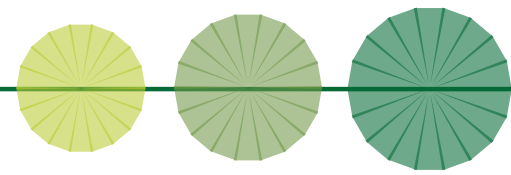


BCA Narrative

Table of Contents

INTRODUCTION	2
PROJECT OVERVIEW	2
BCA RESULTS	2
Overview	2
Detailed Summary of Benefit-Cost Analysis	3
ALTERNATIVES	4
No-Build Alternative	4
Build Alternative	4
BCA METHODOLOGY	5
Analysis Period	6
Safety (Tab C)	6
Environmental Sustainability	7
Emissions Reduction - Bus Electrification (Tab D)	7
Fuel Savings and Bus Salvage (Tab E)	7
Passenger Vehicle Emissions	8
Quality of Life	8
External Highway Operating Costs – Buses (Tab F)	8
External Highway Operating Costs (Tab G)	8
Mobility and Community Connectivity	9
Passenger Travel Time Savings (Tab H)	9
Economic Competitiveness	10
Facility Operations Savings (Tab I)	10
Property Value and Development Potential (Tab J)	10
Transit Amenities (Tab K)	11
State of Good Repair	12
Residual Capital Value (Tab L)	12
Operations and Maintenance Costs (Tab M)	13
Factors Not Quantified	13
BCA RESULTS	14



Introduction

This narrative summarizes the assumptions, methodologies, and results of the Benefit-Cost Analysis (BCA) for the **Triangle Mobility Hub** FY24 RAISE grant application. This BCA provides a means to measure the project's overall benefit by developing a uniform measurement of the impact the project has on society. This is accomplished by assigning a dollar value to benefits that can be compared to the construction costs and other related costs. In the BCA, the capital costs of constructing and maintaining the project are compared to the net benefit that the project provides to the region. The costs and benefits are discounted to compare all costs and benefits with a common measure such as using 2022 dollars.

Project Overview

The Triangle Mobility Hub will be a multimodal transportation center, positioned in the heart of a new transit-oriented district in North Carolina's Research Triangle Park (RTP). It will link bus service, paratransit, and micro-transit with planned bus rapid transit, passenger rail, and a regional multi-use path. The hub will support frequent and high-quality transit by providing a safe, convenient, and accessible place to transfer seamlessly between transportation modes.

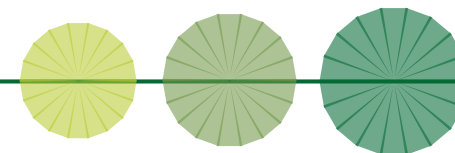
BCA Results

Overview

The cumulative benefits of the project are monetized at \$269 million in non-discounted benefits, compared to a non-discounted project cost of \$54 million in 2022 dollars.

As a result, the project has a Benefit-Cost Ratio (BCR) of 5.02¹, which represents a favorable investment of federal funds and a significant benefit to the region.

¹Assuming a 2% discount rate for CO² emissions, and 3.1% discount for all other benefits

