BG & WC
Metropolitan Planning Organization

BOWLING GREEN
TRANSIT STUDY

JULY 2021

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Introduction

Project Background and Approach

GO bg is a transit system serving Bowling Green, Kentucky. The City of Bowling Green currently contracts the management of the GO bg service to RATP-DEV and operations to Community Action of Southern Kentucky (CASOKY), a large non-profit human service agency responsible for providing services to 10 counties in Southern Kentucky.

In 2019, prior to the COVID-19 pandemic, GO bg operated six routes, Monday through Friday 6:00am to 6:00pm, as well as limited Saturday service. Additionally, GO bg provides demand response, ADA Complementary Paratransit service within ¾ miles from any point on the fixed-route service in the Bowling Green area during the same operating hours.

The purpose of this Transit Service Development Study was to examine the current service and community transportation needs, recommending ways to redesign and/or improve transit service in the City over the next five to ten years. The study recommendations included seven goals featured in this graphic.

Michael Baker International was selected to complete the project. The study was completed through five key tasks established by the Bowling Green and Warren County Metropolitan Planning Organization (MPO).

1. Update and improve transportation services
2. Encourage and incentivize coordination and collaboration with Western Kentucky University's Topper Transit
3. Improve connectivity and access
4. Increase ridership through targeted outreach, marketing, engagement and/or other contractor recommended strategies
5. Provide more transportation options
6. Improve accessibility
7. Develop strategies to meet Performance Measure requirements.

Current Conditions	Community Assessment, Major Employers, Title VI Equity Analysis, and Existing Transit Services Description
Public Outreach and Input	Customer Satisfaction Survey, Stakeholder Interviews, Presentation of Current Transit Profile, and Public Involvement Plan
Goals and Strategies	Review of Recent Studies, Goals and Strategies, Development and Evaluations, and Community and Stakeholder Engagement and Outreach Strategy Development
Financial Plan	Estimate Levels of Funding for Life of Plan, Potential Funding Scenarios, Fare Structure Evaluation, and Peer Comparison of Fare Structures
Strategies	Prioritized Action Strategies, Recommended Timetable for Each Strategy's Implementation, and Funding Strategies

Previous Planning Projects

Since 2009, GO bg has been the subject of multiple reports and planning efforts to optimize transit service in the City of Bowling Green. Five of these reports are outlined below.

GO BG TRANSIT STUDY, BARREN RIVER AREA DEVELOPMENT DISTRICT (2009)

In 2009, the Barren River Area Development District (BRADD) commissioned a study to develop a fifth fixed route for GO bg and to analyze potential pass programs that could increase Western Kentucky University (WKU) student ridership. The study recommended two routing concepts to service both WKU students and riders accessing services on Lovers Lane; service improvements to maintain existing transit ridership and attract potential new riders; and details for a potential student semester pass.

ASSESSMENT OF THE BOWLING GREEN TRANSIT SYSTEMS, BOWLING GREEN-WARREN COUNTY METROPOLITAN PLANNING ORGANIZATION (2011)

The Bowling Green-Warren County Metropolitan Planning Organization (MPO) conducted its own assessment of area's transit services in 2011. The assessment included a review of strengths and weaknesses of both the city's GO bg system and WKU's Topper Transit system to identify necessary route modifications, develop route options, and address connectivity issues between the two systems. Recommendations included:

- Improving connectivity between the two systems by creating a unified website
- Developing a Communication and Policies Plan and a Funding Plan
- Establishing public works coordination with transit
- Creating a joint marketing program

FUNDING THE FUTURE: BENCHMARKING FINANCIAL PROFILES OF COMPARABLE TRANSIT SYSTEMS, BARREN RIVER AREA DEVELOPMENT DISTRICT (2012)

Following up on the 2009 study, BRADD commissioned a financial study of both GO bg's existing level of service and the implementation costs of the 2009 study recommendations. It also included an examination of additional funding sources that could be used to fund GO bg's operations. The study concluded that there was federal funding that GO bg could take advantage of, as well as non-federal funding strategies including:

- Tax revenues
- A partnership between GO bg and local businesses to help offset certain operations
- Utilizing funds from park-and-ride lots and concessions at stations

TRANSIT NEEDS ASSESSMENT AND ROUTE ALIGNMENT STUDY, BOWLING GREEN-WARREN COUNTY METROPOLITAN PLANNING ORGANIZATION (2016)

Building on previous studies, the MPO conducted a closer study of transit needs and bus route patterns in 2016. The study focused particularly on improving access to jobs, providing service to the emerging medical facilities on Lovers Lane, and streamlining routes to better align GO bg Transit service with Topper Transit service. The study detailed three possible network configurations for more efficient but cost-neutral service, service to Lovers Lane, and expanded service to the southwest and along two of the city's radial corridors.

BOWLING GREEN TRANSIT OPERATIONAL EFFICIENCY AND MANAGEMENT ANALYSIS, BOWLING GREEN-WARREN COUNTY METROPOLITAN PLANNING ORGANIZATION (2019)

The MPO's most recent transit study focused on holistic operational improvements to transit in Bowling Green, specifically the feasibility of merging Topper Transit and GO bg Transit. It set short-term, medium-term, and long-term goals for the City of Bowling Green, GO bg Transit, and WKU's Topper Transit on how they could coordinate to provide a more efficient and integrated service.

Why is Transit Important?

Public transportation (transit) as defined by the Federal Transit Administration is the operation of a vehicle(s) that provides service to the public on a regular and continuing basis consistent with 49 U.S.C. Chapter 53. Transit provides the public with access to community resources, employment, shopping, recreation, and medical care. In 2019, approximately 4% of work commutes were taken via transit daily across the United States. That percentage was significantly higher in urban areas with cities such as New York (31.6%), Boston (13.4%), Chicago (12.4%), Seattle, and San Francisco (18.9%).

Integrating public transportation considerations into land use and economic planning can support expanded business opportunities, reduce traffic congestion, and reduce environmental impacts from transportation. Transit benefits choice riders as well as individuals with no other choice. Individuals with no access to a vehicle, as well as households that share a vehicle depend on transit for life necessity trips. Choice riders may have access to a vehicle but find transit provides a more convenient or cost-effective option. For those reasons, areas with effective public transit systems offer advantages to both individuals and businesses choosing to locate in them. In many economically thriving areas, transit plays an important role in their success.

The American Public Transportation Association (APTA) highlights the benefits of investing in transit. APTA state the following:

EVERY...

- $1 invested in transit generates **$5 in economic returns.**
- $1billion invested in transit supports and creates approximately **50,000 jobs.**
- $10 million in capital investment in transit yields **$30 million in increased business sales.**
- $10 million in operating investment yields **$32 million in increased business sales.**

An estimated **$39 billion** of transit expenditures flow into the private sector.

Home values were up to **24% higher near transit** than in other areas.

87% of trips on transit have a direct impact on the local economy.

Public transportation is a **$74 billion industry** that employs more than 435,000 in the US.

GO bg System Overview

Service Area

According to U.S. Census Bureau's 2019 estimates, the City of Bowling Green has a population of about 70,000 people, while Warren County has a population of approximately 133,000. At about 38 square miles in size, the city has experienced rapid growth in the past decade due to its relatively low cost of living and business-friendly environment. Since 2010, the population in Bowling Green increased by 18.7%.

Balancing transit service to meet both social services needs and job access is important to area residents. GO bg Transit was established in 1993 in partnership with local human service organizations with the aim to connect Bowling Green residents with medical facilities, shopping, jobs, and services.

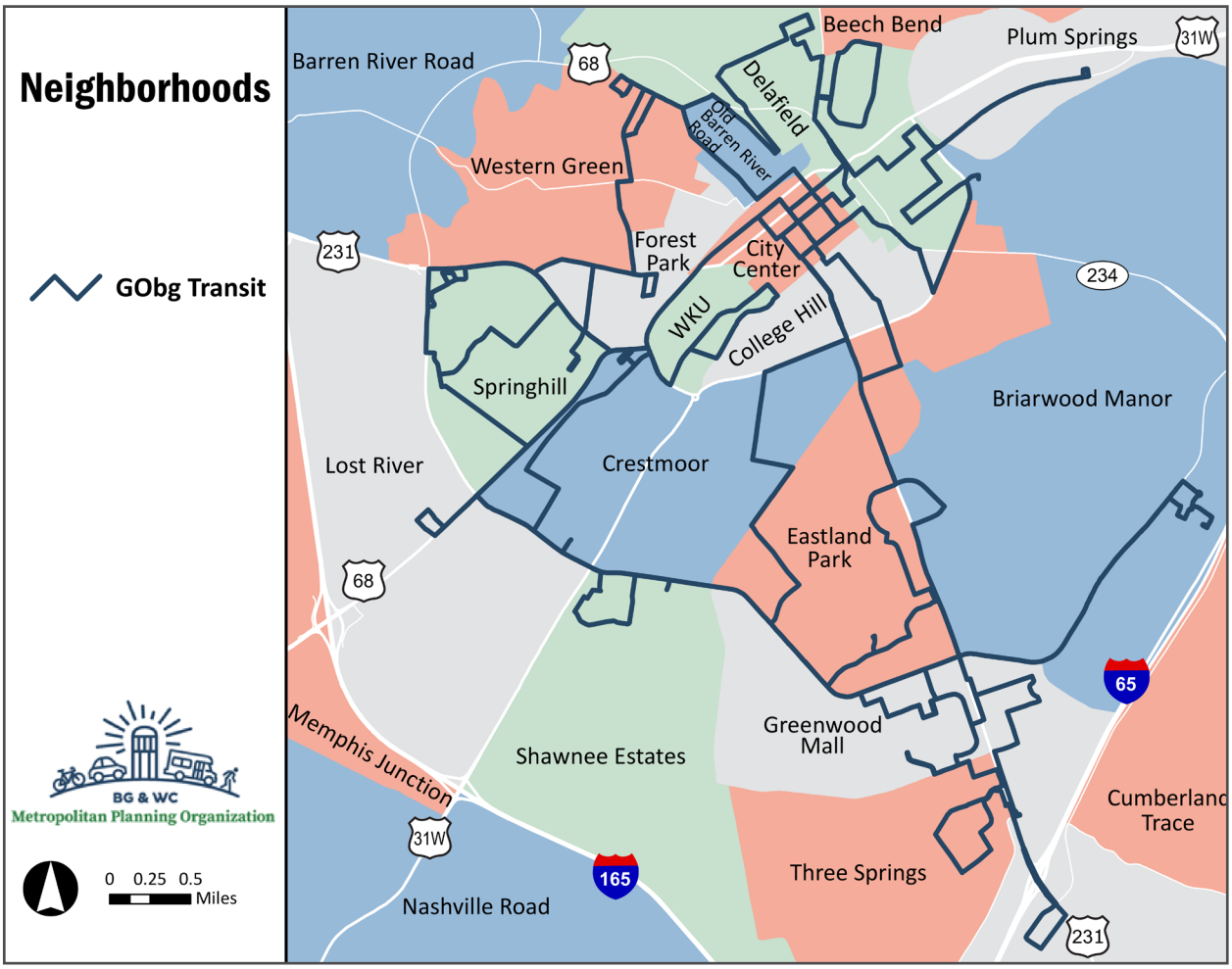


Figure 1: Bowling Green Neighborhoods

Within Bowling Green, the rate of commuting via transit is low compared to both state and national rates. In 2019, only 0.6% of the public citywide indicated public transportation as their primary means of transportation on the U.S. Census Bureau's American Community Survey (ACS). Comparatively, 1.1% of residents in Kentucky and 4.9% of Americans reported transit as their primary mode on the same survey. Additional details about travel within Bowling Green are provided in Table 1 below:

	Bowling Green	Kentucky	National
Mean Travel Time to Work (Minutes)	18.1	23.6	27.1
Drove Alone	76.8%	82.2%	76.3%
Carpool	13.8%	9.7%	9.0%
Walk	5.3%	2.4%	2.7%

Table 1: Travel Characteristics (Source: ACS 2019 5-year estimates)

As shown in Table 1, Bowling Green has a shorter mean travel time to work than both the state and national averages. It also has higher carpool and walk percentages than the state and national rates. The percentage of individuals driving alone was lower than the state rate and consistent with the national rate.

Travel in Bowling Green appears comparable to both the state and national travel statistics. However, several other key measures indicate a significant need for transit in Bowling Green. The percentage of persons living below the poverty rate was 25.2% in 2019, which is significantly above the state and national rates. The percentage of persons 65 or older as well as persons under 18 were both less than state and national rates. This would indicate a slightly higher percentage of residents are still of working age, thereby requiring the need to commute for work. Overall, the characteristics in Table 2 indicate that the population in Bowling Green is more likely to ride transit if it met their needs. This is described in greater detail in the transit propensity section of this report. While some of the demographic metrics are impacted by WKU's student population (median household income, persons living in poverty, and foreign born persons), this impact is no more pronounced than in any other urban area with an university. According to APTA, college students in smaller urban areas with proportionately large student population are more likely to ride transit than in other urban settings.

	Bowling Green	Kentucky	National
Persons living in poverty	25.2%	16.3%	10.5%
Persons with a disability, under 65	11.6%	17.8%	13.2%
Median household income	$41,516	$52,295	$65,712
Persons 65 or older	11.0%	15.5%	15.5%
Persons under 18	20.7%	22.4%	22.3%
Foreign Born persons	12.8%	3.9%	13.6%

Table 2: Population Demographics (Source: ACS 2019 5-year estimates)

Modes of Transit Operating in Bowling Green

Fixed-Route Bus Services:

Fixed-route bus services are provided on a repetitive, fixed schedule along a specific route with vehicles stopping to pick up and deliver passengers to specific locations. Each fixed-route trip serves the same origins and destinations.

Complementary Paratransit Services:

Paratransit service is required by the Americans with Disabilities Act (ADA) for individuals with disabilities who are unable to use fixed-route transportation systems. The complementary services are generally door-to-door service (demand response). Service must be provided in a corridor ¾ of a mile on either side of the fixed bus routes.

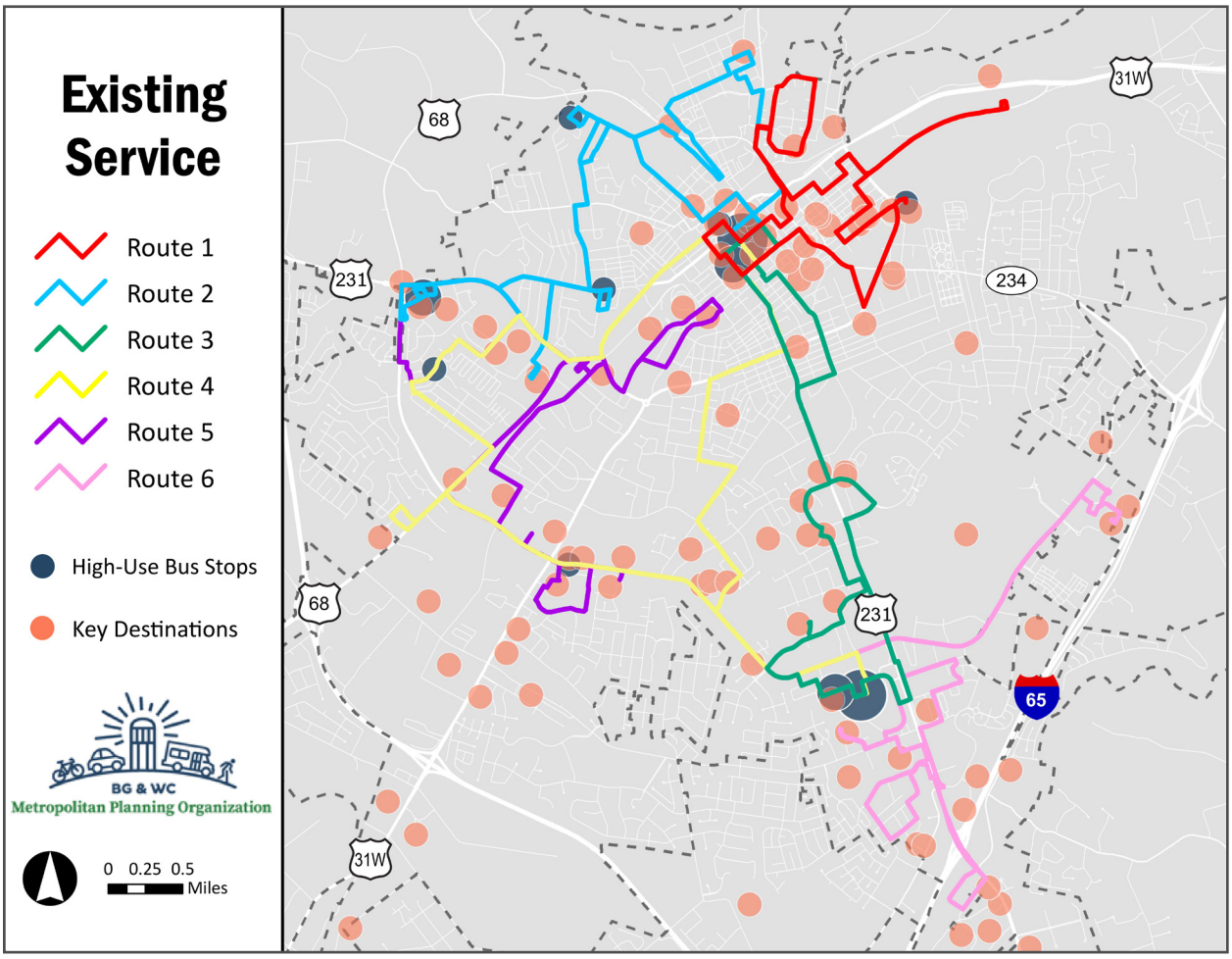


Figure 2: Current GO bg Service

Title VI Program

Title VI of the Civil Rights Act of 1964 protects people from discrimination based on race, color, and national origin in programs and activities receiving federal financial assistance. The FTA works to ensure nondiscriminatory transportation in support of its mission to enhance the social and economic quality of life for all Americans. The FTA has issued guidance to all transit providers that receive federal funds through a series of general requirements.

