^3)	**53,117**	**1,593,510**
Total Onsite Retainage Volume (ft^3)	**191,922**	**5,757,653**

The value of the benefits from the native and native-adapted plants can be derived from the value from the lack of irrigation required to maintain them, saving money from reduced watering fees. Additionally, there is the added benefit of reduced stormwater construction required from the City of Atlanta to retain the anticipated runoff had the project not been constructed.

[21] U.S. Department of Transportation Federal Highway Administration (2000). *Addendum to the 1997 Federal Highway Cost Allocation Study Final Report*. [Web Page]. Retrieved from https://www.fhwa.dot.gov/policy/hcas/addendum.cfm

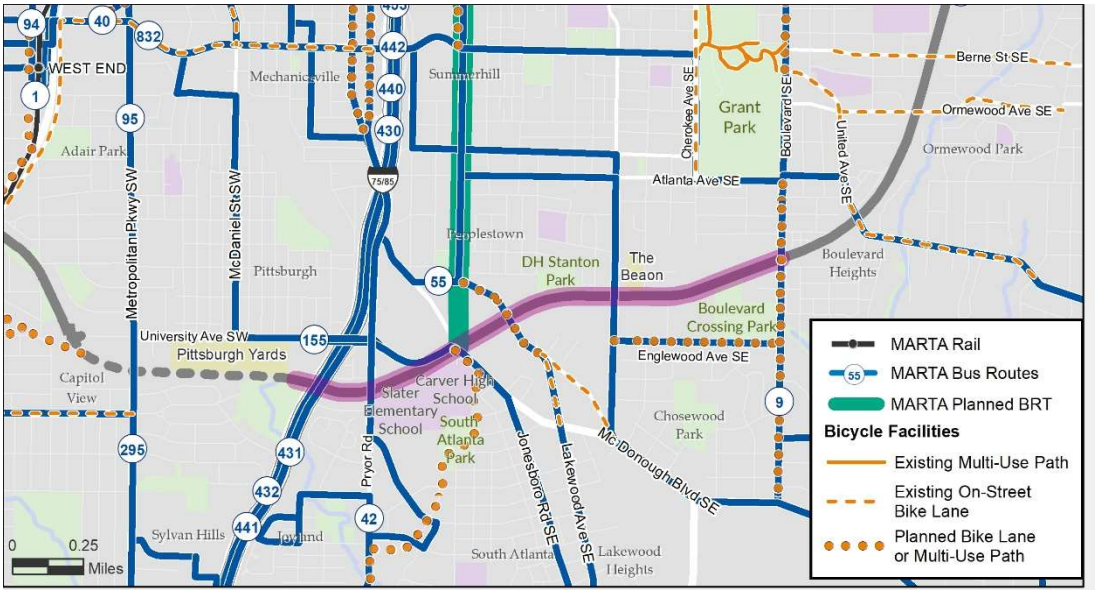
[22] Atlanta BeltLine (2021). Retrieved from https://beltline.org/2021/05/20/public-private-partnership-completes-transformation-of-atlanta-beltlines-smart-city-corridor-and-paves-way-for-new-development-opportunities/.

The utility investment enables the Atlanta BeltLine to assist the City of Atlanta with the transformation to a smart city, promoting digital growth within neighboring communities as well as reducing the digital divide in Environmental Justice communities. The capabilities from this partnership include installing 1.25 inch duct and 288 count fiber along the corridor, while leasing excess duct, dark fiber, and wireless capacity along the BeltLine. The utility investment will span the full 1.9-mile project corridor. The value of the benefits from this investment can be derived from the assumed cost to construct similar fiber capabilities within the neighboring communities, including installing new duct banks, purchasing additional right-of-way, and paying for new construction. The value of this utility installation is estimated at $879,615.