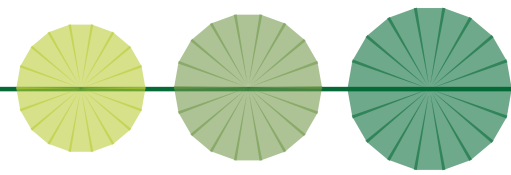


BCA Narrative

Detailed Summary of Benefit-Cost Analysis

Possible Societal Benefits for Consideration		Key Benefits Quantified	Total Benefits (Undiscounted)	Present Value (Discounted at 3.1%)
Safety	Crash Savings	Reduction in injury and PDO crashes related to personal vehicle VMT reductions and improvements in safety at the local intersections near the new Triangle Mobility Hub (TMH) location	\$1,719,572	\$964,546
Environmental Sustainability	Emission Reduction - Fleet Electrification	Reduction in bus emissions due replacement of ten diesel buses with 10 electric buses	\$137,760	\$66,638
	Fuel and Bus Fleet Reduction	Reduction in diesel fuel cost due to increase Electric Bus fleet and reduction in vehicle cost due to increased transit route efficiency	\$24,618,033	\$13,342,772
State of Good Repair	External Highway Costs (Noise, Congestion, Pavement, Emissions) _Buses	Benefits streaming from reduction in VMT of buses due to addition of charging facilities at TMH	\$1,493,107	\$826,696
	External Highway Costs (Noise, Congestion, Pavement, Emissions)	Benefits streaming from reduction in VMT of personal vehicles due to Build scenario	\$64,087,156	\$36,335,470
Mobility and Community Connectivity	Passenger Travel Time Savings	Reduction in personal travel delays due to mode shift to transit. Rate of mode shift is accelerated in the Build Condition. Reduction in personal travel to Park and Ride due to location of TMH	\$36,965,983	\$19,715,960
Economic Competitiveness and Opportunity	Transit Operations Costs	Reduction in operations costs based on reduction in vehicle revenue hours due to greater route efficiencies resulting in reduced average travel distance and increased averaged travel speeds	\$41,468,693	\$22,960,178
	Property Value	Assumed increase in property value in the surrounding ½ mile due to increased access to increase transit access and complementing TOD	\$40,559,252	\$33,770,535
	Transit Amenities	Revealed/Stated Transit Preference Benefit of Transit Facility Amenities. Assumes a higher value of amenities in the new Facility due to a newness factor.	\$48,723,224	\$25,560,903
Other	Residual Value	Residual value of assets at the end of the analysis period	\$10,762,969	\$3,697,250
	Operations & Maintenance Costs	Cost of regular maintenance and inspection of assets	-\$1,126,302	-\$589,566
Total Benefit			\$269,409,448	\$156,651,383
Total Costs			-\$53,694,562	-\$30,018,414
Benefit / Cost Ratio			5.02	5.22
NPV			\$215,714,885	\$126,632,969

▲ Table 1: Benefit Cost Analysis Summary



Alternatives

Consistent with the direction provided by the US Department of Transportation (USDOT), the BCA compares a No-Build Alternative and a Build Alternative. These alternatives compare the benefits and costs of doing nothing at the project location to completing the improvements.

No-Build Alternative

The No-Build Alternative maintains the temporary facility at the current location and assumes the service increases included in the regional transit plan including increased peak hour frequency on existing routes. This assumes no major improvements will be made to the existing facility, and that current operational challenges will continue unabated. Ridership will continue to grow at 2.4 percent per year consistent with historic ridership increases as reported by GoTriangle. These assumptions develop a baseline to compare with the benefits from constructing the project. The No-Build Alternative is consistent with USDOT BCA guidance.

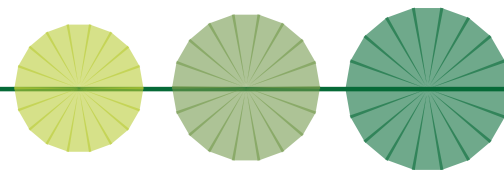
Build Alternative

In the Build Alternative, GoTriangle will construct the new Triangle Mobility Hub at a proposed site near the southwest quadrant of NC 54 and S Miami Boulevard, at 4135 E NC 54 in Research Triangle, NC. This new facility will replace the existing, temporary transit center located at 4600 Emperor Blvd in Durham, NC, a few miles away.

The proposed location for the new facility will create operational efficiencies including shorter routes and improved travel times for GoTriangle's fixed transit routes, and facility design improvements to provide transit vehicle priority and reduce congestion at key access points to the facility from major roads. It will also create transportation safety improvements and new multimodal connections for pedestrian and cyclists traversing the region and accessing the transit and future bus rapid transit and passenger rail connections planned for the proposed site.

The new facility will include 12 bus bays, 2 layover bays, and a separate area dedicated to paratransit and rideshare drop-off, which will be able to accommodate vehicles up to 30-feet in length. The facility will also feature essential passenger quality of life improvements, such as covered waiting areas and indoor ticket vending among many other amenities. The new design will also include safety improvements, including a signalized intersection at the facility entrance, and will be co-located with planned passenger rail station and future bus rapid transit service. The proposed site has better access to major regional transportation arterial roadways, reducing overall drive time for transit vehicles and those accessing the park-and-ride facility. The facility is also located closer to major regional employers, as well as planned future transit-oriented developments, increasing long-term ridership potential.