GO bg has drafted a Title VI Plan which appears to meet the requirements of the FTA's Circular 4702.1B. The City of Bowling Green's Board of Commissioners approved the existing program in May 2017. An updated draft was published in 2020 prior to the start of this study. The draft plan contains a clear complaint procedure, service standards, and service policies to meet the general requirements outlined in FTA's Circular. The draft plan also establishes an ADA coverage area which is consistent with GO bg's current route structure and FTA's ADA demand response requirements.

Based on a review of the GO bg Title VI Plan, two recommendations are offered:

1. The current plan identifies a minimum threshold of 300 employees at a singular employer or in a clustered area to warrant consideration for service. Based on the geospatial analysis and review of available business data, there are many employers that warrant consideration for service that are not in areas that would support efficient and effective transit service. Some of these areas include manufacturing destinations outside of the city's core area. These employers could be better served by adjusting the minimum threshold to a larger number or adjusting the language to refer to minimum measures of service effectiveness such as passengers per revenue hour or passengers per revenue vehicle mile.

2. The current Title VI Plan outlines minimum headways based on the type of route, however performance measures are used elsewhere in the document to evaluate the effectiveness of headways. This inconsistency could be addressed by eliminating the minimum headways and use the performance measurement criteria to specify the level of service provided for each route.

COVID-19 Impacts

On January 7, 2020, the World Health Organization (WHO) identified an outbreak of a new virus, SARS-CoV-2, which causes the disease COVID-19 (Coronavirus Disease 2019). Cases were quickly identified around the world, and on January 21, the first confirmed COVID-19 case was identified in the United States. Ten days later, the WHO declared COVID-19 as a global public health emergency as the number of cases surpassed 9,000 in at least 19 countries. The United States experienced its first recorded COVID-19 related death on February 29. The WHO officially declared COVID-19 a global pandemic on March 11.

American society and its economy has been significantly impacted by COVID-19. The United States imposed international travel restrictions in February to help contain the spread of the virus. On March 6, Kentucky Governor Andy Beshear declared a State of Emergency, and a limited shutdown on non-life sustaining businesses and governmental services began on March 17. On March 23, most non-life-sustaining retail businesses were ordered to shut down. These restrictions continued widely throughout March, April, and May. After a brief decline in cases in Summer 2020, restrictions were reestablished in the fall and continued into early 2021.

Transit agencies across the United States experienced significant reductions in ridership and the associated fare revenue throughout the pandemic. The unknown impacts of lost revenue from typical transit funding mechanisms such as taxes and fees is potentially even more devastating. By the end of 2020, the United States economy shrank by 3.5%. Revenues from sales taxes, motor fuel taxes, tolls, fees on transportation network companies (TNC) such as Uber, and the lottery have all declined. The majority of sources which comprise state and local transit funding have all declined, and the future impacts of those reductions are difficult to conceptualize or quantify at the time of the writing of this report.

Federal COVID-19 Relief Funding

On January 20, 2020, the FTA authorized the use of public transportation funds, to be used at 100% federal share in direct response to the COVID-19 pandemic. In addition to this emergency use authorization, Kentucky was awarded $22.9 million in federal Coronavirus Aid, Relief, and Economic Security Act (CARES) funding in March 2020, and more than $6.4 million in the Coronavirus Response and Relief Supplemental Appropriation Act (CRRSAA) funding in August 2020. Urban agencies applied for these funds directly and could begin spending immediately following FTA approval.

In July 2020, GO bg was awarded $1.9 million in CARES Act Funding from FTA. The relief funding was prioritized for operating and direct mitigation expenses, such as the purchase of Personal Protective Equipment (PPE) and other supplies, administrative leave to avoid furloughs or layoffs, and replacement of lost revenue.

Post-Pandemic Decision-Making

The Transit Act of 2021 made the changes of the CARES Act permanent, enabling the FTA to fund transit operations. This is a significant change in funding and could have a lasting influence on transit operations; however, it is unknown if transit ridership will recover to pre-pandemic levels. Alternative work arrangements such as telework and compressed schedules were already having a negative impact on transit demand prior to the COVID-19 pandemic. The acceleration of digital collaborative platforms, such as Zoom, and their rapid adoption by employers in all sectors may greatly reduce future transit demand. Increases in the use of telemedicine is reducing the demand for medical trips. Further, government agencies have made improvements to business processes resulting in decreased demand for in-person office activities. In addition to these technological changes, travel patterns are likely to change because of changing economic conditions.

Transit agencies are making decisions locally about how they will operate in a post-pandemic environment. Some of the factors being used to inform those operational decisions include:

Availability of state and local funding

Ridership recovery

COVID safety protocols related to cleaning and capacity

Operating expenses

Staffing levels

Equity determiniations

As a result of the pandemic, GO bg reduced service hours and suspended one route (Route 5). Despite these challenges, a demand for transit will undoubtedly continue. The industry's recovery may present opportunities to deliver services that are safer, more efficient, and more effective than ever before.

Transit Demand

Areas with high rates of annual passengers per stop (Table 3) are dominated by retail locations.

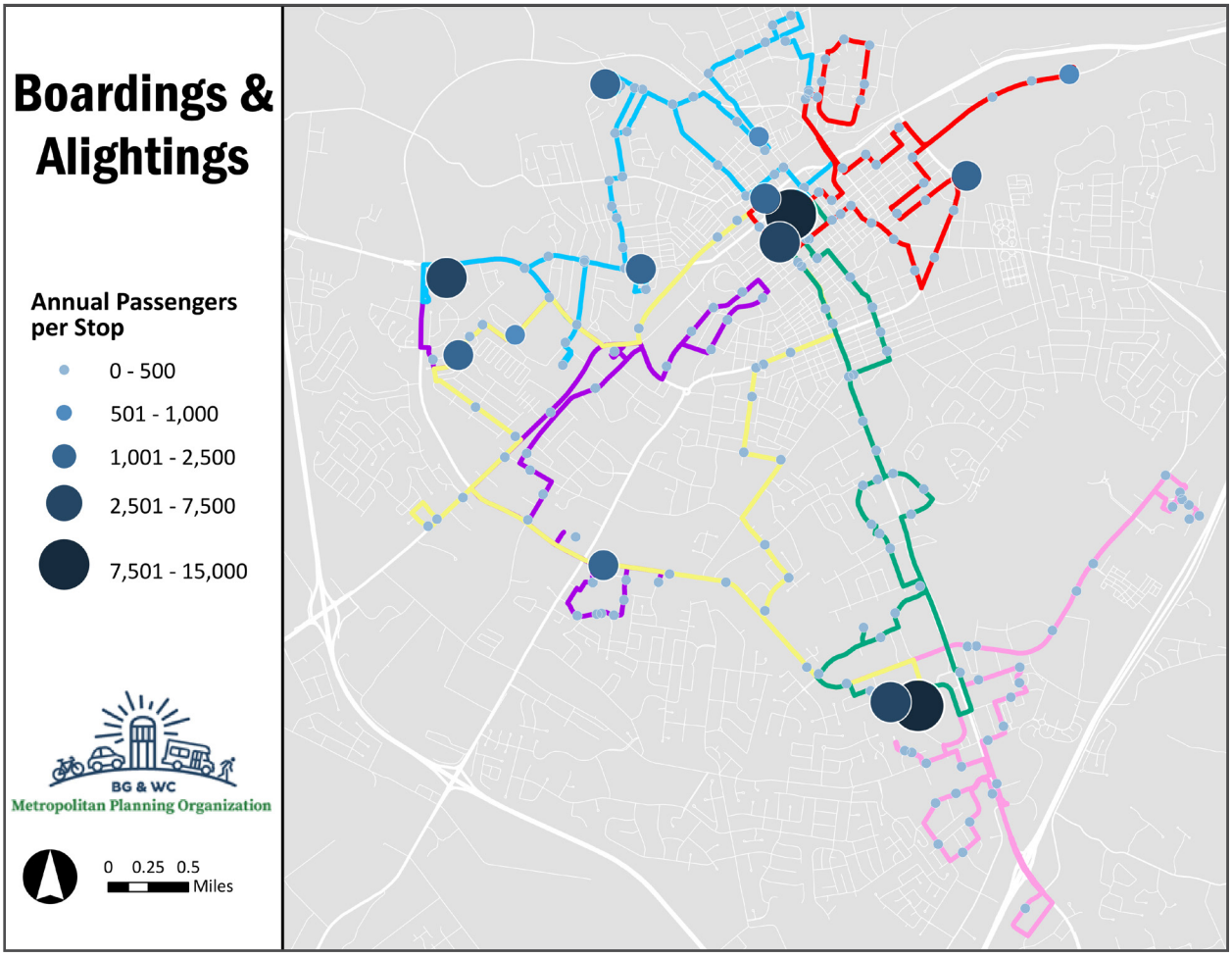


Figure 3: GO bg Bus Stops

Bus fares are an important demand factor. The standard GO bg bus fare is $2.00 with free transfers, while fares for elderly persons, persons with disabilities, Medicare cardholders, and students is $1.00. The complementary paratransit fare is $4.00. Several pre-paid fare options are also available for fixed-route service.

In fiscal year (FY) 2012, GO bg ridership peaked at just over 117,000 trips across both GO bg Transit and Go, too Paratransit. In FY2019, the system provided a total of 99,954 unlinked trips, including 85,894 bus trips and 14,060 demand response (paratransit) trips.

Standard price elasticity indicates that a 3% change in ridership follows a 10% change in price. In GO bg's case, a goal to increase ridership by 3% (to 102,952) would most likely require decreasing the standard fare to $1.80, the special fare to $0.90, and the paratransit fare to $3.60.

	2016	2017	2018	2019
Cost / Revenue Hour	$66.67	$66.30	$70.06	$70.42
Passengers/ Revenue Hour	5.5	5.3	3.7	4.3
Cost / Revenue Hour	$5.59	$5.51	$6.04	$6.02
Cost / Passenger	$12.08	$12.59	$18.78	$16.26

Table 3: Service Efficiency and Effectiveness Data (Source: NTD)

Transit Propensity

Transit demand is generally derived – meaning that most people ride transit as a means to reach key destinations such as employment, entertainment, and other essential services. Therefore, the demand for transit is derived from the demand for people to travel to those key locations. The primary drivers of transit demand are population density and employment density.

Most people are willing to walk five to ten minutes to reach a transit route. Therefore, the reach of transit is generally limited to within a one-quarter to one-half mile walk to a transit route depending on the sidewalk network, walking conditions, and topography. Transit routes that serve areas with higher population and employment densities are likely to have higher levels of ridership than areas with low densities. Transit planners must balance the need to provide options to both types of areas with appropriate levels of service.

While population and employment density drive transit demand, other factors have an influence over a traveler's transit propensity – their decision to actually take transit. National research shows that many population groups often have a higher propensity for transit use than the overall population. These include women, seniors, adults under 25 years old, low-income residents, zero-vehicle households, persons with disabilities, ethnic and racial minorities, workers with a GED-equivalent degree or less, and foreign-born residents.

The project team employed a proprietary transit propensity model that utilized data collected by the American Community Survey (ACS) as well as specific research over the past five years. The model uses a scale of 0 to 1, with 1 representing individuals with the highest transit propensity. The scores were aggregated at the Census Block Group level. Propensity should be seen as a measure of need and not necessarily efficiency. A propensity of "1" means that the residents of that Census Block Group are most likely to ride transit service, but does not mean that transit service would be most productive there. Other variables in the analysis such as land use and walkability are likely to factor into the relative productivity that can be expected in a given geography.

Rockfield is the area with the highest transit propensity of 1; however it is outside of GO bg's service area. Rockville's population has grown by 11% since 2000. Old Morgantown Rd / Normalview Dr. had the second highest transit propensity of .97. The area to the northeast of Plum Springs had the third highest transit propensity at .78, followed by Barren River Rd / Glen Lily Rd with a transit propensity of .74. Generally, the transit propensity scores for Bowling Green show moderate levels of transit demand and is expected throughout most of GO bg's service area.

The transit propensity analysis is generally supported by GO bg's 2019 customer survey. According to the survey, 76.47% of respondents had no alternate transportation and 67.47% were renters Survey respondents stated that their primary reasons for travel included work (34.3%), medical/dental appointments (29.9%), and shopping (23.9%). The demographic information from the survey was also generally consistent with the propensity analysis in terms of age distribution, gender, and employment status.

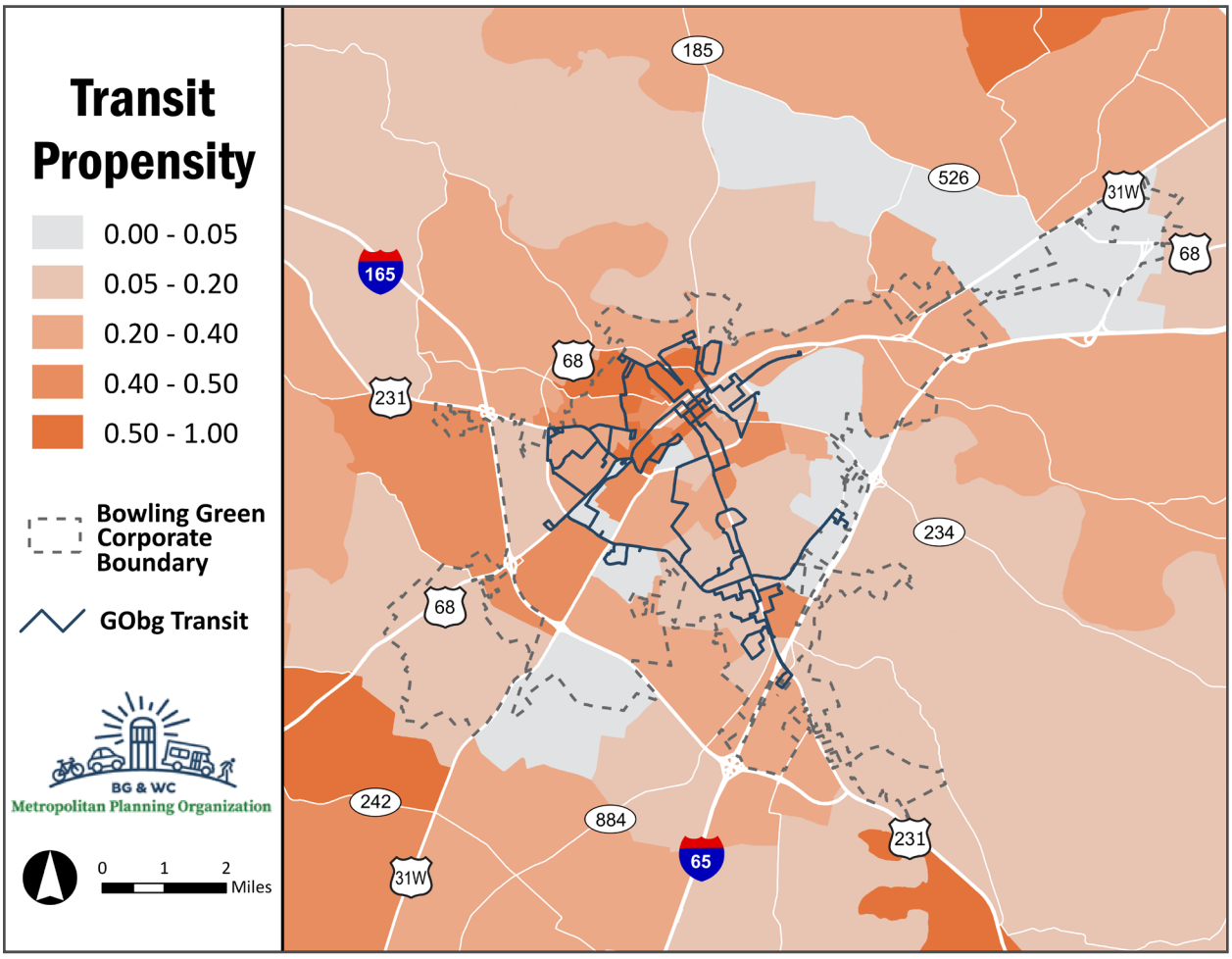


Figure 4: Transit Propensity by Census Block Group

Demographics and Population Density

Data from the 2019 American Community Survey was used to examine current conditions in the city. In 2019, the population of Bowling Green was 67,600, making it the third-largest city in Kentucky. With a city area of 38.1 square miles, the population density in Bowling Green as a whole is 1,774 residents per square mile, and in the city center the population density is over 17,000 residents per square mile.

