AECOM

Beloit Transit System Microtransit Study

Beloit Transit System – City of Beloit

February 20, 2024

Delivering a better world

Quality information

Prepared by	Checked by	Verified by	Approved by
Catherine Osborn, AICP Becca Smiles	Amy Siegel	Catherine Osborn, AICP	Andrew Ittigson

Revision History

Revision	Revision date	Details
0	9/25/2023	First draft to client
1	1/18/2023	Second draft to client
2	1/9/2024	Third draft to client
3	2/20/2024	Fourth draft to client

Prepared for:

Beloit Transit System – City of Beloit
through the Stateline Area Transit Study (SLATS)
100 State Street
Beloit, WI 53511

Prepared by:

AECOM
13355 Noel Road #400
Dallas, TX 75240

T: +1 (972) 788-1000
aecom.com

Table of Contents

Figures

Tables

1. Introduction

The City of Beloit is located in Rock County, Wisconsin. It is positioned along the I-39/90 corridor approximately 50 miles south of the state capital, Madison, 90 miles from Chicago, and bordered by the Illinois state line, giving the city high connectivity to regional economic hubs. Between 2016 and 2021, there was a 5.8% decrease in the population compared to a 1.6% increase in Rock County.

Currently, the City of Beloit operates with six fixed bus routes throughout the city operating weekdays from about 5:30 AM to 6:00 PM. In addition, Beloit Transit jointly operates the Beloit–Janesville Express route with hourly weekday service from 6:00 AM to 6:00 PM between the two cities. The City of Beloit is interested in identifying opportunities to optimize the overall transit service in the community through the use of new innovative mobility services such as microtransit. This report examines the city's demographics, activity centers, commute patterns, and mobility needs to identify opportunities to apply microtransit service.

2. Transit System Assessment

An assessment of the current transit system and services was completed to identify existing transit conditions and opportunities where microtransit may be a good fit.

2.1 Existing Transit Service

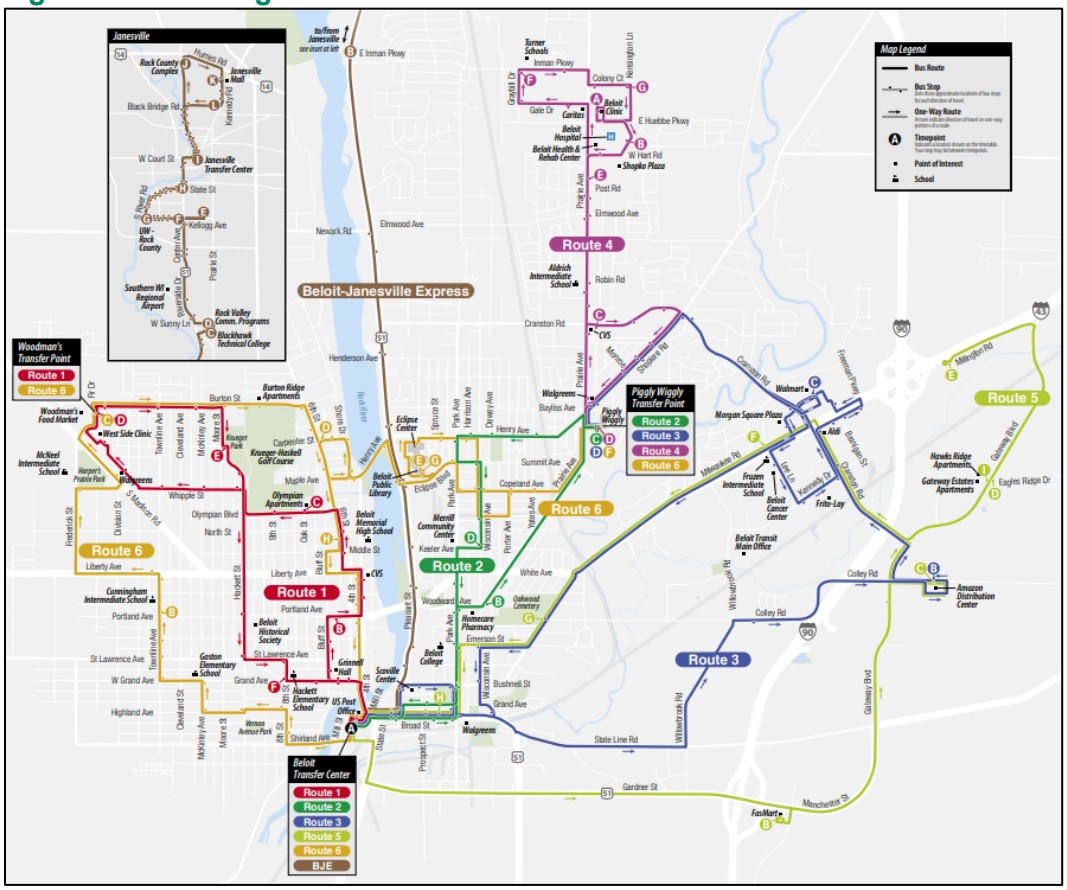
The City of Beloit has a robust transit history, from an early interurban rail in 1902, to streetcars serving more than 2 million people in 1909. [1] The first bus company, Orange Line Buses, was operated by Wisconsin Power & Light and grew to 25 buses in operation (1947). Beloit Transit System (BTS) officially launched in 1976. Today the transit agency operates seven fixed routes and contracts paratransit services in association with Rock County Specialized Transit.