Other improvements of the Build Alternative include the ability to accommodate an expanded electric fleet for GoTriangle with new electric charging infrastructure for fleet vehicles at the Mobility Hub and the replacement of 10 existing diesel buses with electric buses.



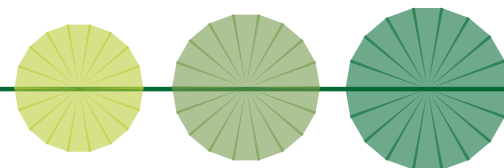
BCA Methodology

The BCA was developed using the updated 2024 guidance provided by the USDOT. Analysis was completed as necessary to develop the benefits and costs of the No-Build and Build alternatives. Major components of the analysis include:

- ▶ Costs and Disbenefits
 - Initial capital costs
 - Facility maintenance costs
- ▶ Benefits
 - Safety benefits associated with the proposed signalization at the transit center entrance
 - Environmental benefits associated with a reduction in bus and passenger vehicle miles traveled (VMT)
 - Environmental benefits and fuel cost savings associated with accelerated bus fleet electrification
 - Reduction in highway use costs (i.e., vehicle operating costs, congestion costs, noise costs, safety costs, emissions costs, pavement wear costs) associated with
 - Reduced bus VMT due to a more efficient facility location, and
 - Reduced passenger VMT due to mode shift
 - Travel time savings associated with a more efficient facility location, reduced wait and transfer times, and reduction in distance between the park and ride area and the transit facility
 - GoTriangle operating savings due to reduced revenue hours, related to the more efficient facility location
 - Local property value increases associated with Triangle Mobility Hub and complementary Transit-Oriented Development (TOD)
 - Value of transit amenities related to rider experience
 - Residual capital value at the end of the BCA period

In addition to the main benefits, unquantified benefits were also identified. These benefits were not developed into monetized results but describe additional value of constructing the project beyond the quantified results of the BCA. These broader benefits are generally discussed in the Project Description and Merit Criteria narrative.

The BCA spreadsheet included in this application begins with an Inputs tab containing key information about the project. This tab also includes many of the inputs and assumptions discussed below and provides source information, as appropriate. The next tab is the Summary which includes all the annualized costs and benefits and calculates the BCA results. The following tabs calculate the individual costs and benefits including construction costs and residuals, safety impacts, travel time, and others. These individual tabs reference information from the main Inputs tab and include additional inputs and sources as necessary.



Analysis Period

The BCA analysis was completed for a 30-year period starting in 2028 when the Triangle Mobility Hub begins operation. Per the Federal Transit Authority’s Asset Management Guide Supplement,² “maintenance facilities are typically built to last at least 50 years or many times the life of the agency’s normal revenue vehicle.” A 30-year operating period was chosen to align with the FTA’s assessment of facility design life while also staying within USDOT guidance.

The analysis uses the current project schedule and construction duration assumptions. This assumes construction will begin in spring 2026 and be completed by spring 2028. Any temporary net benefits or indirect costs caused by the construction of the project, including jobs created by the construction or travel time delays due to construction are assumed to be minimal and were excluded from the analysis. Based on this schedule, the project costs will be \$53.7M in 2022 dollars undiscounted and \$30.0M using a 3.1% discount rate. 2028 is the first full year that benefits from the project will begin.

SAFETY (TAB C)

The proposed transit center facility entrance on NC 54 is to be signalized. The Build Alternative will improve safety at the facility’s access point through this signalization, thereby reducing the propensity for all types of crashes at the facility entrance.

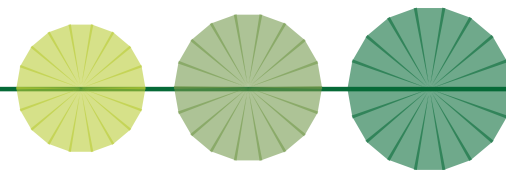
Crashes along NC 54 from Wilkinson Farm Road/Select Drive to South Miami Boulevard occurring between 2018 and 2023 were quantified.³ The five-year average annual crash rate (organized by crash severity) at the proposed facility entrance is detailed below in Table 2.