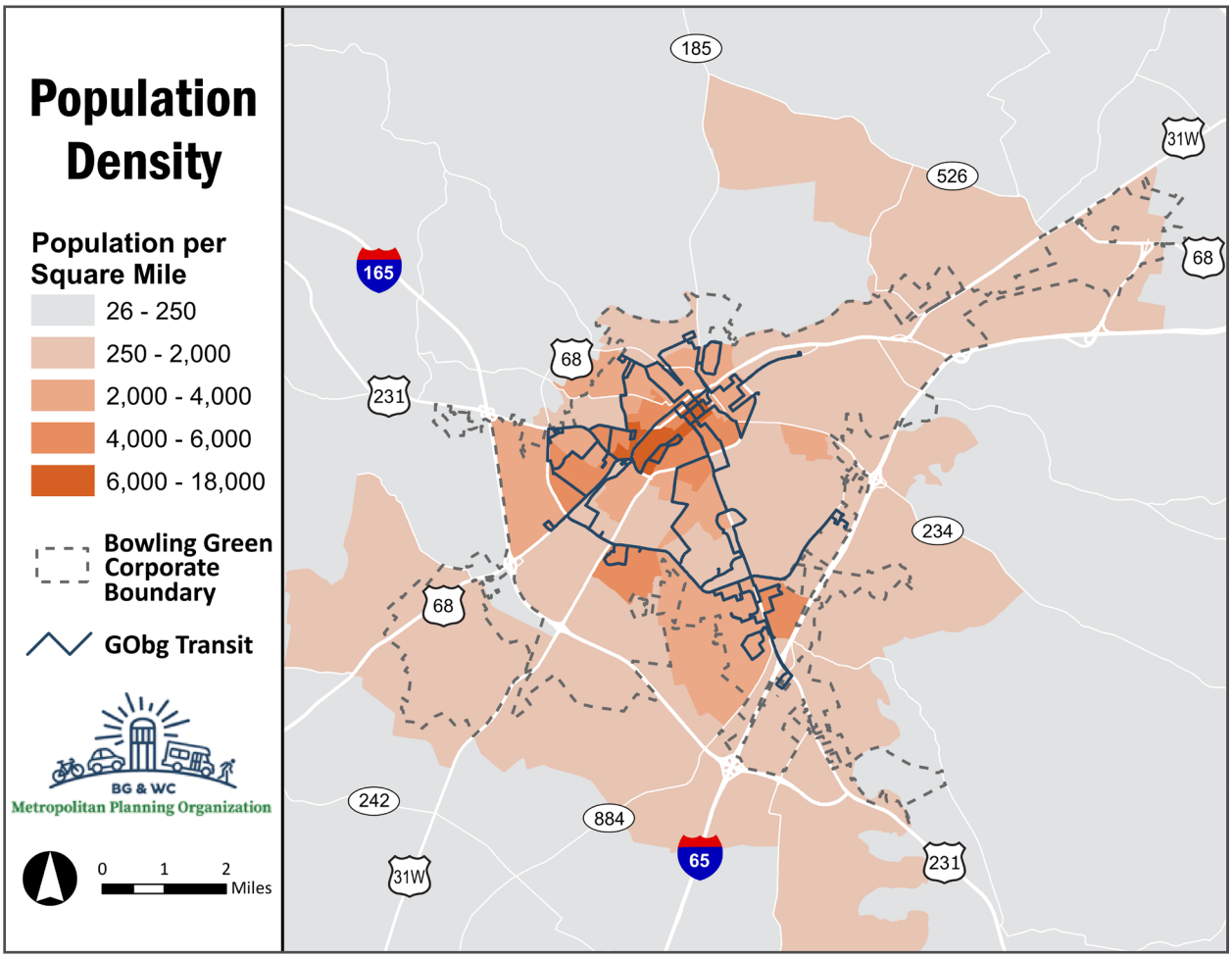


Figure 5: Population Density, 2018

The median household income in Bowling Green was $42,164 in 2019, while the median individual income was $20,568. Over 23% of the city population was living below the poverty line, compared to a national average of 12.3%.

For workers aged 16 years and older, driving alone is the primary mode for commuting, followed by carpooling. Commuting via public transit was the least common mode, trailing both walking to work and working from home.

	Drove Alone	Carpooled	Public Transit	Walked	Worked from Home	Other Means	Total
Bowling Green	25,485	4,065	65	1,710	581	353	32,259
	79.0%	12.6%	0.2%	5.3%	1.8%	1.1%	100.0%
Warren County	50,852	6,627	65	1,920	1,672	803	61,939
	82.1%	10.7%	0.1%	3.1%	2.7%	1.3%	100.0%
Kentucky	1,551,679	183,154	20,408	44,888	61,603	24,897	1,886,629
	82.2%	9.7%	1.1%	2.4%	3.3%	1.3%	100.0%

Table 4: Commuting Mode (Source: ACS 2019 5-year estimates)

Employment

A previous survey of GO bg Transit users in 2019 indicated that most trips are for work, making employment connections a top priority for GO bg Transit. Maps showing each of the top employment centers by sector—manufacturing, retail, government and social services, medical facilities, and education—can be found in Appendix A.

The areas with the highest job density (City Center, Delafield, and Eastland Park) are generally served by GO bg's current network.

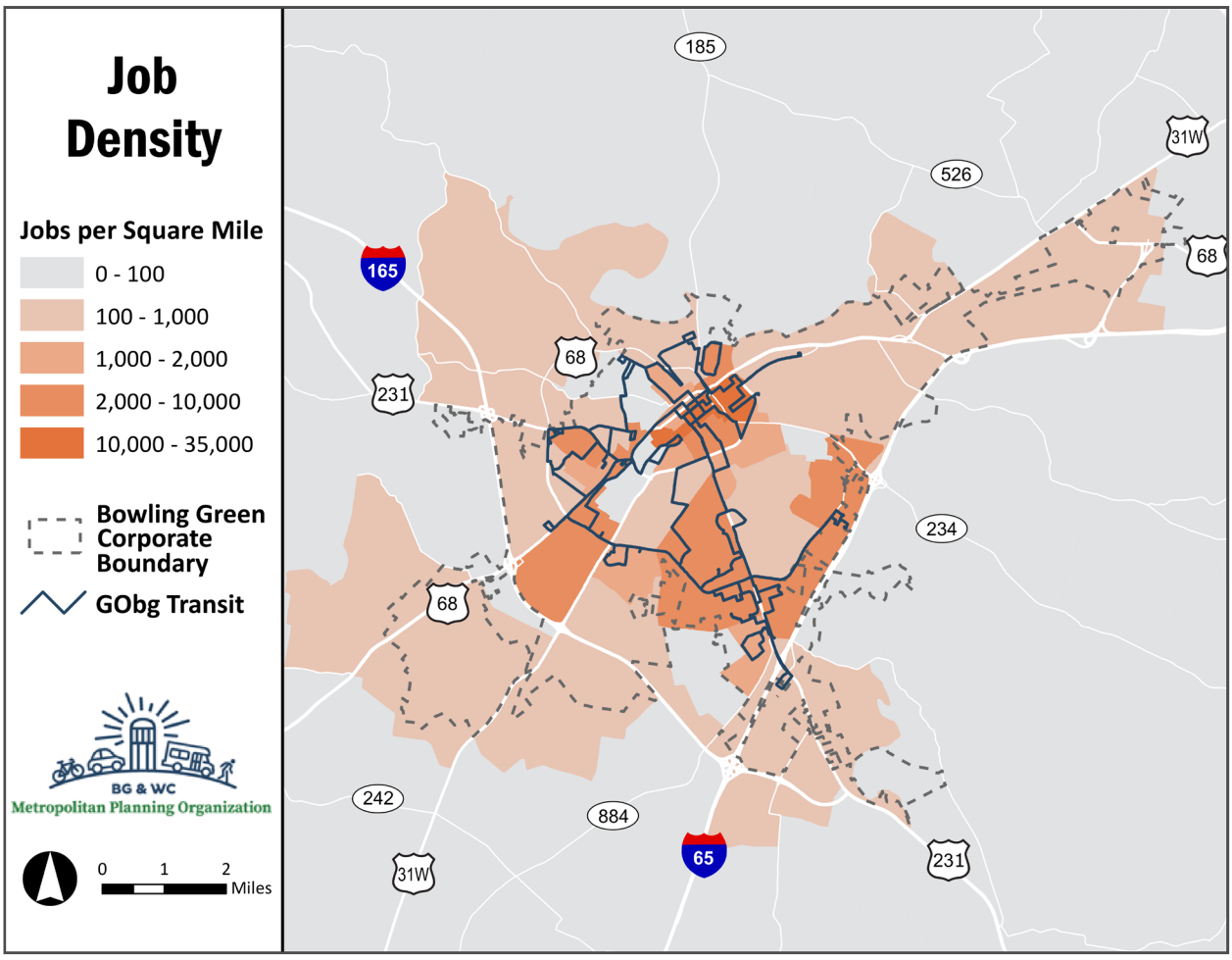


Figure 6: Job Density, 2018

The bulk of Bowling Green's employment is concentrated in the medical, education, and manufacturing sectors.

	Employer	Number of Employees
1	Western Kentucky University	4,646
2	The Medical Center at Bowling Green	2,222
3	Bowling Green Metalforming, LLC	1,498
4	Union Underwear Co., LLC (Fruit of the Loom)	1,410
5	Warren County Board of Education (multiple locations)	1,031
6	Sun Products Corporation (Henkel AG & Co.)	994
7	General Motors Corporation	950
8	Graves-Gilbert Clinic	794
9	Houchens Food Group, Inc.	720
10	City of Bowling Green	661

Six of the locations with the highest numbers of employees onsite are outside of the reach of the current system. Although manufacturing is the largest industry in the region, the factories in the northeast and southwest of the city are not served. The project team evaluated the potential to serve those locations during this study; additional detail can be found in the System Recommendation section of this report.

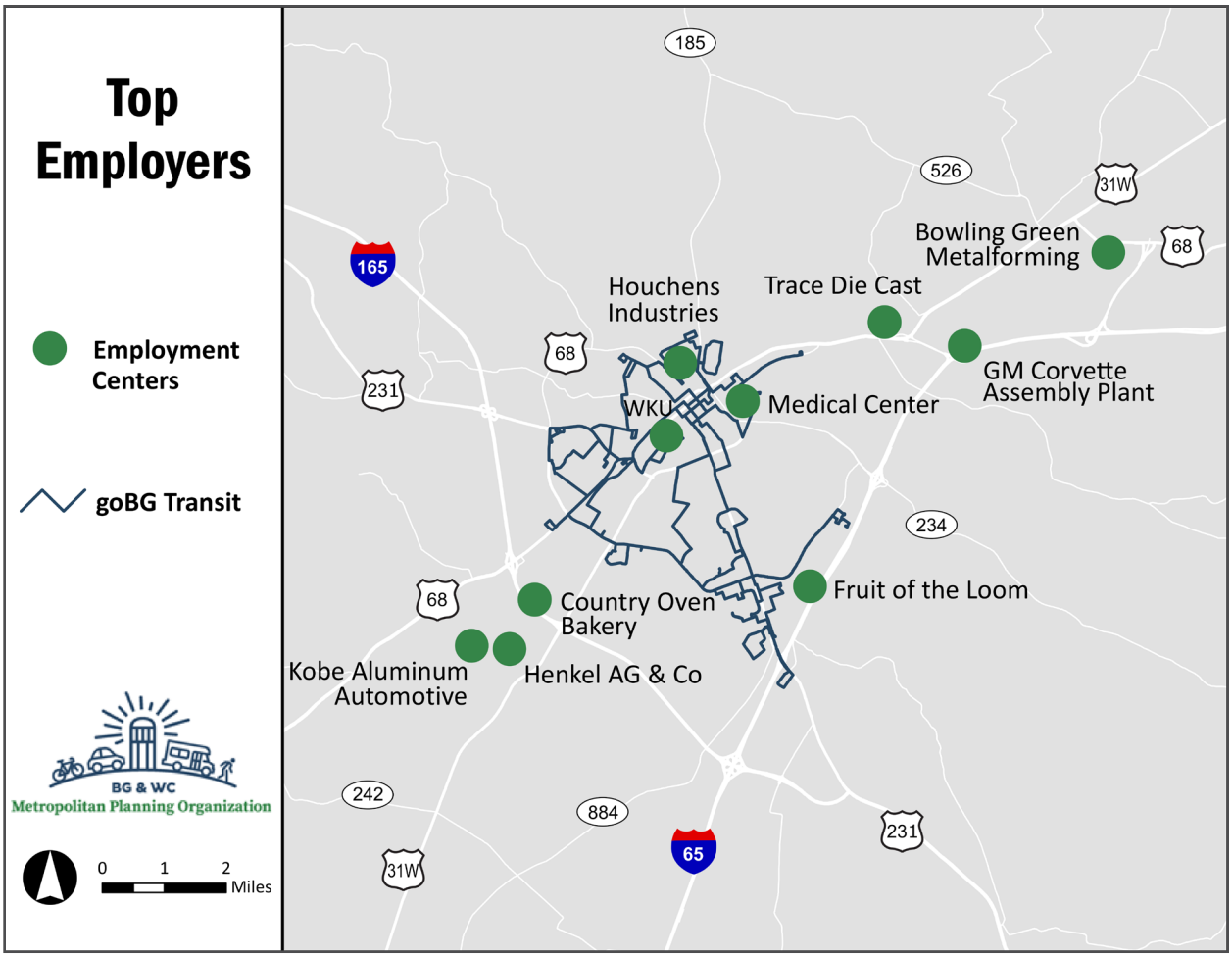


Figure 7: Location of Top Employers

Major Activity Centers

Major destinations in Bowling Green include the following:

- Western Kentucky University Credit Union
- Fruit of the Loom
- Southcentral Kentucky Community & Tech College
- Holley Performance Products
- Western Kentucky University
- Graves Gilbert Clinic
- Tristar Greenview Regional Hospital
- Daymar College
- Education and Training Resource
- Martin MGMT Group
- Lifeskills
- National Corvette Museum
- Commonwealth Health Corporation
- Sumitomo Electric Wiring Systems
- Houchens Industries

Public Engagement

The discussion with the affected community is one of the most important elements of the planning process. In January of 2021, the project team developed a draft strategy for engaging the stakeholders, the transit ridership, and the general public concerning the issues and needs of the current GO bg Transit System. The strategy included four major components: Virtual Meetings, Surveys, Stakeholder Interviews, Presentation of Study Recommendations. The public involvement strategies for this planning study supported GO bg Transit's Title VI Policy that states that "before significant changes are made that would affect any person's ability to access transit services, the staff with the City will receive input from all parties and representatives from other community-based organizations." Since Bowling Green is home to several local organizations that provide essential services to low-income and minority residents, the strategy included opportunities for those support agencies to provide comments.

Meetings

As the nation experienced a second deadly surge from the Covid19 Pandemic, the project team agreed that all meetings with the stakeholders and the general public would be conducted virtually. This input from these meetings would be vital in the development of the plan's recommendations. The Stakeholders Meetings were scheduled across two dates, February 9 and 10, 2021, to provide a range of opportunities for involvement. The February 9th meeting was held at 5:30 pm while two meeting opportunities were provided on February 10th at 9 am and 1 pm. The Stakeholders Meetings were designed to obtain a local perspective on transit issues within the community. The stakeholder meetings included an overview presentation of the GO bg Transit service purpose, study purpose, study schedule, existing conditions of the GO bg system, potential service gaps in the system, and a facilitated discussion of the challenges of the current system. Through the facilitated discussion and also captured through the chat box feature of the virtual meeting, the meeting participants were encouraged to identify specific issues and concerns associated with the existing GO bg Transit service such as connectivity, safety, and system operation. The meeting participants were also encouraged to promote the February 16th Public Meeting and the Survey which opened on February 9th and ran until February 23rd.

Over the course of the three stakeholder meeting opportunities, twenty-two people participated in the discussions concerning GO bg Transit. Common themes across the three opportunities were that the system should provide:

- Access to job opportunities
- Longer service hours in the evening
- Weekend service
- Improved frequency
- Shorter travel time
- Better community-wide awareness of the system and its benefits.

The virtual meeting with the general public was held on February 16, 2021 from 6:30 pm to 8 pm. Similar to the stakeholder meetings, the public meeting included an overview presentation of the GO bg Transit service purpose, study purpose, study schedule, existing conditions of the GO bg system, potential service gaps in the system, and a facilitated discussion of the challenges of the current system. Flyers in English and Spanish were posted along the route buses and at the Transit Center to advertise the public meeting.

Despite the wide promotion of the public meeting, a small gathering of 15 attendees, including GO bg, MPO, and MBI representatives participated in the virtual meeting. This also included one city commissioner, Dana Beasley-Brown. One individual represented the local school system's refugee student program while another represented a community interest group and one representative from WKU. No one attending the meeting indicated that they were transit users. Comments from the facilitated discussion during the public meeting focused upon outreach and support for transit use in the large refugee population in the city, making certain that transit routes provided access from "food desert" neighborhoods to grocery stores, and the need for service to the medical and social service centers located on Lovers Lane. In light of the sparse participation in the public meeting, the project team made a stronger effort to collect input, especially among current transit users, through the survey.