Fixed Route Bus Service

The transit system from the latest bus network redesign in 2021 (shown in Table 2.1 below) consists of seven fixed bus routes. One of the other three routes include an express to Janesville with several intermediate stops between the two cities, including Blackhawk Technical College. The fixed-route system operates Monday through Friday between 5:30 AM and 6:30 PM, apart from the Gateway Extra Route (Route 5), which only operates between 6:00 AM and 8:00 AM and from 5:00 PM to 6:30 PM. There is also an on-demand service on Saturdays, available between 8:40 AM and 4:00 PM. On-demand trips must be scheduled before 3:00 PM on the Friday prior. All services operate using Gillig large, heavy-duty buses (35-40 feet). Frequency per route is described in Table 2.1: Fixed Route Operations Hours and Frequency.

[1] https://www.beloittransit.com/history/ (Accessed: 02/28/2023)

Figure 2.1: Existing Fixed Bus Routes in Beloit



Source: Beloit Transit System Rider Guide (2021), Accessed July 2023.

Table 2.1: Fixed Route Operations Hours and Frequency

Route Name & Number	Direction	Frequency
1 - West Line (Red)	Northwest / Downtown	30 minutes
2 - East Loop (Green)	Northeast / Downtown	30 minutes
3 - Walmart Line (Blue)	East / Downtown	60 minutes
4 - Clinic Loop (Pink)	North / South	30 minutes
5 - Gateway Extra (Gray)	East / Downtown	60 minutes
6 - Crosstown Loop (Orange)	West / East	60 minutes
Beloit–Janesville Express (BJE) (Brown)	North / South	60 minutes

Source: https://www.beloittransit.com/route-1/

The fare is $1.50 for one in-town ride and $3.50 for a one-way ride on the Beloit–Janesville Express (BJE). Beloit Transit has several discounted fares based on distance, ticket purchase volume, and for certain demographic groups, such as children, students, seniors, and people with disabilities. Transit fares can be purchased in-person at several locations across the city or by mail. Beloit Transit will also be introducing an electronic cashless fare option beginning in early 2024.

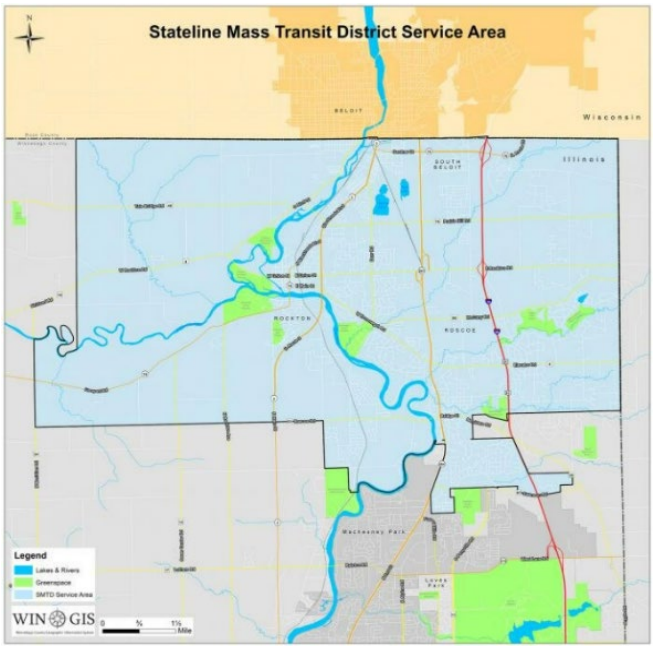
Paratransit and Specialized Transit Services