	K (Fatality)	A (Serious Injury)	B (Minor Injury)	C (Possible Injury)	O (Property Damage Only)
2018 – 2023 Crash History	-	-	-	6	18
Average Annual Crash Rate	-	-	-	1.20	3.60

▲ Table 2: Five-Year Crash History

²Federal Transit Authority Asset Management Guide Supplement: Asset Category Overviews & Lifecycle Management Update

³Crash history sourced from the North Carolina Department of Transportation Traffic Engineering Accident Analysis System



Per the Crash Modification Factor (CMF) Clearinghouse,⁴ the installation of a traffic signal corresponds to a CMF of 0.61. Applying this CMF to the crash history at the transit center facility entrance corresponds to an annual crash reduction of 0.73 “possible injury” crashes and 2.20 “property damage only” crashes. Applying the crash monetization factors provided by the USDOT BCA guidance, this annual crash reduction is associated with an annual cost savings of approximately \$59,000. Over the course of the analysis period, this corresponds to approximately \$1.7M in cost savings, or \$965,000 discounted at a rate of 3.10%.

Environmental Sustainability

The project is assumed to result in an overall reduction in emissions based on three factors: a decrease in bus revenue miles traveled due to operational efficiencies, the ability to electrify the existing transit fleet, and a reduction in overall passenger VMT based on an assumed ridership increase.

EMISSIONS REDUCTION - BUS ELECTRIFICATION (TAB D)

The project includes accelerated electrification of GoTriangle’s bus fleet where 10 diesel buses will be replaced with 10 electric buses. This accelerated electrification represents an environmental benefit through the elimination of fossil fuel emissions.

Based on the average annual VMT per GoTriangle bus, the accelerated electrification corresponds to an annual carbon dioxide (CO₂) emissions savings of approximately \$123,000 and an annual non-CO₂ emissions savings of approximately \$14,000. The total of CO₂ and non-CO₂ annual emissions savings is approximately \$138,000, or \$121,500 discounted.⁵ **The total of annual emissions savings over the course of the analysis period is approximately \$4.1 Million, or \$2.7 Million discounted.**

FUEL SAVINGS AND BUS SALVAGE (TAB E)

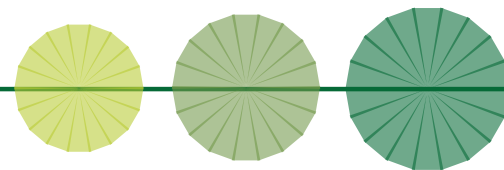
The accelerated electrification of the GoTriangle bus fleet is expected to result in reduced fuel costs and a monetary benefit based on the salvage value of diesel buses gradually being retired. While these benefits may only be tangentially related to environmental sustainability, these benefits are presented in the **Environmental Sustainability** section of this document because they are related to the electrification of the GoTriangle bus fleet.

The project proposes to introduce 10 electric buses in the GoTriangle fleet in 2028. Based on the cost of diesel fuel versus the cost of electric charging, the accelerated electrification is associated with an annual benefit of approximately \$345,000 in the first year of project use. Assuming an annual escalation in the cost of diesel fuel and electric charging of 2.5%, the total fuel savings over the course of the analysis period is approximately \$15.1M.

The efficiency of the new location will allow GoTriangle to retire three diesel buses from its current fleet. The diesel buses can be sold as they are decommissioned, making the salvage value of the buses an overall benefit to the project. The BCA assumes a 12-year life for the buses; therefore, one diesel bus will be retired each in 2028, 2040, and 2052. The reduction in buses at a cost of \$680,000 per diesel bus over the course of the analysis period is associated with a total salvage benefit of approximately \$9.1M.

⁴[Crash Modification Factors Clearinghouse – Install a Traffic Signal](#)

⁵Per USDOT 2024 BCA Guidance, CO₂ emissions savings are discounted at a rate of 2% while all nonCO₂ emissions savings are discounted at a rate of 3%



Based on a salvage value of \$35,000 for each diesel bus, ten diesel buses that will be retired in 2028 represent a total salvage benefit of approximately \$350K.