Stakeholder Interviews

To capture a larger sample of input, the project team decided to conduct phone interviews targeting specific stakeholders. These interviews were conducted in late February and early March. The interviewed stakeholders represented these agencies:

1. Hotel, Inc.
2. BRASS Barren River Area Safe Space
3. CALKY Center for Accessible Living
4. Graves-Gilbert Clinic
5. Hope House
6. Lifeskills
7. MARC Men's Addiction Recovery Campus
8. Refugee Center
9. Salvation Army
10. BG Towers
11. Veterans Affairs

The agency representatives were engaged by phone to participate in a short interview which consisted of two questions that focused upon the personal challenges and physical or operational barriers experienced by their clients in their use of transit. A third question was focused upon the system's current coverage. A fourth question consisted of asking the interview participant to decide among the potential "trade-offs" of possible system improvements. As the final question of the interview, participants were asked to share their thoughts on the priorities for improvements to GO bg Transit.

Regarding personal challenges experienced by their clients, six interview participants indicated that their clients "do not understand how to use the transit system." Four responses indicated that the cost of the fare is a challenge and one participant shared that their agency gives out passes, but it is still a struggle for many. Five agency representatives indicated that their clients had difficulty physically getting on the bus. The interview participants shared five comments that indicated that the current service hours do not meet the needs of their clients and another commented on the lack of frequency of the service. Four participants shared that the service failed to be convenient to where clients wanted to go to employment or service centers and

the lack of connections between routes. Additional comments dealt with the need for paper route maps because of the lack of smartphone access, the confusion on how to apply for ADA transportation services, and language barriers.

When asked about operational or physical barriers for their clients, three representatives responded that there is no transit service near their location and another three responded that the service takes too long. Seven representatives provided their concerns that the service did not operate late enough in the day or did not provide weekend service hours. The Men's Addiction Recovery Campus (MARC) representative remarked that being furthest stop on the route was at times difficult for their clients to link to other routes. Other comments dealt with lack of coverage especially for their clients to access the employment offered within the industrial parks that are located beyond the system.

When asked about the current service's coverage of destinations, three representatives responded that they did not know of any additional destinations that needed transit service. However, six responses indicated that more employment centers needed transit access while four responses indicated better access to medical facilities. Three responses supported including more residential areas into the transit service. Only one response indicated an access need to shopping areas. An additional comment was in support of access to substance abuse support group (AA) meeting spaces.

The 11 interview participants were asked to make "trade-offs" among five pairs of potential improvements. Seven representatives indicated that they preferred longer service hours during a day compared to the only four representatives supporting more frequent bus service. Faced with the choice between "more weekend service" and "more weekday service", nine representatives selected "more weekend service". However, one representative strongly stated that both choices were necessary. When choosing between "more stops for shorter walk distance to and from stops" and "fewer bus stops for faster bus service", seven representatives selected "more stops for shorter walk distance to and from stops" as opposed to four supporting less stops and faster service. Concerning selecting "buses running more frequently on fewer streets" or "buses running on more streets but less frequently", eight of the representatives chose as their preference for buses to run less frequently, but on more streets. All eleven representatives selected "serving new areas not currently served" over the improvement of the existing bus service routes.

As the final interview question, the representatives provided their insights on what they believed should be the top priorities for GO bg Transit to improve service and meet the community's needs. Four comments focused upon the priority of extending service hours in the evenings and on the weekends. One specific representative remarked that "it is currently ineffective for many people as transit can't get them home at the end of the workday even if it does get them to work." Additional comments underlined the need for the service to further investigate additional stops, especially to areas of the community that are not being currently served, especially employment centers.

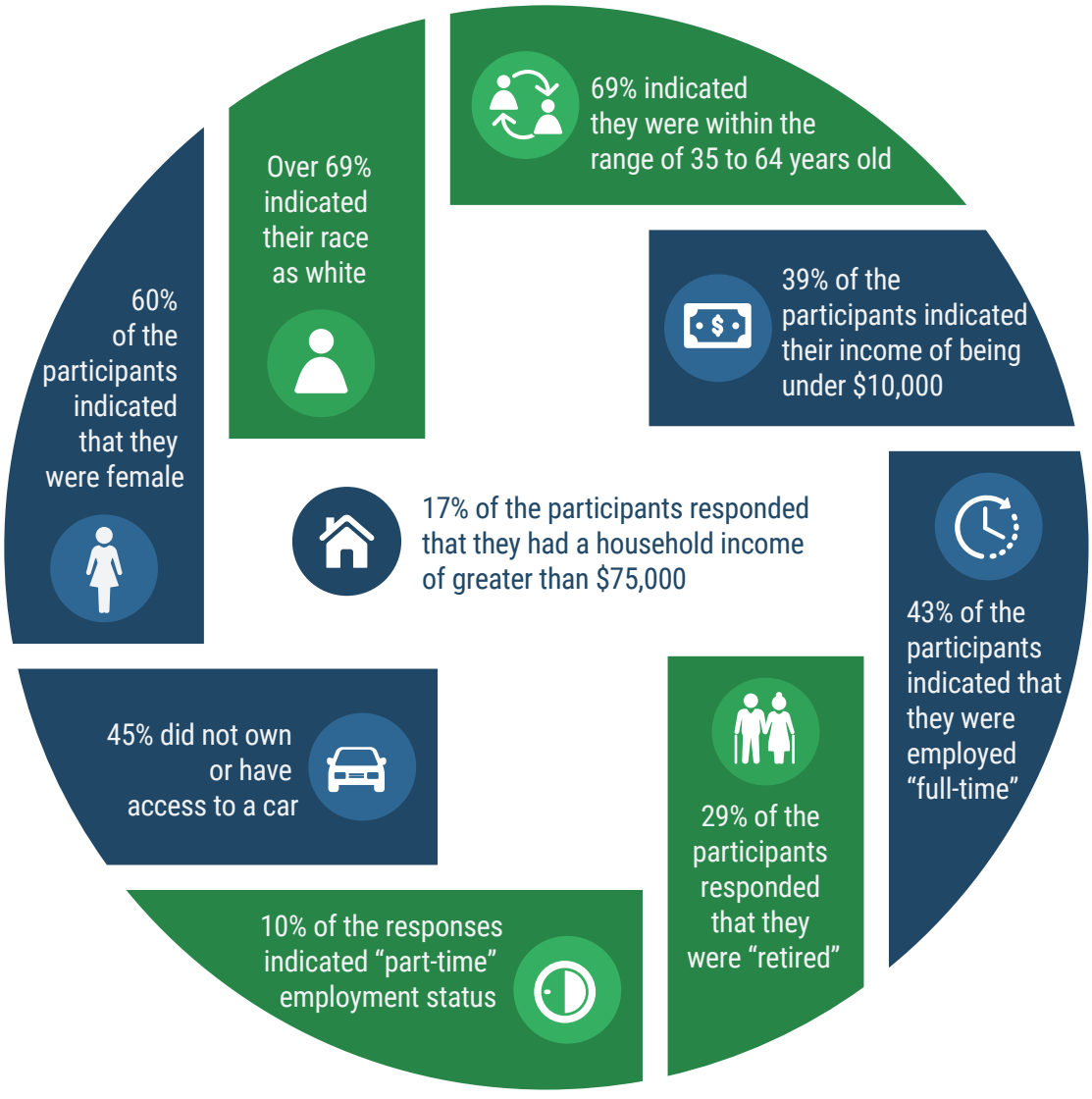
Survey Results

As a major element of the community engagement for this study, a survey was provided in English and Spanish, in both online and hard-copy versions, to capture input concerning the current GO bg Transit System. The survey included 17 questions concerning the level of transit use and travel patterns, system service and coverage satisfaction, and the demographics of the survey participants.

The survey was open for completion beginning February 9, 2021 and captured a total of 87 responses. As over 14% of survey respondents indicated that they lacked internet access, the hard-copy surveys were a major component of the survey rollout.

The participants in the survey represented both transit-dependent riders and members of the community who could become more frequent riders if conditions are suitable. Almost half (45%) of the survey participants responded that they did not own or have access to a car, which indicates a reliance on public transit, walking, and/or getting a ride in a friend or family member's car. Forty-three percent of the survey participants indicated that they were employed full-time, a segment of the community who either are or could become frequent riders who utilize the service multiple days a week.

Demographic Composition of Survey Respondents



Most survey respondents were existing GO bg users, but much of the feedback collected from the survey speaks to what potential riders are looking for in a transit system. A quarter of the survey participants reported using the services almost every day, with 2/3 of the participants reporting that they use the services for errands. The 37% of respondents that reported not currently using transit represent an untapped pool of potential new riders.

Transit Use

25%
used the services almost every day

38%
used used the system from several times per week to only a few times per year

37%
did not currently use transit

62.6%
walked to a transit stop

4%
used a mobility aid like a walker or wheelchair to access a transit stop

28%
use transit for Shopping or personal errands from home

23%
use transit for Commuting to work

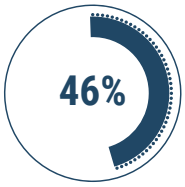
17%
use transit for Medical appointments

The Red Route/#1, which starts and ends at the Downtown Transit Center after circulating through downtown and Old Louisville Road, was the most popular route among respondents. The Purple Route/#5, serving WKU, was the least popular route and was already suspended during the COVID-19 pandemic.

Top Routes Used by Participants

Red Route | #1

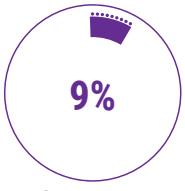
Green Route | #3



Blue Route | #2

Pink Route | #6

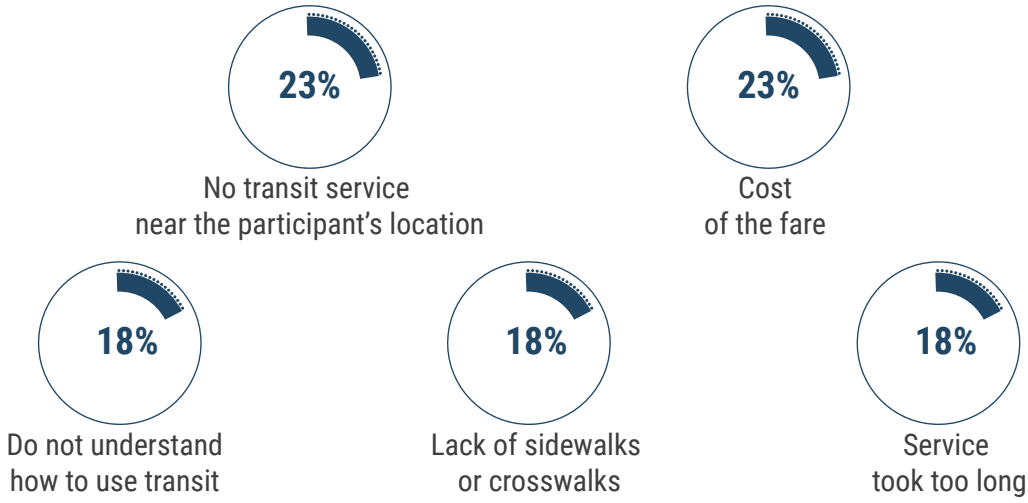
Yellow Route | #4



Purple Route | #5

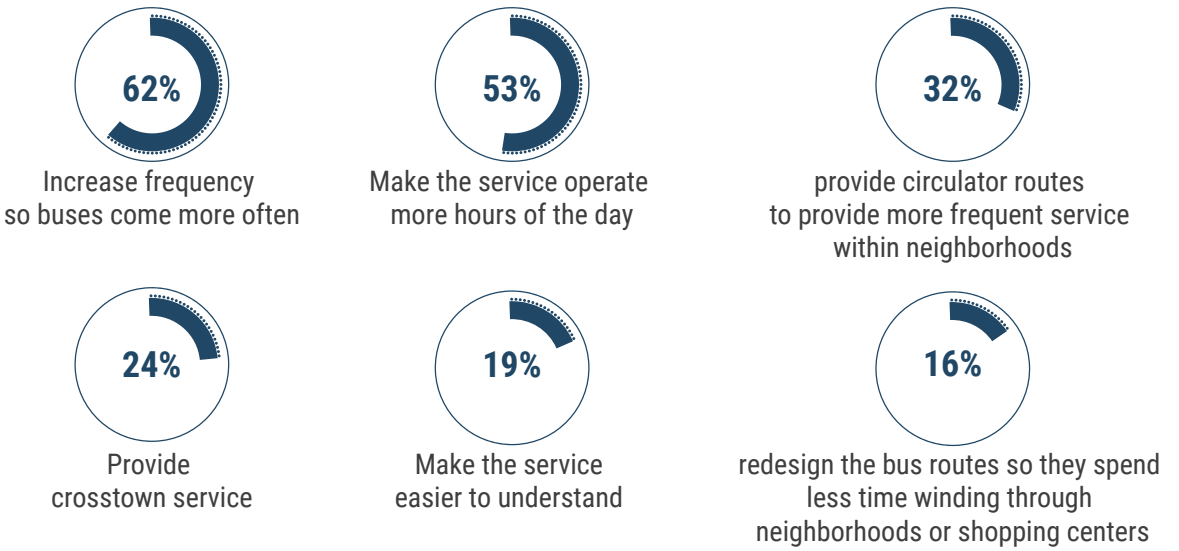
Survey participants' reported that the biggest barriers to using GO bg's Transit Services are the lack of transit service near the participants' home addresses and the cost of fare.

Barriers to Using GO bg Transit



The survey also provided feedback about what service improvements would draw more riders and increase how frequently riders use GO bg Tranist. Increasing frequency so that buses come more often was the most popular improvement, followed by making the service operate for more hours of the day (GO bg operates Monday through Friday, 6am to 6pm, with limited Saturday service).

Preferred Improvements



Thirty-seven participants provided additional comments to share their general comments concerning GO bg Transit. Most comments involved suggestions for better frequency and shorter route travel times. Two comments specifically dealt with access to neighborhoods that are not being currently served by the routes including the residential area near Preston Miller Park (Water Park) off Veterans Memorial Lane.

Insights from the Stakeholder and Public Involvement

The major insights deduced from the stakeholder and public involvement activities were:

1. **Longer Span of Service Operation**
   a. majority of participants expressed a desire for longer hours of the service in the evening and increased weekend service hours. Comments also expressed an increase in frequency of service.

2. **Communicate Functionality & Benefits of GO bg Transit System**
   a. Many participants asked for more communication focused on how to use the system, what neighborhoods and services are being served by transit, and what the benefits are to the entire community of having a transit system.

   b. One participant suggested expressing these benefits through personal narratives of transit users and how the system provided them with a level of independence to access their needs that would otherwise be denied.

   c. Comments also indicated confusion on how the WKU Topper Transit System and GO bg system interface.

3. **Route Simplification**
   a. These comments provide support for investigating a concept of a system that would include neighborhood circulators and crosstown connectors.

Alternatives to Standard Local Service

The most common type of bus service is local fixed route service, which involves full-sized buses making regular outbound and inbound trips along a corridor every 30 to 120 minutes throughout the day. This is one of the most efficient and effective service options available to riders; however, under certain demographic conditions, the alternatives outlined below may offer other viable alternatives.

Local Circulators and Feeders

Local circulator services typically operate on a frequent, continuous loops and are designed to directly serve important destinations and corridors. For example, GO bg currently provides downtown circulator service with its Route 3 Green Line. The route circulates between 31 downtown locations in less than 25 minutes.

Feeder services are designed to provide an easy connection to transit stations or high frequency transit services such as light rail or Bus Rapid Transit (BRT). Feeders mitigate the need for fixed routes to deviate from their primary corridors. Some universities and colleges operate feeder-like shuttles between their campuses and the local transit system.

Demand-Response and Microtransit

Demand-response services provide door-to-door trips within a specified service area using smaller transit vehicles. Community Action of Southern Kentucky was awarded grant funding from United Way Venture to undertake a pilot transportation service based on a demand response. Paratransit services are typically provided in response to the Americans with Disabilities Act (ADA), and are funded by state and federal sources to provide service to individuals who are generally unable to use traditional fixed route services.

Microtransit is a type of demand-response service provided to everyone. These services typically operate in low density suburban and rural communities where fixed route services are not cost effective. Across the United States, microtransit services are being offered by both transit agencies and by private companies. Microtransit typically uses a smartphone-based platform that enables customers to hail a shared-ride on demand or with a short wait. In places such as Kansas City, transit agencies use microtransit as a service integrator to provide better first and last-mile connections in their largely rural service area.

Flex Routes

Flex services are a hybrid between fixed route and demand-response service. Flex routes travel along a fixed alignment with scheduled start times, but can deviate from the route to directly serve a destination by rider request. Passengers may also "flag" a bus at any safe point along the fixed route rather than having to walk to a specific stop.

Rideshare Services (TNCs)

Private rideshare companies, or Transportation Network Companies (TNCs) like Uber and Lyft, compete directly with transit services. Evidence suggests they play a role in declining transit ridership across the country. Public-private partnerships with these companies can also provide a way for individuals to reach fixed route services and integrate into a transit system TNCs have entered into arrangements in several metropolitan areas to provide connections from underserved areas to areas where fixed route service exists. Lyft, Inc. claims to have over 80 partnerships in North America to provide subsidized trips in areas underserved by transit. Uber claims to have 30 similar partnerships worldwide.