7.4. Connectivity to Other Multi-Modal Projects

Multi-modal connections to the Atlanta BeltLine help to encourage users to walk or bike to the facility. While there are plenty of local sidewalk connections to the BeltLine, there is minimal bicycle infrastructure in place, as can be seen in Figure 13. As such, the City of Atlanta will be constructing a cycle track along Boulevard Avenue, the eastern extent of the SST project. Using the calculations from the NCHRP 552, it was found that the construction of both projects would create 19 new recreational cyclists. This would have a recreational value of $91,830 and a health benefit value of $3,370 in the opening year of the project.

Figure 13: Bike Infrastructure Around the SST



7.5. Access for ADA and Aging Populations

The ARC conducted a survey entitled “Metro Atlanta Speaks”, which found that transportation was the second highest concern for the elderly population in Atlanta. With this, several regional and local plans have addressed steps for assisting aging in place. The ARC’s *Walk. Bike. Thrive!* plan establishes initiatives for creating walkable and bikeable communities, with the BeltLine a prime example of delivering an accessible trail for aging populations and those with disabilities.

Additionally, ARC's *Lifelong Community Partnership*[23] focuses on how to provide housing and transportation options to ensure all ages and abilities can access services and remain independent, with the BeltLine a contributing factor for inner city residents. The Atlanta BeltLine is designed for all users and focuses on ensuring accessibility for those with disabilities and aging populations, with ADA accessible access locations shown in Figure 15.