The sum of fuel savings and salvage value over the course of the analysis period is approximately \$24.3M, or \$13.1M discounted at a rate of 3.10%.

PASSENGER VEHICLE EMISSIONS

Note, the BCA includes an evaluation of emissions reduced through passenger mode shift in the evaluation of external highway operations cost savings. Please refer to **External Highway Operating Costs (Tab G)** for the summary of this evaluation.

Quality of Life

EXTERNAL HIGHWAY OPERATING COSTS – BUSES (TAB F)

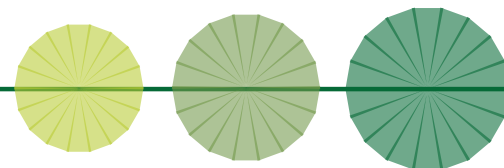
The Triangle Mobility Hub will include charging stations for the electric buses in GoTriangle's fleet. The proposed location of the transit center facility and its charging stations is more central to fixed bus routes than the location of GoTriangle's only existing charging facility, at the Bus Operations & Maintenance Facility. On average, the ability to charge at the Triangle Mobility Hub will prevent the electric buses in GoTriangle's fleet from having to make an 8.2 mile round-trip to the only existing charging facility. This reduction in required trips and miles traveled can be associated with a reduction in external highway operating costs, including vehicle operations, congestion, noise, safety, and pavement wear.

Applying the monetized values associated with external highway operating costs provided by the USDOT 2024 BCA Guidance with the proposed number of electric buses in GoTriangle's fleet, the reduced trip length to the existing charging station, and the anticipated annual number of trips to the existing charging station yield an annual benefit of approximately \$49,800. Over the course of the analysis period, **this represents a total benefit of approximately \$1.5M, or \$827,000 discounted at a rate of 3.10%.**

EXTERNAL HIGHWAY OPERATING COSTS (TAB G)

The improved quality of service made possible by the Triangle Mobility Hub is expected to incite mode shift away from personal vehicle use and towards greater use of transit. The new transit center facility location is also closer in proximity to the nearby park and ride facility compared to the temporary transit center facility; therefore, the new location is associated with reduced trip length for park and ride users. These reductions in use of personal vehicles are associated with savings related to external highway operating costs including vehicle operations, congestion, noise, safety, emissions, and pavement wear. The monetized values associated with each category of external highway operating costs were applied to the expected reduction in VMT associated with the new transit center facility location to estimate the overall project savings in external highway operating costs.

Based on GoTriangle service model results, the estimated total of new annualized trips at the Triangle Mobility Hub is approximately 330,000 trips and the average one-way transit trip length in the GoTriangle system is 8.38 miles. To account for the possibility of carpooling, an assumed vehicle occupancy of 1.3 persons per vehicle was applied. Considering the total of new annualized trips, the average trip length,



and assumed vehicle occupancy, the estimated annual VMT reduction associated with mode shift is approximately 2.1M miles.

Relative to the existing facility location, the proposed Triangle Mobility Hub facility location is closer to the I-40 interchange at South Miami Boulevard. Based on this improved proximity, it is assumed that the new facility location will allow a one-mile reduction in each one-way trip for park-and-ride users. Per the GoTriangle service model, the existing total of annual park-and-ride use is 50 trips per day. Considering the one-mile reduction in trip length, a 106% change in revenue hours (per the GoTriangle service model), an assumed two trips per day per park-and-ride user, and an average vehicle occupancy of 1.03, the estimated annual VMT savings associated with park-and-ride users is approximately 40,000 miles.