Transportation Management Associations

Employment areas that lack concentrated density but still form a congregation of employers are prime targets for Transportation Management Associations (TMAs), public-private partnerships between transit agencies, and local employers who coordinate with public transit by offering van or shuttle service. Schedules and drop off destinations can be coordinated to get employees to and from destinations within a service area. This type of service is much more efficient than a fixed route looping bus service. Coordinated partnerships can help get employees to their destinations faster and can help a transit agency run more productively. GO bg Transit, Bowling Green-Warren County MPO, and WKU Topper Transit are three TMAs operating in the Bowling Green service area.

System Recommendations

The project team utilized transit demand factors, propensity, and best practices in system design to develop system recommendations based on the city's available budget. The recommendations were refined to include information gathered the public and stakeholder engagement processes. The project team, inclusive of the MPO staff, representatives from the City of Bowling Green, and CASOKY/GO bg were engaged in regular meetings to discuss system recommendations.

The project team made the following initial key observations of the existing transit system:

- Ridership in Bowling Green is significantly lower than state and national averages. The city has characteristics that would suggest transit ridership should meet or exceed national averages. This is likely an indicator that the bus network does not meet the needs of potential riders.
- Retail locations account for most of the busiest stops on the system outside of the downtown transit center. In addition to generating trips for shopping, retailers generate trips for employment purposes.
- Several of the routes are complicated and are not clear to potential new riders. Several of the routes, including the Route 2 and Route 6 travel in multiple directions.
- Most of the routes consists of either one omni-directional loop or have different in-bound and out-bound routes. This creates some stops that can only be reached by traveling the entire system. For example, Route 3 stops at the Greenview Regional Hospital during its run from the downtown to Greenwood Mall. During the return trip from Greenwood Mall back to Downtown, the route stops at the Sloan Convention Center instead of the hospital.
- The travel time of several routes are significantly longer than the travel by alternative means.
- There are stops on the system that have less than one boarding per service day. This may create an opportunity for stop consolidation or potentially the ability to serve different locations.
- Several of the largest employers (e.g., manufacturers) and activity centers are not served by the current route structure. The employers in the manufacturing sector are far from the city's core. While these locations may generate potential trips, there is likely only demand for three in-bound and three out-bound trips per day (at shift changes).

System Design Options

The project team considered the initial observations, the results of the public outreach, and data collected during the market analysis to develop several alternative system designs. Four initial systems were developed and refined through the life of this study. Each system was designed with an operating budget of $1.2 million – 1.3 million annually.

Redesign Option 1

Redesign Option 1 consisted of the current GO bg system without Route 5, but with the addition of Saturday service. Route 5 was suspended during the COVID-19 pandemic and it is assumed that it would not resume operation. In this option, the budgeted funds previously assigned to operate Route 5 were reallocated to the rest of the system as a way to fund limited service on every Saturday for all other routes.

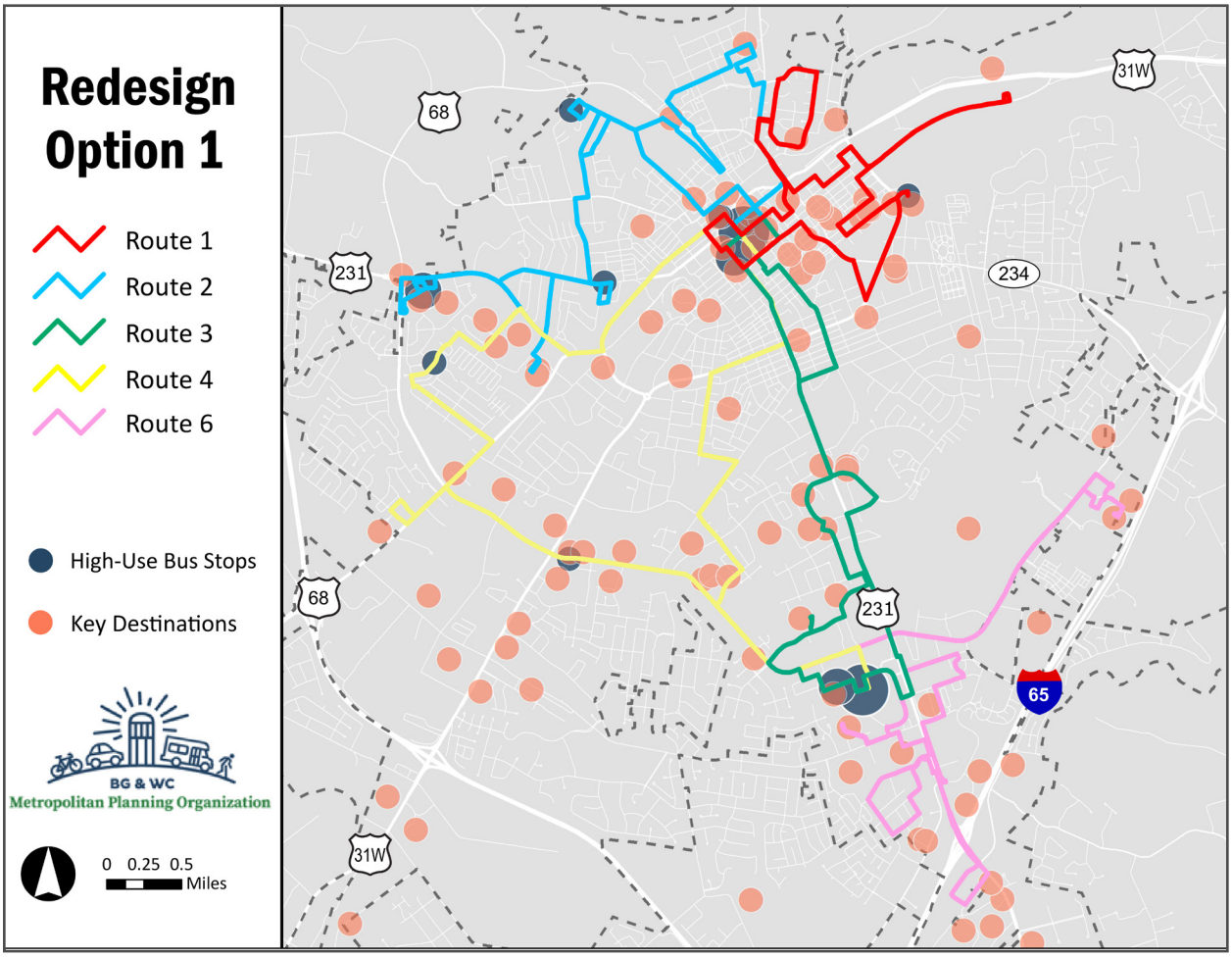


Figure 8: System Redesign #1, Saturday Service

Redesign Option 2

Redesign Option 2 included several changes to address public concerns with the current system. Route 2 was revised to straighten the route and create a consistent inbound and outbound trip. Route 3 was modified to have a consistent inbound and outbound trip that serves the hospital in both directions. Route 4 was modified to shorten the trip time and was shifted to meet Route 2 at the Wal-Mart on Morgantown Road. This route would no longer service Greenwood Mall since a new route would offer a new connection. Route 6 was modified to slightly shorten total trip time. A new Route N was created to service the manufacturing employers to the north of the city's core. It runs from downtown to the General Motors plant. A new Route S was created to service the southern portion of the city's core area. This route runs from the Kroger store on Campbell Lane to Greenwood Mall.

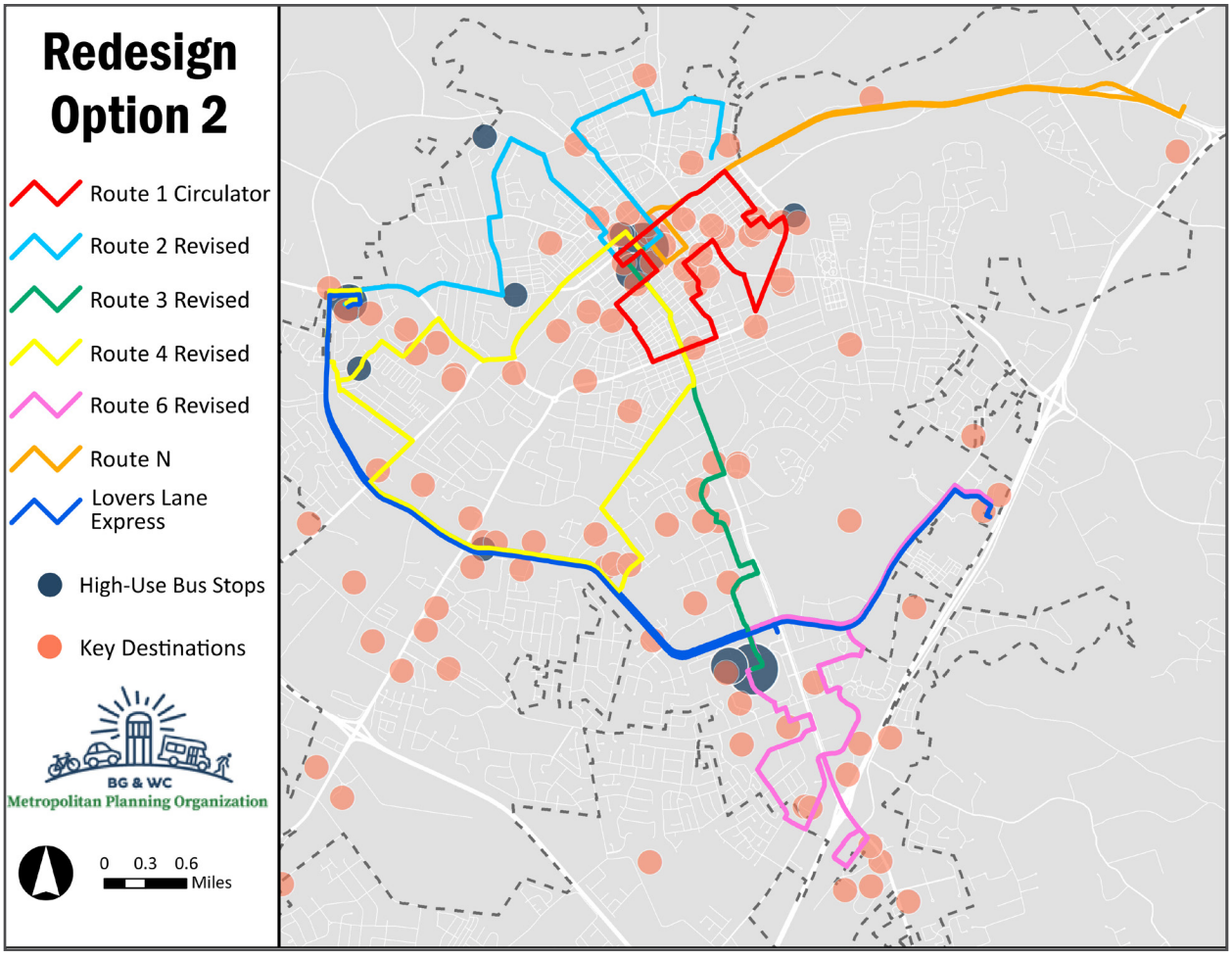


Figure 9: System Redesign #2, Revised Routes

Redesign Option 3

Redesign Option 3 included demand-response service as an approach to reach areas with lower population or job density. This option includes a microtransit zone in the area near the manufacturing employers to the north of the city's core area. A second microtransit zone would be utilized to the south of the Greenwood Mall.Microtransit options are further explained in the Alternatives to Standard Local Service section of this document.

Route realignments in this option include:

- Route 1 to cover a slightly larger service area by increasing the walking distance to stops
- Route 2 to be a loop instead of offering inbound and outbound trips. The loop serves the same service area but would increase walking distances to stops.
- Route 3 to have a consistent inbound and outbound trip. The route was extended to serve the eastern portion of the city previously served by Route 6.
- Route 4 to meet the revised Route 2 at the Wal-Mart on Morgantown Road. The most substantialmodification to Route 4 would no longer service the downtown/central business district area.
- Route 6 to eliminate the portions of the route to the south and east of Greenwood Mall

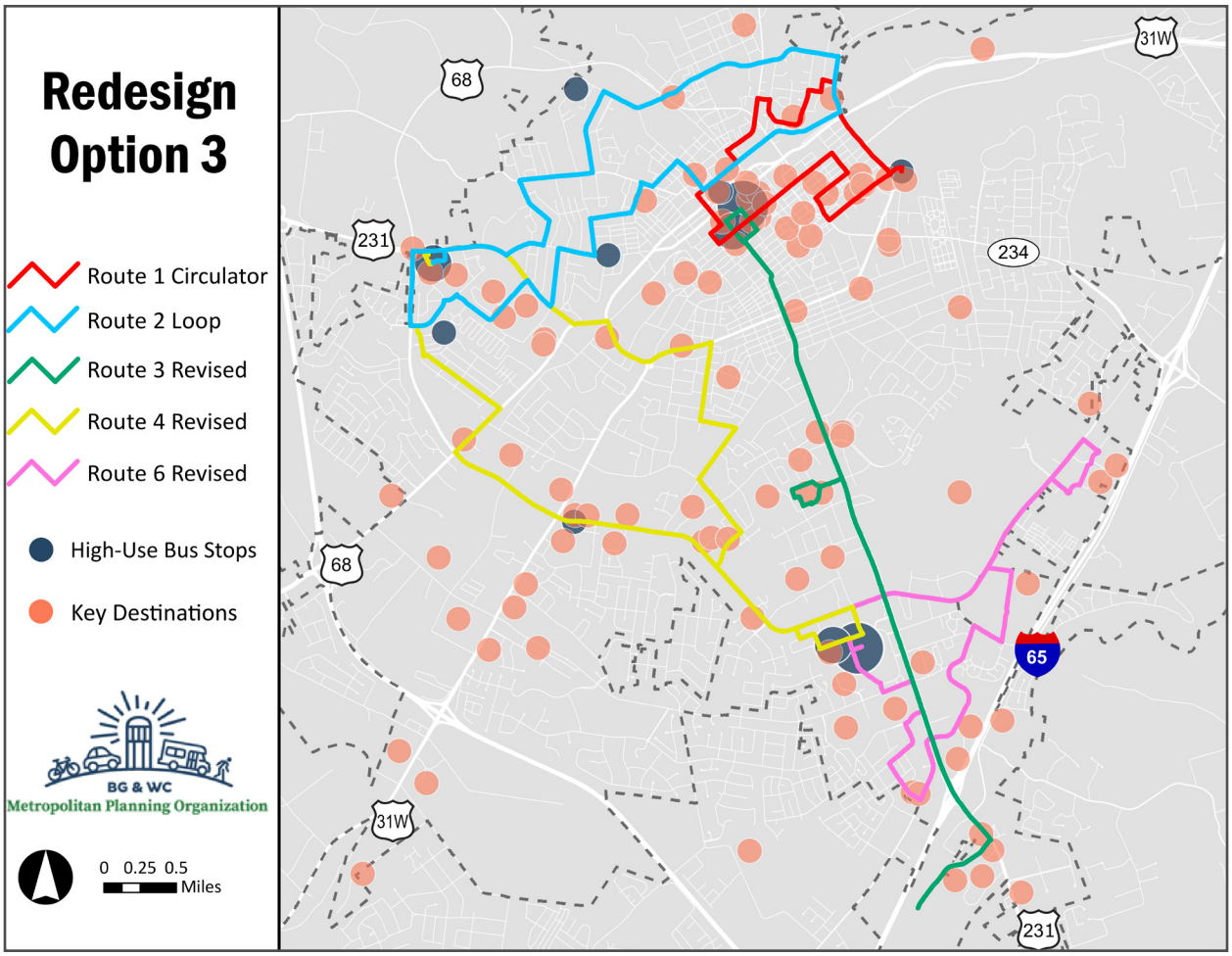


Figure 10: System Redesign #3, Microtransit

Redesign Option 4

Redesign Option 4 attempted to create a new system from a blanked slate based on the information the plan's data collection efforts (e.g., population and job density, transit propensity, high-use bus stops, key destinations, etc). This option contains multiple circulators, crosstown routes, feeder routes, and transit hubs. There are major connections at Greenwood Mall, West Side Wal-Mart, and the downtown transit center. The circulators serve the central business district, the westside near Wal-Mart on Morgantown Road, and the eastside near Greenwood Mall. Each circulator was designed to have headways of less than 45 minutes and runtimes of less than 30 minutes. The circulators attempt to connect neighborhoods to a major destination (where people work or travel to). The new crosstown routes create longer distance connections.. The Central Crosstown connects the Downtown Circulator to the East Community Circulator. The South Crosstown connects the West End circulator to the East Community Circulator. The North South Crosstown connects the areas north of the central business district to the area south of Campbell Lane. The Westside and Eastside feeders bring passengers from the communities outside of the circulators to the transit hubs.