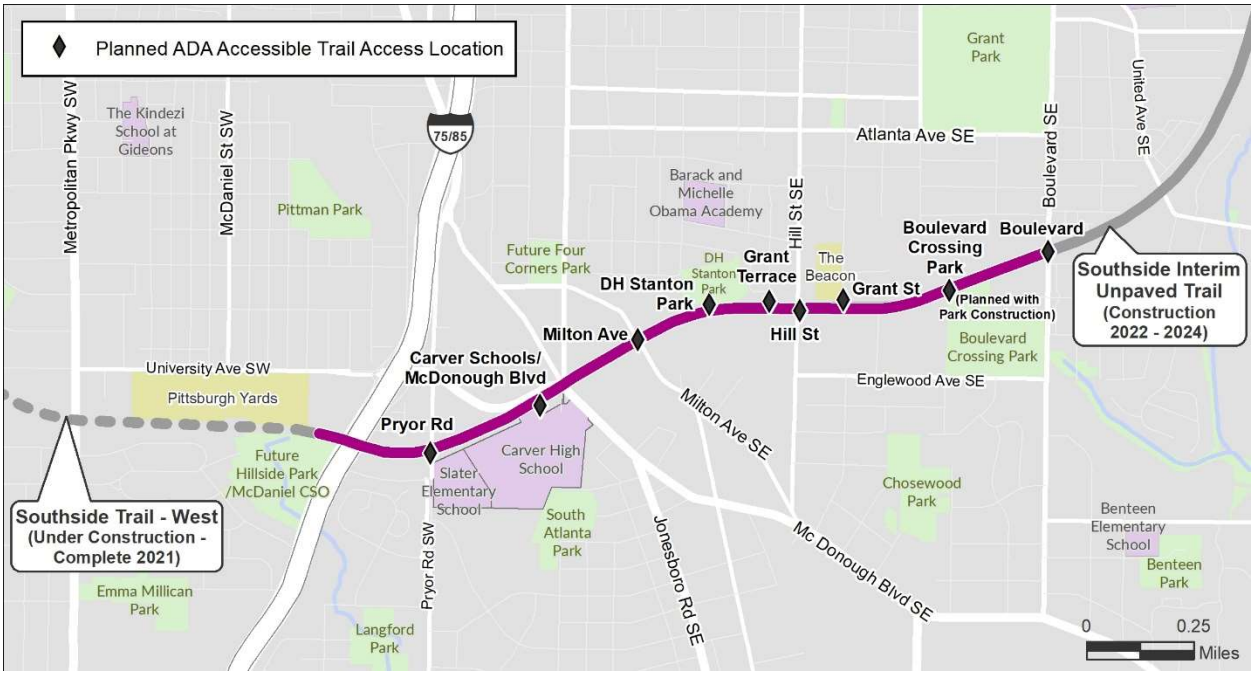
Figure 14: Suitability for All Ages

Staff from Stantec, an internationally recognized transportation engineering and planning firm, conducted an intercept survey on Atlanta BeltLine's behalf. They performed intercept surveys along the Eastside and Westside Atlanta BeltLine trail abutting the ends of the BeltLine as it approaches the proposed SST project. The survey was utilized to understand the purpose of the users' trips, where they originated from, and what modes they utilized along the trail. In addition to this, respondents were surveyed on which age group they fell within. Of the 422 users surveyed, it was found that 3.55% of the total users were 65 or older. Since the intercept surveys only captured those willing to talk to the surveyors, this value is considered low. Using the PUMA for the Fulton County (East) – Atlanta City (Southeast), it was found that 8.9% of the population within this area is 65 or older. While these benefits are difficult to quantify monetarily, it is worth noting that it can be assumed a conservative value of at least 42 of the New Adult Users on the SST will be 65 or older and benefit greatly from the BeltLine's inclusive design structure.

Additionally, Disability Characteristics from the US Census Bureau Table S1810 shows that 9.8% of the population within this area have a disability, of which 2.7% have a vision difficulty, 1.4% have a self-care difficulty, and 2.9% have an independent living difficulty.[24] Based on these percentages, it can be assumed that 148 of the New Adult Users on the SST will have a disability characteristic.

[23] Atlanta Regional Commission (2021). *The Lifelong Community Partnership*. Retrieved from: https://atlantaregional.org/aging-health/lifelong-communities/advocating-for-lifelong-community-options/.
[24] United States Census Bureau (2021). *S1810*: Disability Characteristics. Retrieved from: https://data.census.gov/cedsci/table?q=Disability&g=7950000US1301007&tid=ACSST1Y2019.S1810&hidePreview=true.

Figure 15: ADA Accessible Trail Access Locations



8. BCA Summary

The SST project proposes continuing the vision of the Atlanta BeltLine by revitalizing inner city neighborhoods and providing new means of safe, active transportation in a car-centric city. This project is the top priority for the City of Atlanta, as well as the Atlanta BeltLine, and is estimated to attract 1,220 new daily adult users, provide an increase in state and local tax revenue resulting from an expanded tax base, and add a significant infusion of new jobs created through direct or supporting industries. The funding from the RAISE grant will enable the project to realize the associated benefits in safety, travel time, emissions reductions, and recreation for years to come. After adjusting for inflation and a 7% discount rate (3% for CO^2), the project is expected to result in a positive benefit-cost ratio of 1.71. The benefits are summarized in Table 32 and Figure 16.

Table 32: Summary of Project Cost and Benefits

Net Present Values	In Project Opening Year	7% Discount Value (3% for CO^2)
Construction Costs	-	$44,507,331
Maintenance Costs	$321,000	$1,308,000
Total Costs	**$321,000**	**$45,815,331**
Reduced Cyclist/Pedestrians Accident Costs	$3,099,640	$23,953,180
Reduced Vehicular Accident Costs	$9,730	$76,270

Net Present Values	In Project Opening Year	7% Discount Value (3% for CO^2)
Improved Travel Time Savings	$502,288	$3,881,540
Reduced Emissions Savings	$6,040	$91,350
Value to Recreational Cyclists	$1,825,830	$14,304,110
Value to Recreational Pedestrians	$4,694,980	$36,781,990
Value to Health Benefits	$239,190	$1,873,900
Total Benefits	**$10,377,696**	**$80,962,370**
Net Present Value (NPV)	**$10,056,696**	**$35,147,039**
Benefit Cost Ratio	**-**	**1.77**

Figure 16: Percentage Breakdown of Benefits and Quality of Life Benefits