Applying the monetized values associated with external highway operating costs to the VMT reductions associated with mode shift and the shortened trips for park-and-ride users results in an annual cost savings of \$2.1M. **Over the course of the analysis period, the total savings in external highway operating costs is estimated at approximately \$64.1M, or \$36.3M discounted.**⁶

Mobility and Community Connectivity

PASSENGER TRAVEL TIME SAVINGS (TAB H)

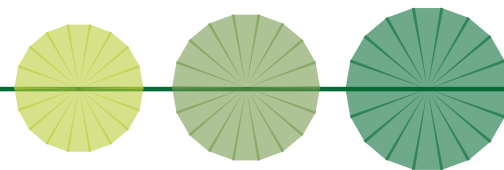
The proposed location of the Triangle Mobility Hub is closer in proximity to existing GoTriangle routes; therefore, it represents a more efficient location in terms of travel time. The proposed location is also closer in proximity to the I-40 interchange at South Miami Boulevard, representing a source of travel time savings for park-and-ride users. The improved service made possible by the transit center facility is also expected to reduce passenger wait and transfer times, further emphasizing the proposed location's positive impact on efficiency. To quantify the benefits associated with these efficiency improvements, monetized values associated with travel time savings were applied to travel time savings estimates provided by the GoTriangle service model.

Based on GoTriangle service model results, the annual total of new trips at the Triangle Mobility Hub is approximately 330,000 trips. Based on historic data from GoTriangle, the average annual increase in ridership is 2.40%. The travel time, transfer time, and wait time savings estimated by the GoTriangle service model are summarized below in Table 3.

	Transit Time	Wait Time	Transfer Time	Park-and-Ride Drive Time
Time Savings (minutes per trip)	3.5	5.28	10	1
Proportion of Trips Applicable	100%	20%	17%	10%

▲ Table 3: Summary of Travel Time Savings

⁶ Per USDOT 2024 BCA Guidance, CO2 emissions savings are discounted at a rate of 2% while all nonCO2 emissions savings are discounted at a rate of 3%



In 2028, during the first year of project use, the total sum of travel time savings associated with the Triangle Mobility Hub is approximately 35,000 hours. This corresponds to a monetary savings of approximately \$897,000, or \$747,000 discounted at a rate of 3.10%. Over the course of the analysis period, the **total monetary savings associated with travel time savings is approximately \$37.0M, or \$19.7M discounted at a rate of 3.10%.**

Economic Competitiveness

FACILITY OPERATIONS SAVINGS (TAB I)

The project is assumed to result in operational efficiencies for GoTriangle which will reduce the total annual revenue service hours (at current service levels) for the routes serving the Triangle Mobility Hub. The proposed Triangle Mobility Hub location is expected to reduce travel times because of its proximity to major transportation arteries, and the proposed signalization of the facility entrance is expected to further reduce delay and travel times. A reduction in travel time, and thereby annual revenue service hours, corresponds to decreased operating costs for GoTriangle. The operations cost savings were estimated considering of the Triangle Mobility Hub were calculated based on information provided by GoTriangle service model.

Per GoTriangle, every hour of revenue service is associated with \$146.51 (2022\$) in operating costs. Per the GoTriangle Service model, the proposed Triangle Mobility Hub location is associated with an annual vehicle revenue hours reduction of 9,435 hours. Considering the hourly operating costs and the estimate reduction in vehicle revenue hours, the estimate monetary savings associated with improved operational efficiencies is approximately \$1.4M per year, or \$1.2M discounted at a rate of 3.10%. Throughout the course of the analysis period, the **total savings associated with operational efficiencies is \$41.5M, or \$23.0 discounted at a rate of 3.10%.**

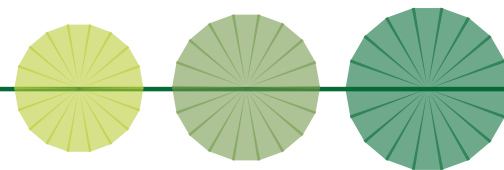
PROPERTY VALUE AND DEVELOPMENT POTENTIAL (TAB J)

Based on the benefits of the Transit-Oriented Development (TOD) that the Triangle Mobility Hub will make possible, it is assumed that the construction of the Triangle Mobility Hub will be associated with an increase in property value immediately surrounding the proposed facility. A 2008 study prepared for the FTA and USDOT by the Center for Transit-Oriented Development⁷ reports a wide variety of property value increase levels associated with the construction multimodal transit centers.

For the purposes of the BCA, it was conservatively assumed that the construction of the Triangle Mobility Hub would be associated with a one-time property value increase of 5.5% increase for parcels within ¼ of the facility. The BCA further assumes that parcels located between ¼ mile and ½ mile from the proposed facility will experience a one-time increase of 3.0%. The levels of property value increases used for the analysis (5.5% and 3.0%) are considerably conservative compared to the anticipated benefits for a transit station with TOD elements (11%).⁸ See Figure 1 for an illustration of the ¼ and ½ mile radius around the proposed facility location.