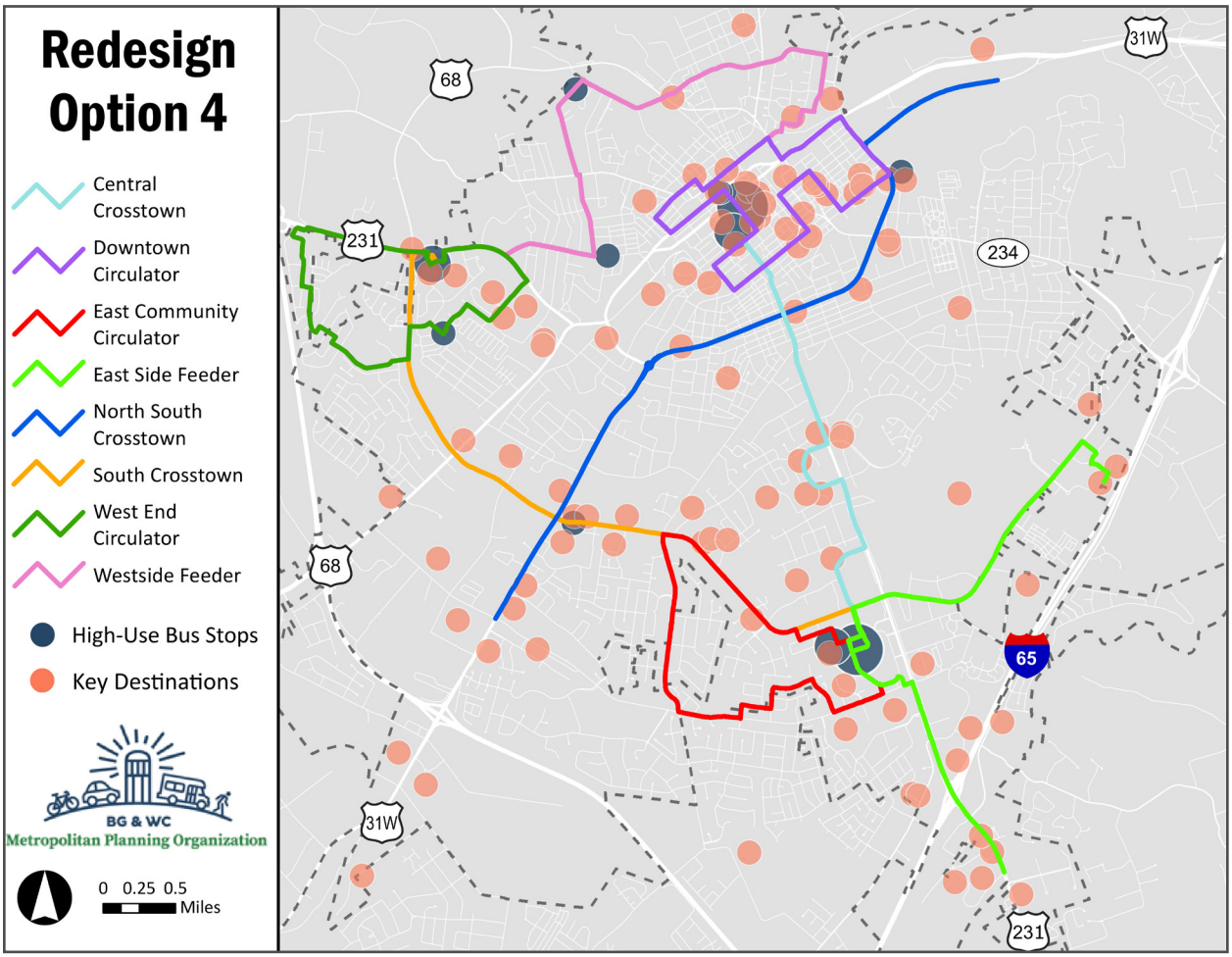


Figure 11: System Redesign #4, New Routes

The process of developing these four options led to several important considerations to service in Bowling Green:

- Servicing industrial areas north and south of the city's core area withfixed route service would be expensive due to the distance and anticipated infrequent boardings. That type of service is not cost effective (based on service effectiveness and efficiency measures) and would limit GO bg's ability to service other high-demand locations. A demand response model such as microtransit may be effective, but a pilot project would be necessary to evaluate potential long-term ridership.
- Bowling Green's geographic borders present some challenges for providing service within the limits of the urbanized area. Some roads, such as Dishman Lane, traverse the city limits multiple times in a short span. Developing routes in these areas may prove to be difficult.
- Social service agencies have relocated out of the central business district to more remote locations such as Lovers Lane. These are services frequented by transit dependent customers, but the overall demand is not as high compared to other locations. There may be opportunities to serve these locations with more efficient, cost-effective methods such as vanpools or microtransit. For example, a van service could service Lovers Lane from Greenwood Mall by request instead of running a fixed route with lower ridership.
- The constrained nature of the City's budget for transit limits the ability to add new or expanded service. The only way to modify service is via trade-offs. For example, GO bg could add weekend service by eliminating an existing route. This type of trade-off analysis will require additional study as well as extensive public outreach and engagement. Any changes will require a dedicated change management approach.

Final System Recommendation

The project team met multiple times to discuss the attributes of a final system recommendation. Following much deliberation, the decision was made that the timing and conditions are not appropriate to support a significant change in the current system. The decrease in transit ridership resulting from the COVID-19 pandemic, the progress of businesses reopening, and uncertainty in near-term transit funding create unfavorable conditions to support substantial change at this time.

In lieu of a significant networked overhaul, the consultant team provided support to CASOKY to improve the current system without disrupting the existing route system. This approach provides stability and continuity for GO bg Transit's existing ridership. CASOKY also identified minor changes to each route and redesigned Route 5 to focus on maintaining existing ridership and implementing efficiencies.

Red Line - Route 1

RUNTIME
44.3 min
every 60 min

STARTS & ENDS
Downtown
Transit Center

KEY LOCATIONS
Downtown Transit Center, Kroger on Bypass, Medical Center, BRASS, Neighborhood Services, RHDC, Post Office (State St)

MODIFICATIONS: The loop above Parker-Bennett-Curry Elementary School was moved to Route 2. Added to Route 2 is the E 10th St section formerly on Route 3.

EXPANSION: N/A

POSSIBLE CONNECTION/TRANSFER POINTS: Downtown Transit Center - Rts 2, 3, 4, 5

Blue Line - Route 2

RUNTIME
42.5 min
every 60 min

STARTS & ENDS
Downtown
Transit Center

KEY LOCATIONS
Downtown Transit Center, Roses, IGA, Housing Authority, Dollar General, Wal-Mart (Morgantown Rd). Hotel Inc., Salvation Army, Hope House, Plasma Center

MODIFICATIONS: The loop above Parker-Bennett-Curry Elementary School was added to Route 2 and removed from Route 1. The Spring Hill area was removed and placed on Route 5.

EXPANSION: N/A

POSSIBLE CONNECTION/TRANSFER POINTS: Downtown Transit Center - Rts 1, 3, 4, 5; Roses/IGA - Rt 5; Wal-Mart (Morgantown Rd) - Rt 5

Green Line - Route 3

RUNTIME
46.6 min
every 60 min

STARTS & ENDS
Downtown
Transit Center

KEY LOCATIONS
Downtown Transit Center, Bowling Green Towers, Greenview Hospital, Mejiers, Wal-mart (mall), Greenwood Mall, Social Security Office, Convention Center

MODIFICATIONS: E 10th St section was moved to Route 1. Added to Route 3 is the Social Security Office formerly on Route 6.

EXPANSION: N/A

POSSIBLE CONNECTION/TRANSFER POINTS: Downtown Transit Center – Rts 1, 2, 4, 5; Greenwood Mall – Rt 6

Yellow Line - Route 4

RUNTIME
43.7 min
every 60 min

STARTS & ENDS
Downtown
Transit Center

KEY LOCATIONS
Downtown Transit Center, Graves Gilbert (Nashville Rd), Kroger (Campbell Ln), Aldi, Mejiers

MODIFICATIONS: The Spring Hill area was removed and placed on Route 5. Apartments on Patton Way added from the suspended Route 5. The route will no longer serve Wal-Mart (Mall) or Greenwood Mall as it now stands but needs consideration. Propose adding Wal-Mart and/or Greenwood Mall time permitting.

EXPANSION: Loop to service Grave Gilbert (Nashville Rd)

POSSIBLE CONNECTION/TRANSFER POINTS: Downtown Transit Center - Rts 1, 2, 3, 5; Mejiers

Purple Line - Route 5

RUNTIME
42.0 min
every 60 min

STARTS & ENDS
Downtown
Transit Center

KEY LOCATIONS
Roses, IGA, Wal-Mart (Morgantown Rd), Waterpark, Russellville Rd Area

MODIFICATIONS: The Spring Hill and Russellville Rd area was added and removed from Route 4.

EXPANSION: Waterpark neighborhood, Section of 31-W By-Pass

POSSIBLE CONNECTION/TRANSFER POINTS: Downtown Transit Center - Rts 1, 2, 3, 5; Roses/IGA - Rt 2; Wal-Mart (Morgantown Rd) - Rt 2

Pink Line - Route 6

RUNTIME
46.3 min
every 60 min

STARTS & ENDS
Greenwood
Mall

KEY LOCATIONS
Greenwood Mall, Pascoe Neighborhood, Post Office (Scottsville Rd), Pedigo Area, Lovers Ln Medical

MODIFICATIONS: The Social Security Office was moved to Route 3. The route will no longer serve Wal-Mart (Mall) as it now stands but needs consideration. Propose adding Wal-Mart (Mall) time permitting.

EXPANSION: Route extended to Post Office on Scottsville Rd.

POSSIBLE CONNECTION/TRANSFER POINTS: Greenwood Mall - Rt 3

Marketing

Marketing and outreach activities are an effective way to increase demand for transit service. Public outreach activities during the study process indicated a lack of awareness of the GO bg system and the utilityfor residents and visitors to the city. The project team has identified the following cost-efficient marketing strategies to improve awareness of the GO bg service and potentially increase ridership:

Stop and Station Signing

Bus stop signage not only identifies the physical location of the stops, but also provides a visual indicator that transit exists to potential riders of the system. Stop and station signage can be simplistic in design (e.g.,small signs with the GO bg logo). More detailedsigns containing route information with a QR-code that links to the bus schedule could be installed at the busiest stops. Signs with variable displays that provide next vehicle arrival are available but are likely too costly to install across the system.

Vehicle Branding

Transit vehicles themselves provide an opportunity to improve awareness of the system. Cutaway style buses that are not providing transit services can be commonly found in urban areas. . Hospitals in particular commonly operate a similar type of vehicle. Simple vehicle branding strategies include color and messages. Vehicles could display system maps or system facts such as “service between downtown and Greenwood Mall.”

GTFS Feed to Web Apps

General Transit Feed Specification (GTFS) is a standard format for sharing transit data across computer applications. GTFS is the format that allows services like Google to provide real-time datato help users navigate the system via its maps. New mobility services are arising across the country and provide future opportunities to share route information with the public. This strategy is especially important to individuals visiting Bowling Green, who may be relying on web-based services to guide them.

Intercept Surveying / Marketing

Conducting periodic, in-person surveying at GO bg’s busiest stops could not only provide valuable voice of the customer information, but also presents an opportunity to provide information on the system to both users and potential users. For example, conducting intercept surveys monthly at the Greenwood Mall could provide an opportunity to hand out informational materials about the entire system and talk to potential system users . This may also allow for capturing anecdotal information about why people are not using the service. Intercept surveys could vary by location and time of day across the system. The mere presence of staff wearing GO bg branded attire may also increase awareness of the transit service. Intercept surveys should be kept to 10 questions or less.

Community Advisory Board (CAB)

Community Advisory Boards (CAB) are utilized by transit agencies across the United States to maintain engagement with communities throughout their service areas. Implementing a CAB offers an opportunity to engage with specific communities and deliver targeted messaging. Those messages are typically cascaded from the CAB back to the public through community and neighborhood associations. The CAB could also include representation from larger employers which allows for targeted messaging and education on how transit operates. Successful CABs offer an information exchange where communities share their developments and challenges, and the transit service has the opportunity to share the same.

GO bg Website Update

The Internet is a major planning tool for travelers regardless of the mode of transportation they plan to utilize. Customers and potential customers should be able to utilize the GO bg website to plan their trips and see important info about the status of routes. Many websites today have mobile versions which allow for most functionality to work on mobile phones and tablets. During the public outreach period, 18% of respondents did not understand how to use the transit system. An updated website could not only provide key information for customers, but could also provide information to convert potential customers into customers.

Financial

The American Public Transportation Association (APTA) highlights the benefits of investing in transit. APTA state the following:

Every $1 invested in transit **generates $5 in economic returns.**

Home values **were up to 24% higher near transit** than in other areas.

87% of trips on transit **have a direct impact** on the local economy.

Public transportation is a **$74 billion industry** that employs more than 435,000 in the US.

Transit agencies, including GO bg, receive a combination of federal, state, and local funds. To add to the complexity of transit funding, there is no consistency in the funding mix from state to state and agency to agency. This section provides a high-level overview of this complex topic.

At the federal level, transit agencies receive funds under the provisions of Title 49, Chapter 53, of the United States Code. Each year new appropriation legislation is passed to appropriate general revenues that fund transit programs from the Mass Transit Account (MTA) of the Highway Trust Fund (HTF) for transit programs. Those funds are distributed by the FTA to transit agencies through both formula and discretionary (competitive) grant programs.

The COVID-19 pandemic led to a significant decrease in ridership revenues, while national relief funding aimed to fill that temporary gap. In May 2020, Kentucky was awarded $22.9 million in CARES Act funding. In July of 2020 GO bg was awarded $1.9 million in CARES Act funding and in August 2020, Kentucky was awarded CARES Act funding again at the amount of $6.4 million. GO bg had to reduce service hours and suspended one route as a result of COVID-19 affecting ridership.

Tables 5 and 6 (below) detail GO bg Transit's expenditures for operating needs and capital improvements over the past few years. Compared to most transit agencies across the country, GO bg relies very heavily on federal funding to continue its operations, with comparatively little state support or use of directly generated fare revenues.

	2016	2017	2018	2019	GO bg Average Percentage	National Average Percentage
Federal Funding	$932,289	$877,733	$936,198	$880,941	59.4%	8.6%
State Funding	$39,328	$31,156	$36,164	$28,104	2.2%	22.7%
Local Funding	$245,267	$332,580	$607,719	$461,570	27.0%	32.6%
Directly Generated	$115,695	$117,810	$67,198	$88,537	6.4%	36.0%
Other Funds	$61,189	$69,041	$0	$166,434	4.9%	–
Total	**$1,393,768**	**$1,428,320**	**$1,657,279**	**$1,625,586**	**–**	**–**

Table 5: Operating Funds Expended (Source: National Transit Database)

	2016	2017	2018	2019	GO bg Average Percentage	National Average Percentage
Federal Funding	$269,648	$36,147	$0	$618,717	97%	36.2%
State Funding	$24,301	$4,017	$0	$0	3%	15.1%
Local Funding	$0	$0	$0	$0	0%	48.7%
Directly Generated	$0	$0	$0	$0	0%	0.0%
Other Funds	$0	$0	$0	$0	0%	–
Total	**$293,949**	**$40,164**	$0	**$618,717**	**–**	**–**

Table 6: Capital Funds Expended (Source: National Transit Database)

Note: In most years, GO bg Transit did not purchase new vehicles, replace equipment, or pay for construction projects.

Fares

As Bowling Green continues to recover from the COVID-19 pandemic, any fare increases for GO bg through 2022 are not recommended. The findings of this report indicate that the City should evaluate fares before a new transit operations contract is executed in 2023. A fare elasticity evaluation is appropriate to consider the potential impact of fares on transit demand. Price sensitivity (fare elasticity) is measured using elasticities, defined as the percentage change in consumption resulting from a one-percent change in price, all else held constant. Generally, the Simpson-Curtin rule is can be used to estimate the impact of a fare increase on overall demand. The rule says a 3% fare increase reduces ridership by 1%. However, more specific percentages should be applied for specific portions of the population using techniques such as the Autoregressive Integrated Moving Average (ARIMA). It should be noted that a fare reduction may be appropriate to increase ridership. An equity analysis would allow the City to determine the balance where ridership and cost recovery are both maximized.

Operations Budget

The GO bg service is governed by two contracts: one contract between the City of Bowling Green and Community Action of Southern Kentucky, Inc., and one between the City of Bowling Green and RATP DEV USA, Inc. Based on the contract, Community Action of Southern Kentucky is required to supply and pay for all administrative, operating and maintenance costs not specifically identified as being the responsibility of the City in the agreement including, but not limited to, all necessary labor, vehicle repairs due to accidents, outside repairs not authorized in advance and in writing by the City, insurance, services, janitorial supplies, utilities, office supplies, capital assets not supplied by the City, and all other expenses for the proper fulfillment of the Contract. Reimbursement for operation of revenue service is reimbursed on a vehicle revenue hour basis. For purposes of this report, actual costs to operate the routes are included based on estimates by the transit planning software REMIX as well as the estimated vehicle revenue hour costs required by the contract. From July 1, 2021 to June 30, 2022, the reimbursement per revenue hour is $75.71. That price increases to $77.98 per hour on July 1, 2022. Based on the other contract, RATP DEV with provide management of the fixed route and paratransit systems for the City and also provide consultation services to the City of Bowling Green to assist transit operations. RATP DEV will be paid a fixed management fee of $221,146.97 from July 1, 2021 to June 30, 2022. The price increases to $227,652.62 in 2022.