⁷<http://www.reconnectingamerica.org/assets/Uploads/ctodvalcapture110508v2.pdf>

⁸<https://digital.lib.washington.edu/researchworks/handle/1773/34203>



Per local GIS data, the estimate property value within ¼ mile ½ mile of the proposed Triangle Mobility Hub location is \$435M and \$862M, respectively. In the first year of facility operations, the difference in property value between the build and no-build scenarios is approximately \$40.6M, or \$33.8M discounted at a rate of 3.10%.



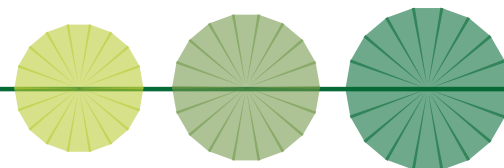
▲ Figure 1: Map showing 1/4- and 1/2-mile radius around proposed facility location

TRANSIT AMENITIES (TAB K)

The proposed Triangle Mobility Hub is to be equipped with a variety of transit facility amenities. Some of the proposed amenities will be new compared to the temporary facility, and some of the amenities currently exist at the temporary transit center facility. See Table 4 for a summary of what amenities are included in the No-Build and Build Scenario.

Using the monetized values associated with transit facility amenities provided by the USDOT 2024 BCA guidance, the BCA includes the full benefit for amenities that will be at the proposed facility that do not currently exist at the temporary facility, and it assumes partial benefit for amenities that currently exist at the temporary facility. This assumption acknowledges that the existing amenities provide some amount of value, however, it considers the fact that many of the amenities at the temporary facility are either of poor quality, are outdated, and/or are no longer compliant with current standards. The BCA assumes that existing amenities at the temporary facility are equal to 75% of the value represented by the same amenity at the new facility.

In the first year of facility operations, the total benefit associated with the proposed facility amenities is approximately \$1.1M, or \$939,000 discounted at a rate of 3.10%. Throughout the course of the analysis period, **these benefits amount to approximately \$48.7M, or \$25.6M discounted at a rate of 3.10%.**



BCA Narrative

Amenity	Value/Trip	Present in No Build	Present in Build
Clocks	\$0.07		X
Electronic Real-Time Information Displays	\$0.90		X
Information/Emergency Button	\$0.11		X
PA System	\$0.10		X
Platform/Stop Seating Availability	\$0.13	X	X
Platform/Stop Weather Protection	\$0.13	X	X
Restroom Availability	\$0.11	X	X
Retail/Food Outlet Availability	\$0.06		
Staff Availability	\$0.19	X	X
Step-Free Access to Station/Stop	\$0.21	X	X
Step-Free Access to Vehicle	\$0.07	X	X
Surveillance Cameras	\$0.33	X	X
Temperature Controlled Environment	\$0.65		X
Ticket Machines	\$0.07		X
Timetables	\$0.50		X
Bike Facilities	\$0.10	X	X
Car Access Facilities	\$0.12	X	X
Elevator	\$0.07		
Escalators	\$0.04		X
On-Site Ticket Office	\$0.10	X	X
Taxi Pickup/Dropoff	\$0.05		X
Waiting Room	\$0.21		X

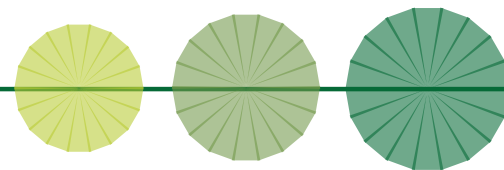
▲ Table 4: Summary of Transit Amenities

State of Good Repair

RESIDUAL CAPITAL VALUE (TAB L)

Many of the components of the project have service lives beyond the analysis period, so the residual capital value is calculated for the Build alternative and applied as a benefit in the BCA. Major structural components were assumed to have a 75-year design life, while most roadway components were assumed to have a 40-year design life. **The total benefit associated with the residual values is \$10.8M, or \$3.7M discounted at a rate of 3.10%.**

To be conservative, soft costs associated with construction such as engineering costs and mobilization are given no residual values.



OPERATIONS AND MAINTENANCE COSTS (TAB M)

There will be additional operations and maintenance costs associated with maintaining the newly constructed facility in a state of good repair. Average annual maintenance costs for the existing GoTriangle facility include a \$36,700 lease (assumed to continue throughout the analysis period as part of the No-Build scenario), approximately \$497,000 in total annual maintenance and operations dedicated to the transit facility, and an additional \$110,000 per year in small capital costs due to the age of the facility.

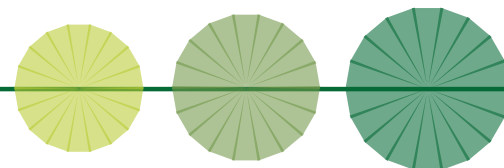
Since the current transit facility occupies a lot adjacent to the GoTriangle Plaza office building, which includes the agency's headquarters, the analysis included assumptions to define the total annual maintenance costs that might reasonably be assumed to support the transit facility alone, including lawn maintenance, utilities, and general repairs. The Triangle Mobility Hub is anticipated to be slightly more costly to operate and maintain; therefore, the analysis assumes an annual operations and maintenance cost in the build scenario of \$665,000 in the Build scenario. This assumption is based on a review of similar facilities, including the downtown Raleigh Moore Square transit facility operated by GoRaleigh. All maintenance costs were escalated at a rate of 2.5% per year.

The total disbenefit of operations and maintenance cost over the analysis period was valued at approximately \$-1.2M, or \$-608,000 discounted at a rate of 3.10%.

Factors Not Quantified

Several factors were not quantified as part of the analysis but provide additional benefits beyond those quantified above. Some unquantified factors are:

- ▶ **Improved Access to Jobs.** The new facility will be located closer to major existing regional employers within the Research Triangle Park, as well as in an area anticipated to see increased development over the coming decade. This increased location efficiency will provide increased transit access to employment compared to the existing facility, which relies on a partnership with transportation network companies, or app-based ride-hailing services, to access many regional employers.
- ▶ **Improved walkability.** Connecting to bicycle and pedestrian facilities and the future transit-oriented development nearby demonstrates transportation-efficient land use and design that enables more trips to be completed by biking and walking or combining bicycle and pedestrian trips with transit to reach further destinations. The project will provide the public with more active choices for how to travel.
- ▶ **Increased Access for Historically Disadvantaged Communities.** The new facility will reduce travel times and increase connections to transit for those living in communities designated as Areas of Persistent Poverty (APP), low-income populations, residents of affordable housing, and Historically Disadvantaged Communities. Today, residents can access 17,700 jobs in 45 minutes by public transit. With the Triangle Mobility Hub and SPOKE network expansion, the same transit travel time will result in access to more than 79,000 jobs.



BCA Narrative

- ▶ **Establishing Transit-Oriented Development across Research Triangle Park.** Through GoTriangle’s partnership with the Research Triangle Foundation of North Carolina, transit-oriented development will be built in the immediate vicinity of the Triangle Mobility Hub. Businesses and residents of the area will benefit from the concentration of new amenities and uses that will be accessible through easy biking, walking, and transit connections. The proposed site is currently vacant and wooded, so developing the site will not create any displacement of businesses or residents.

BCA Results

The results of the BCA conducted for the Triangle Mobility Hub project 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 the project benefits outweigh the project costs. The larger the BCR and NPV, the greater the expected benefits of the project. The BCR provides the amount of benefit per unit cost, which can be useful for determining the highest dollar for dollar benefit when comparing projects.

The results of the BCA for the project, calculated using the methodology described above, are presented in the table below. The results are shown without any discount applied and with the appropriate discount value applied (2% discounted rate for CO2 emissions, 3.1% for all other benefits). As can be seen in the table, there are substantial benefits associated with the Triangle Mobility Hub.

	Undiscounted	Discounted
Benefits	\$269,409,448	\$156,651,383
Costs	-\$53,694,562	-\$30,018,414
BCR	5.02	5.22
NPV	\$215,714,885	\$126,632,969