- **Red Line – Route 1**
  Estimated annual operating cost (REMIX) - $198.4K.
  The route operates 12 revenue vehicle hours per day, five days per week, for a total of 3,120 revenue vehicle hours per day for a total of $236,215.20 (2021$) (assumes 260 regular service days).

- **Blue Line – Route 2**
  Estimated operating cost (REMIX) - $223.2K.
  The route operates 12 revenue vehicle hours per day, five days per week, for a total of 3,120 revenue vehicle hours per day. (assumes 260 regular service days).

- **Green Line – Route 3**
  Estimated operating cost (REMIX) - $231.5K.
  The route operates 12 revenue vehicle hours per day, five days per week, for a total of 3,120 revenue vehicle hours per day. (assumes 260 regular service days).

Yellow Line –Route 4
Estimated operating cost (REMIX) - $231.5K.
The route operates 12 revenue vehicle hours per day, five days per week, for a total of 3,120 revenue vehicle hours per day. (assumes 260 regular service days).

Purple Line – Route 5
Estimated operating cost (REMIX) - $210.8K.
The route operates 12 revenue vehicle hours per day, five days per week, for a total of 3,120 revenue vehicle hours per day. (assumes 260 regular service days).

Pink Line – Route 6
Estimated operating cost (REMIX) - $235.6K.
The route operates 12 revenue vehicle hours per day, five days per week, for a total of 3,120 revenue vehicle hours per day. (assumes 260 regular service days).

Other Operational Costs

Marketing Plan:

The GO bg service can benefit from an effective marketing plan to increase awareness of the system. Several recommendations are recommended earlier in the Marketing section of this report. Based on the existing contract, the City shall be the official source for the issuing of all press releases and marketing activities. An annual budget of $62-70K is recommended for the tasks outlined in the marketing plan. The suggested allocation of those funds is as follows:

- Stop and Station Signing: $13,000 annually
- Vehicle Branding: $17,000 annually
- GTFS Feed to Web Apps: $12,000
- Intercept Surveying / Marketing: $12,000 annually ($1,000 per month)
- Community Advisory Board (CAB): $3,600 annually ($300 per month)
- GO bg Website Updates: $6,000 annually

Transit Operations Information Technology:

Under its current contract, the City is responsible for all planning activities relative to transit service including days and hours of operations, preparation of planning documents, budgets, grant applications and related documentation, and other such activities relative to overall system administration. GO bg currently utilizes two subscription services to support transit planning and fare collection. REMIX is a planning platform for public transit that allows agencies to design, evaluate, and collaborate all in one place. It is capable of supporting planning for everything from a small detour to a full system redesign. Budgeting $10K annually for Remix would allow GO bg to continue taking advantage of the platform's transit planning capabilities. Token Transit lets customers ride public transit and pay with their credit, debit or commuter benefits card. The Token Transit app is used in over 100 cities across the United States and Canada. Agencies are charged a fee based on how many customers utilize the service. While current usage is low, and fees are close to $5K annually, **it is recommended that the City budget $10K annually for the Token Transit service.** This type of system has the potential to increase the number of discretionary riders using the transit system.

Vehicle Telematics subscription:
Telematics is the technology of sending, receiving, and storing information relating to remote objects, like vehicles, through telecommunication devices. When used in a bus, telematics technology can count how many miles it has been driven and can measure vehicle performance data. Telematic devices can monitor and inform drivers of things such as speed, vehicle position, trip length and distance, fuel usage, and engine acceleration. This data can benefit GO bg by facilitating real-time vehicle monitoring for GTFS feeds, and by providing data to forecast future vehicle costs. Vehicle telematics should receive $30k annually in the budget (~$2,500 per month for 10 vehicles).

	2021	2022	2023	2024
Management Fee	$221,146.97	$227,652.62	$234,254.55	$241,047.93
Fixed Route Operations	$1,417,291.20	$1,459,785.60	$1,502,119.38	$1,545,680.84
Transit Operations Technologies	$15,000.00	$20,000.00	$20,500.00	$20,910.00
Telematics	$25,000.00	$30,000.00	$30,600.00	$31,365.00
Unplanned vehicle repairs	$50,000.00	$51,000.00	$52,020.00	53,060.40
Total	**$1,791,438.17**	**$1,852,698.22**	**$1,905,039.13**	**$1,958,920.27**

Table 7: Recommended Operations Budget

Capital Costs

Agencies in urbanized areas, such as GO bg, receive funding through FTA's Urbanized Area Formula Grants - 5307. These grants provide funding for capital, planning, job access and reverse commute projects. These types of projects include purchases of buses, overhaul of buses, construction of passenger and maintenance facilities, and guideway systems such as light rail. Urbanized Area Formula grants also cover some expenses related to mobility management programs such as American with Disabilities Act complementary paratransit services. These grants are based on formulas which consider population, population density, transit vehicle revenue miles and passenger miles. The grants usually cover up to 80 percent of project costs for capital projects, and up to 90 percent of costs for vehicles and equipment attributable to compliance with the Clean Air Act and the American with Disabilities Act. Table 7 contains several of the most popular FTA grant opportunities that GO bg may be eligible for.

Unlike operations budgets, capital budgets are not usually consistent overtime as they are developed based on the specific capital needs in any given year. Based on the fleet information as of 2020, GO bg's fleet is comprised of 12 cutaway buses and 5 minivans. Based on the ages of the vehicles, FTA's transit asset management useful life benchmarks, and available budget, GO bg may be able to focus its short-term capital program on the recommended capital budget in Table 9.

	2022	2023	2024	2025
Cutaway Buses	$290,100	$290,100	$290,100	$580,200
SUV/Minivan	$39,000	$78,000	$39,000	$78,000
IT assets	$160,000	$20,000	$25,000	$20,000
Maintenance Equipment	$20,000	$100,000	$20,000	$20,000
Shelters	$40,000	$25,000	$25,000	$25,000
Asset Management	$50,000	$75,000	$100,000	$100,000
TOTAL	**$599,100**	**$588,100**	**$499,100**	**$823,200**

Table 8: Recommended Capital Budget

The recommended budget includes three additional buses (not replacements) in 2022, 2023, and 2024. This will facilitate the ability to increase frequency on routes or pilot projects to serve the manufacturing areas of the City. However, if those recommendations are not pursued these vehicles should not be procured as it would exceed FTA recommended spare ratio guidance and may not be eligible for formula grant funding. The recommended budget does include funding to replace SUVs/minivans for paratransit service in each year. The 2022 recommendation includes $160K for new dispatching software. Each subsequent year includes funding for ongoing maintenance and support for that software. The 2023 budget includes $100K for new maintenance equipment including mechanic tools. Every other year in the budget contains a small amount to replacement of tools and equipment. The recommended budget contains funding to install several new bus shelters in 2022, and funding to maintain / replace shelters in each subsequent year. Finally, the recommended budget includes funding in each year for transit asset management spending to maintain system and facility assets in a state of good repair.

Program Title	Description	Type
Urbanized Area Apportionments (5307)	Provides funding by formula to transit agencies to be used for both operating expenses, preventative maintenance expenses and capital expenses. For small urban areas, this funding must be allocated through the Governors Apportionment established by the state's governor.	Formula
Bus and Bus Facilities Infrastructure Investment Program	Provides funding through a competitive allocation process to state and transit agencies to replace, rehabilitate and purchase buses and related equipment and to construct bus-related facilities. The competitive allocation provides funding for major improvements to bus transit systems that would not be achievable through formula allocations.	Competitive
Metropolitan & Statewide Planning and Non-Metropolitan Transportation Planning - 5303, 5304, 5305	These programs provide funding and procedural requirements in metropolitan areas and states for multimodal planning. Eligibility is annual and dependent on federal formula-based information from the most recent census. Planning funds are allocated to State Departments of Transportation, who then sub-allocate the funds to the Metropolitan Planning Organizations. Funds may be used to increase the overall safety, efficiency, and multimodal integration and connectivity of the transportation system.	Formula
Grants for Buses and Bus Facilities Formula Program – 5339(A)	Provides funding to states and transit agencies through a statutory formula to replace, rehabilitate and purchase buses and related equipment and to construct bus-related facilities. In addition to the formula allocation, this program includes two discretionary components: The Bus and Bus Facilities Discretionary Program and the Low or No Emissions Bus Discretionary Program	Formula
Low or No Emission Vehicle Program 5339(C)	Provides funding through a competitive process to state and transit agencies to purchase or lease low or no emission transit buses and related equipment, or to lease, construct, or rehabilitate facilities to support low or no emission transit buses. The program provides funding to support the wider deployment of advanced propulsion technologies within the nation's transit fleet.	Competitive

Table 9: Federal Transit Administration Grant Opportunities

Program Title	Description	Type
State of Good Repair (SGR) Grants --5337	Provides capital assistance for maintenance, replacement, and rehabilitation projects of existing high- intensity fixed guideway and high-intensity motorbus systems to maintain a state of good repair. Additionally, SGR grants are eligible for developing and implementing Transit Asset Management plans.	Formula
Rebuilding American Infrastructure with Sustainability and Equity (RAISE)	The RAISE program provides funding for innovative, multi-modal and multi-jurisdictional transportation projects that promise significant economic and environmental benefits to an entire metropolitan area, a region, or the nation.	Competitive

Other Recommendations

Throughout this study, the project team made the following recommendations which could impact transit ridership and operations in Bowling Green:

- To further encourage transit ridership, GO bg should invest in modern fare payment technologies. Modern fareboxes are capable of accepting multiple forms of payment including contactless bankcards, prepaid/reloadable payment cards, smart card ID credentials, and mobile payment technologies. These technologies facilitate the use of emerging payment methods such as Apple Pay and Google Wallet from near-field communication devices such as smart phones and smart wallets. These technologies also facilitate prepayment of fares prior to boarding, which can reduce boarding times and improve the security of collected fares.
- Technology integration and potential merging with Topper Transit (fare, scheduling, etc). As Bowling Green and WKU consider a potential future merger of GO bg and Topper Transit they should jointly consider integrating technologies. For example, Bowling Green could benefit from one central scheduling system that show the route schedules for both systems. Other systems such as AVL, GTFS feeds, and fare collection technologies could be integrated.
- Bowling Green should consider pilot projects to serve the industrial and manufacturing areas that contain several of the city's top employers. Two potential pilot options include vanpools and microtransit. A vanpool is likely the most economical method of providing service to the area and could provide service from the downtown service center to each of the manufacting areas. Microtransit could provide greater flexibility; however it would cost more than a vanpool.
- As Bowling Green continues to recover from the impacts of the pandemic, it is important to engage key stakeholders and the public about aspects of the system recommendations that the City and the MPO find acceptable. It is likely that key aspects of each system could be combined to create a system that balances ridership with coverage at a cost that is affordable.

- The GO bg system could benefit from a modern maintenance facility with adequate accommodations for its fleet. A small, outdated maintenance facility is a major constraint to a transit agency's ability to change, adapt, or grow. A newer maintenance facility could allow CASOKY to purchase low- or no-emission vehicles, as other transit agencies like Lexington's Lextran and the Owensboro Transit System have done to meet federal air quality standards. Such a facility would also accommodate additional vehicles to the fleet, allowing for future network expansion or a potential merger with Topper Transit. There are multiple FTA competitive funding opportunities for transit facilities, including the Grants for Buses and Bus Facilities Program (49 U.S.C. 5339) and its subprograms including the Low or No Emission Vehicle Program.
- The GO bg system could benefit from transitioning to electric buses over time. Transit fleets have become more efficient and environmentally sustainable over the past two decades. The percentage of the U.S. bus fleet powered by traditional diesel has decreased from 79% in 2007 to 46% in 2018. Federal funding has led to clean energy projects in 38 states. FTA established its Low or No Emission Vehicle Program - 5339(c) in 2016 which distributed $279M for clean fuel vehicles from federal FY 2016 to FY 2019. This competitive grant program provides 85-90% of funding for each vehicle, associated infrastructure, and program management. Grant recipients can count non-traditional funds in their matching funds such as manufacturer incentives and third-party funds (i.e. environmental groups). This would allow local organizations to assist in meeting the local funding requirement for each vehicle. While the total cost of an electric bus may exceed current costs for diesel buses, the higher grant amount and ability for not traditional local matches would result in less spending per bus for GO bg. Further, electric buses have demonstrated lower maintenance cost throughout their useful lives, and lower fuel costs (comparing cost per charge to diesel). Electric buses should be considered as an option for vehicle replacement purchases in 2025 and beyond.
- The GO bg system could benefit by increased coordination with Intercity bus service. Greyhound currently utilizes the BP Gas Station at 4767 Scottsville Rd and has five routes that make stops in Bowling Green. A temporary stop at the Cracker Barrel on Pink Route would allow their riders a direct connection to the GO bg system. A more suitable permanent stop would be at the Greenwood Mall which would give riders a direct connection to multipe routes. The City could coordinate with Greyhound to see if there is a possibility for cost sharing for enhanced shelters at any locations shared with them.

Implementation

GO bg provides an essential transportation option to Bowling Green's residents and visitors. The final recommended redesign option can be implemented following its adoption by the City and public comment as outlined in GO bg's Title VI Plan.

The Title VI plan states the following:

"Before significant changes are made that would affect any person's ability to access transit services, staff with the City and CASK will receive input from all parties and representatives from other community-based organizations. When decisions are made that directly affect the overall level of service provided, all individuals are given opportunity to provide commentary. These decisions would include change in service, fee changes, additional routes, changes in para-transit services or any other effective decision. Individuals will be provided the opportunity to make comments either in person or in writing to the City of Bowling Green or CASK."

The nature of the changes to the current system rise to the level of being significant. A public comment period prior to the implementation should address the requirements in the Title VI plan. Additionally, a marketing plan should be developed to communicate the changes to the system, increase overall awareness of the system, and outline the benefits of utilizing the system.

As Bowling Green continues to recover from the COVID-19 pandemic, GO bg may have the opportunity to implement aspects of the study recommendation. The pandemic has likely changed some aspects of transit demand permanently, such as demand for medical trips seeing a decline due to telemedicine practices. Demand for employment-related trips have likely been permanently decreased by some percentage due to teleworking and remote work. As these changes become more normalized and trip data begins to demonstrate clear patterns, it may be appropriate to reevaluate the potential for one of the recommended options to improve public transportation in the city.

The project team continues to support the previous recommendation of merging the WKU Topper Transit System with the GO bg system. This period of pandemic recovery and reduced passengers may offer an opportunity for collaboration between the two systems about steps towards a combined future. A combined system may be better positioned to address any future funding challenges or significant changes to overall transit demand factors.

Conclusion

GO bg provides an essential transportation option to Bowling Green's residents and visitors. Although current ridership is lower than expected, minor changes to the system may enhance the experience for passengers without the risk of alienating existing ridership. In the period following the COVID-19 pandemic's disruptions to ridership and revenue, GO bg aims to maintain ridership and increase efficiencies with the recommended system update.

While it may take a few years to fully recover, Bowling Green has great transit potential. The results of this study provides Bowling Green with network design recommendations which may be implementable in the future to support an enhanced transportation network. The results also contain short-term recommendations including marketing tactics and potential fare collection improvement opportunities.

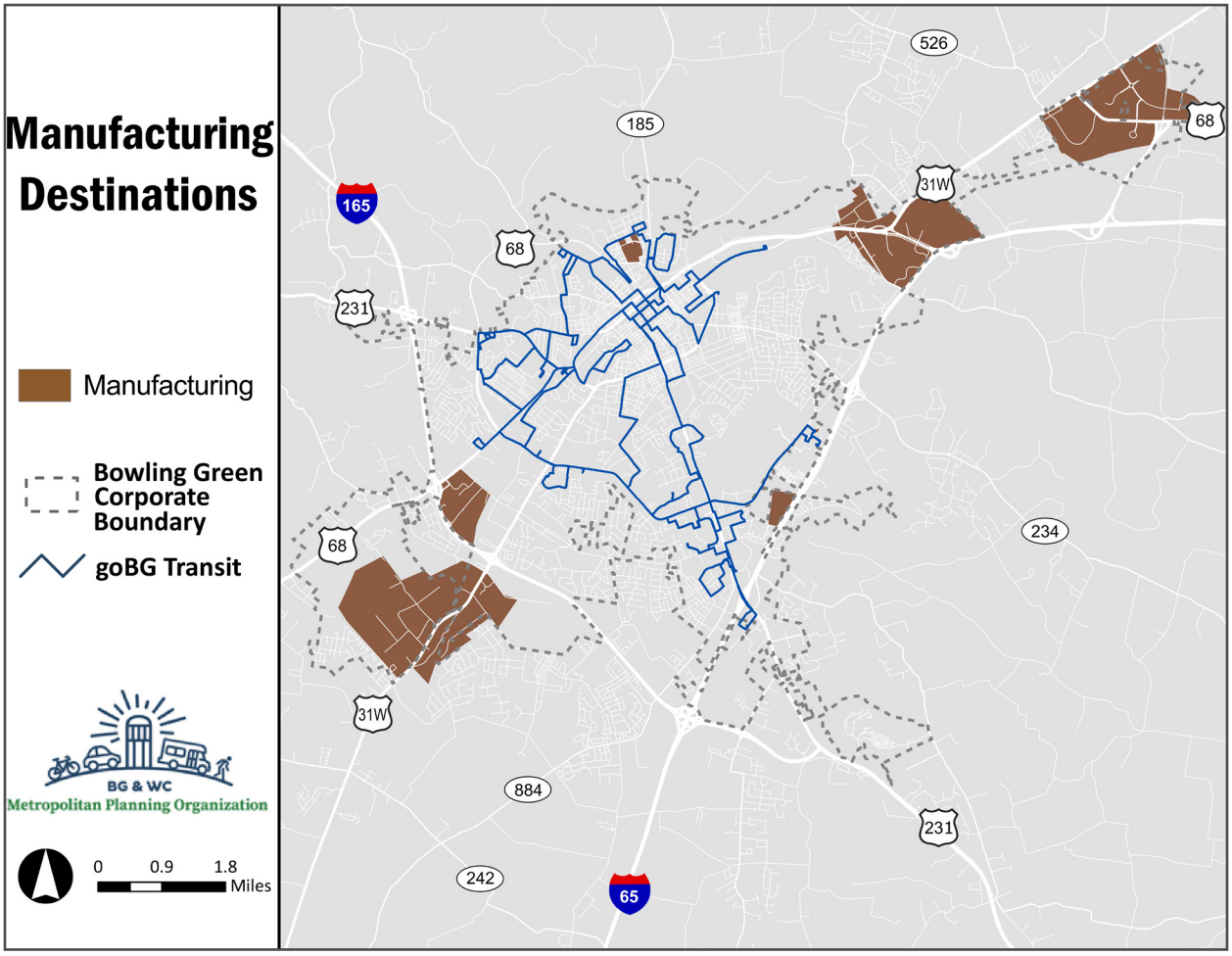
Transit planning, especially in a fiscally constrained environment, forces organizations to balance trade-offs. As Bowling Green determines the long-term future of its system, it should continue to engage the public and identify its priorities for the transit system. Addressing those priorities provides GO bg with an opportunity to grow the system that its residents desire.

APPENDIX

Maps of Employers by Sector

BG & WC
Metropolitan Planning Organization

BOWLING GREEN
TRANSIT STUDY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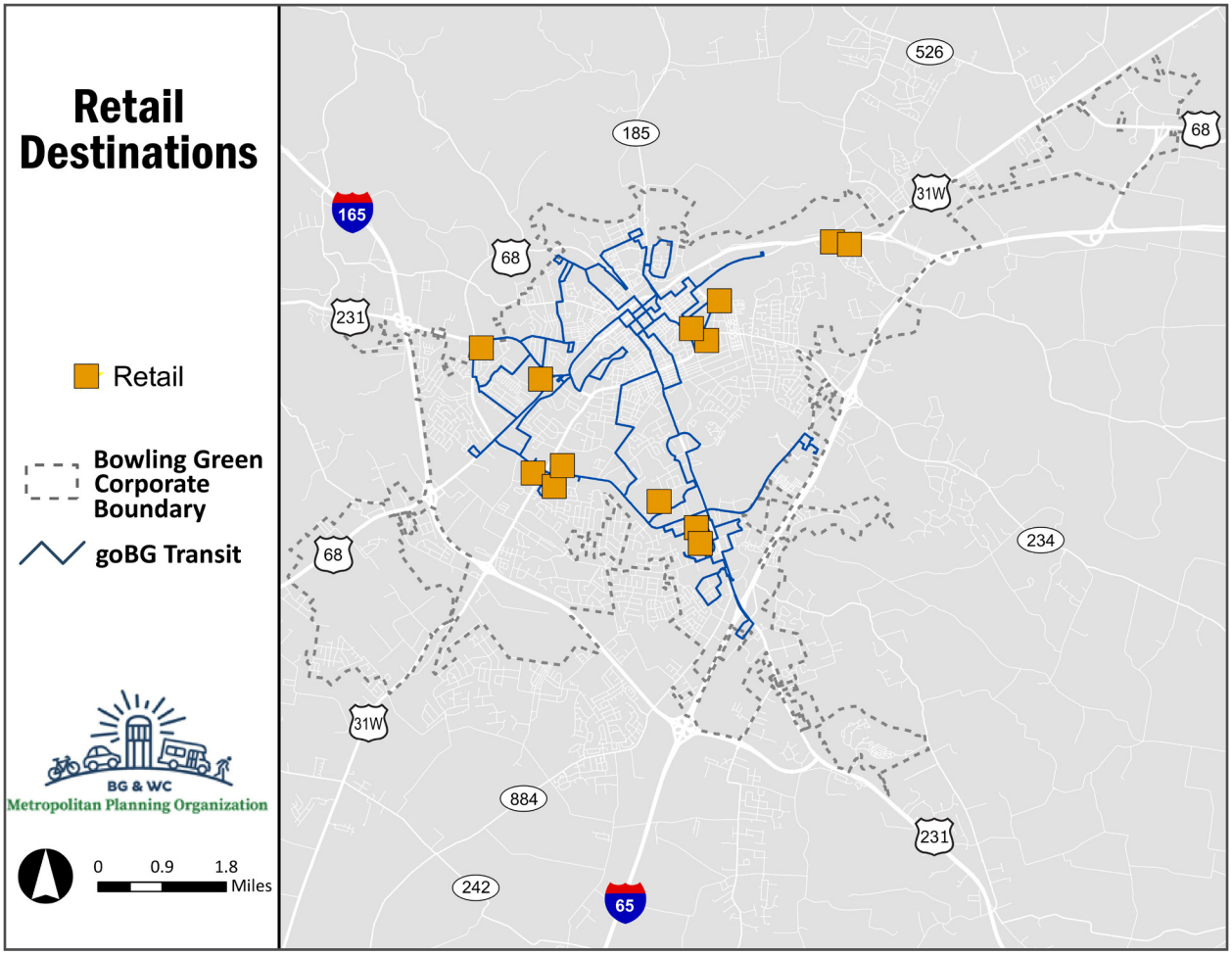
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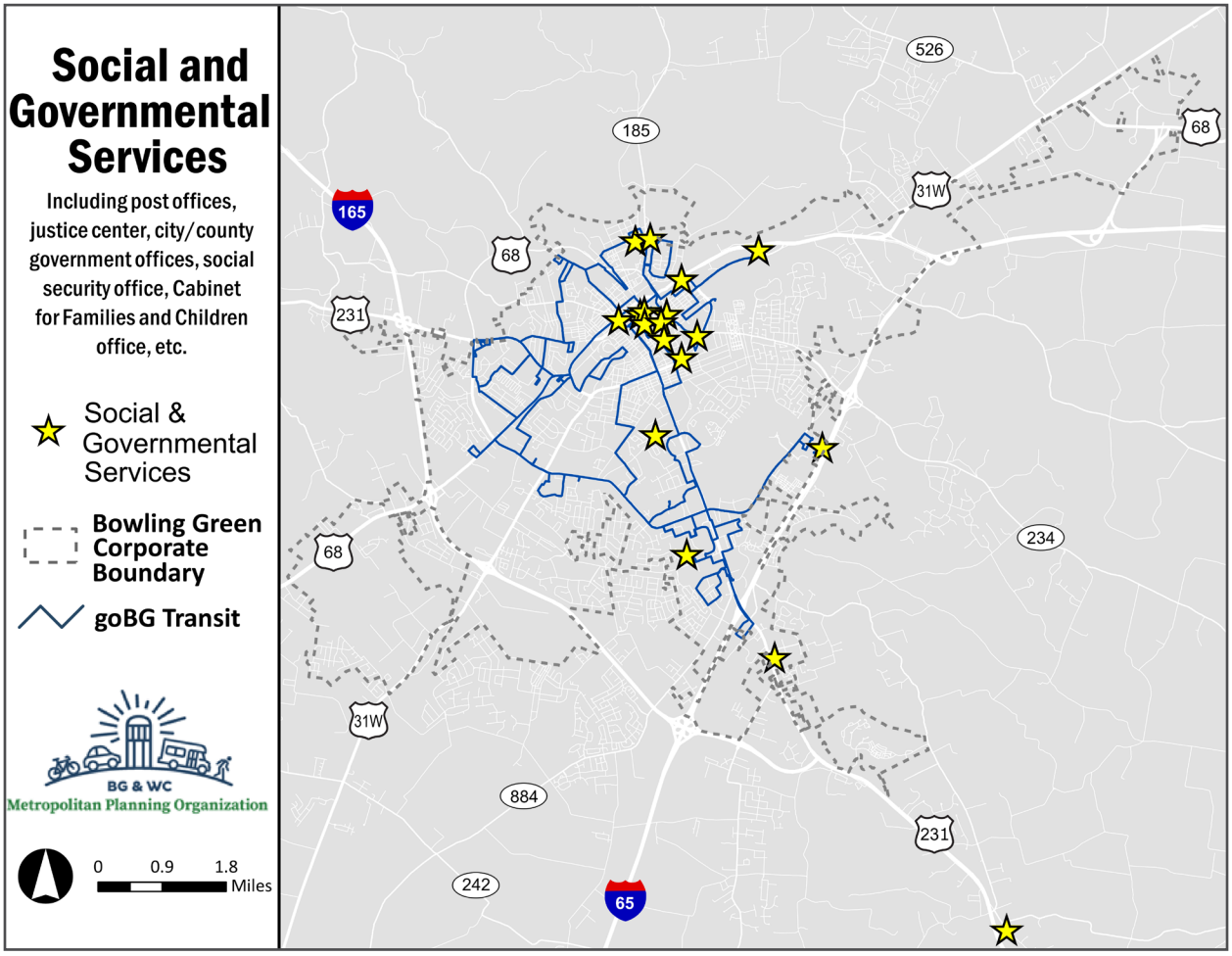
Social and Governmental Services
Including post offices, justice center, city/county government offices, social security office, Cabinet for Families and Children office, etc.
Social & Governmental Services
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BG & WC
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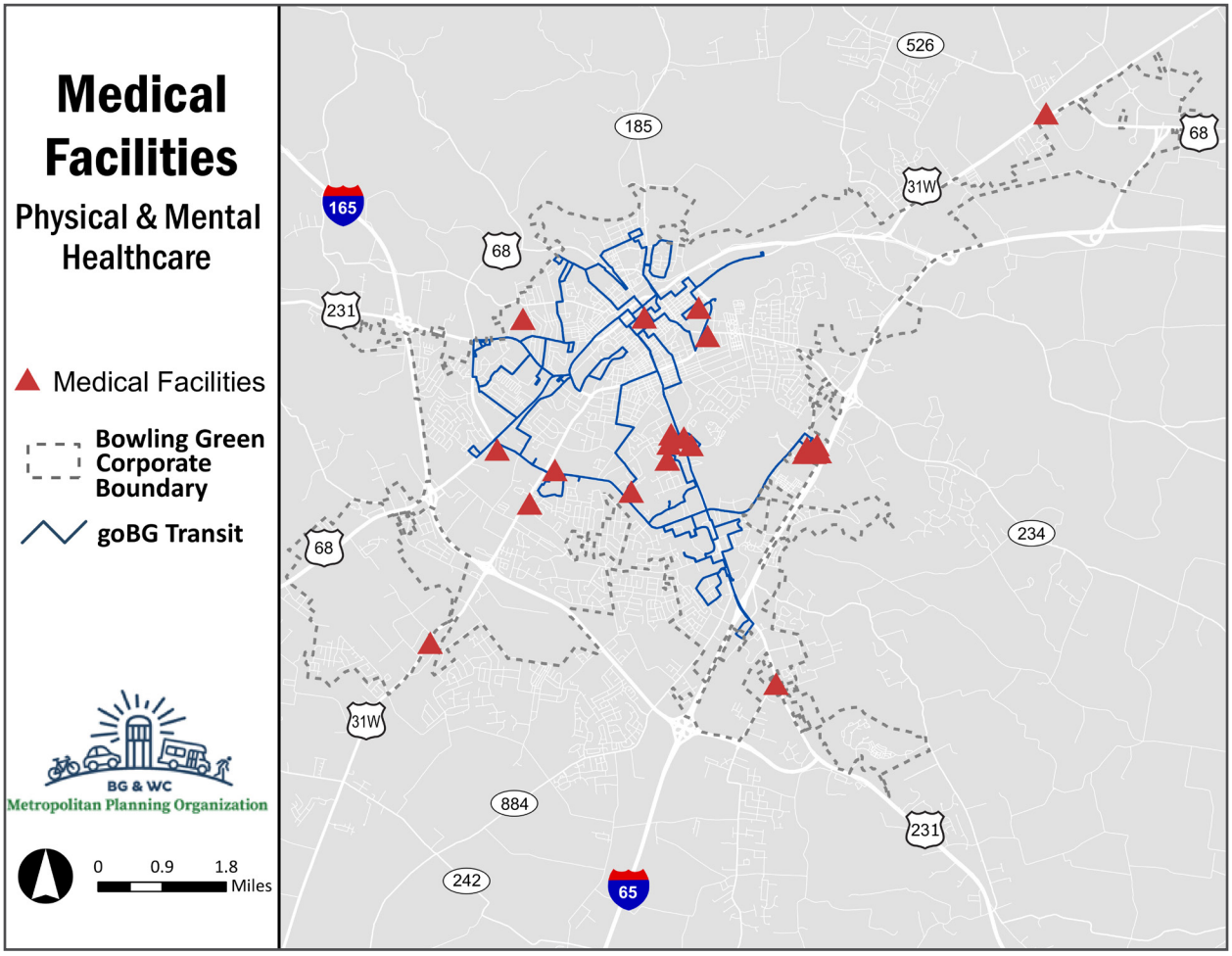
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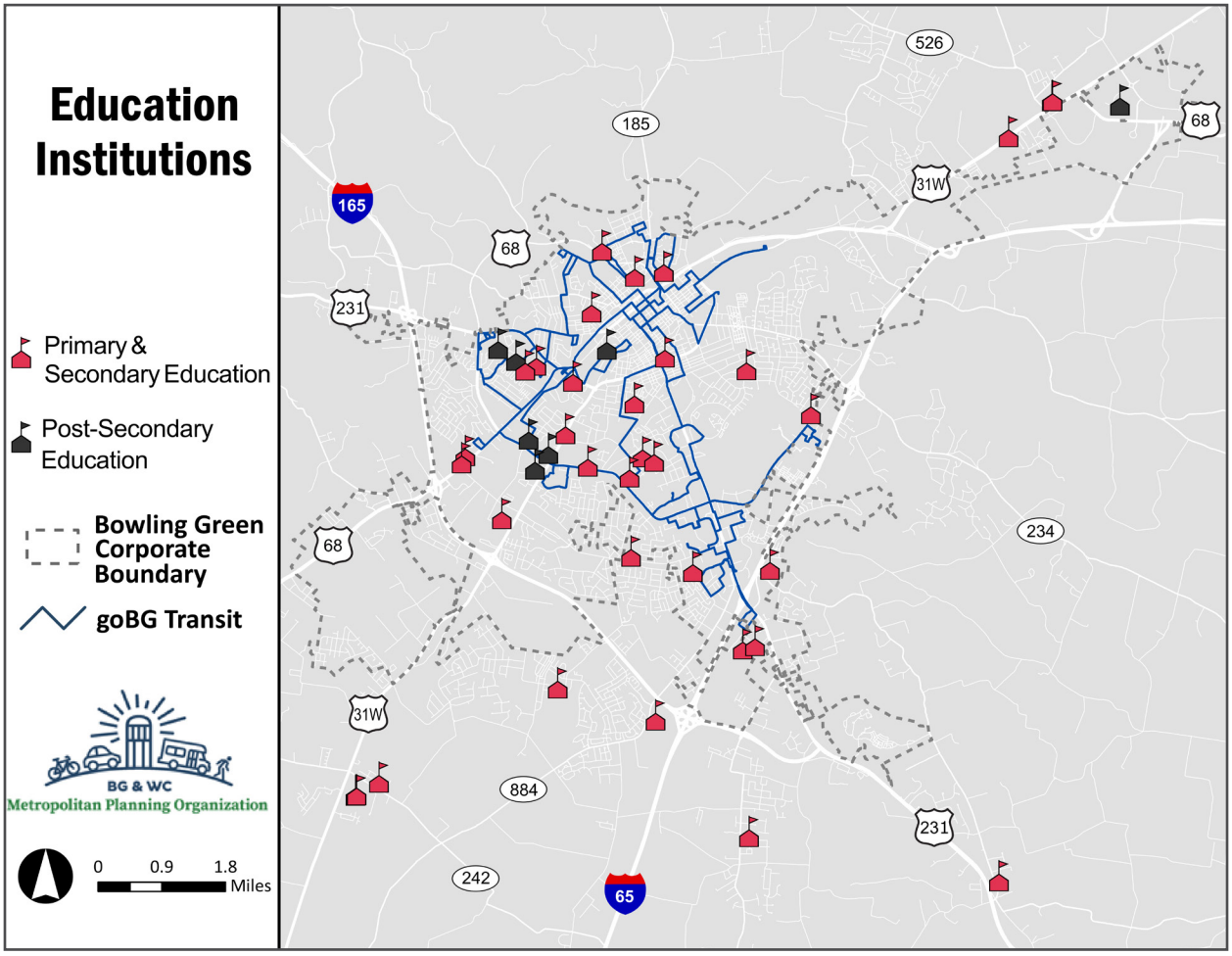
Education Institutions
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BOWLING GREEN
TRANSIT STUDY

PREPARED BY:

Michael Baker
INTERNATIONAL