BTS operates complimentary paratransit service through a contract with Rock County Specialized Transit to provide services to individuals over 55 and those who have a disability and are unable to use the regular transit bus system.[2] Paratransit services are door-to-door shared rides, requiring riders to register and schedule at least 3 days in advance. Paratransit services operate at the same days and times as regular BTS routes. Fares for complimentary paratransit services are $3.00 per ride within Beloit and $7.00 per trip to/from Janesville.

Additional Transit Services

Additional transit services that connect with the Beloit service area include the Stateline Mass Transit District (SMTD) and Janesville Transit System (JTS).

Figure 2.2: Stateline Mass Transit District (SMTD)



Source: https://www.smtd.biz/information/service-area

SMTD provides curb to curb services to all residents of the municipalities of Roscoe, Rockton, South Beloit, Rockton Township and Roscoe Townships (see Figure 2.2). SMTD operates Monday through Friday from 5:15 AM to 10:00 PM, Saturday from 6:00 AM to 6:00 PM, and Sunday from 8:15 AM to 4:30 PM. Fares start at $3.00 per ride and include several discounted fares for children, students, seniors, and people with disabilities. SMTD allows for transfers with the adjacent Rockford Mass Transit District and Beloit Transit System, including the BTS' Gateway Extra Route 5 and the Beloit Transfer Facility.

JTS is the major city located to the north of Beloit and provides five fixed bus routes as well as paratransit service through a contract with Rock County Specialized Transit. JTS bus service operates 6:15 AM to 10:15 PM weekdays and 8:45 AM to 6:15 PM on Saturdays. Fares can be purchased as a 30-day pass, 10-ride pack, or a day pass. The system uses fare-capping up the value of a 30-day pass at $52. Currently, JTS only connects to Beloit via the Beloit-Janesville Express Bus service.

[2] Beloit Transit System – Paratransit Information (Accessed 02/28/2023): https://www.beloittransit.com/paratransit-information/

2.2 Existing Service Analysis

Existing service performance measures such as operating statistics, ridership, and funding sources were used to draw insight into the overall efficiency and effectiveness of existing transit services.

Systemwide Trend Analysis

Annual operational and financial performance metrics from FY2013 to FY2022 were used to quantify existing conditions and highlight potential future trends using data from the National Transit Database (NTD). A summary of these key metrics is presented in Table 2, with detailed discussion of each metric following in the subsections below.

Table 2.2: Systemwide Operational Metrics (FY2013 to FY2022)

Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Ridership Trends										
Annual Passenger Trips	254,851	243,698	201,826	184,013	149,978	146,393	95,997	48,805	80,812	92,798
Service Effectiveness (Productivity) Trends										
Annual Revenue Hours	21,451	21,516	21,289	20,590	21,177	20,738	20,613	17,474	21,717	20,547
Annual Revenue Miles	309,285	310,576	304,261	307,786	291,643	280,357	279,093	256,713	323,740	312,906
Passengers per Revenue Mile	0.82	0.78	0.66	0.60	0.51	0.52	0.34	0.19	0.25	.30
Passengers per Revenue Hour	11.88	11.33	9.48	8.94	7.08	7.06	4.66	2.79	3.72	4.5
Financial Trends										
Operating Expenses	$1.89M	$1.98M	$2.02M	$1.93M	$1.99M	$2.36M	$2.07M	$2.05M	$2.07M	$2.10M
Fare Revenue	$217,522	$209,191	$190,742	$166,283	$154,646	$144,445	$147,897	$66,952	$93,633	$88,530

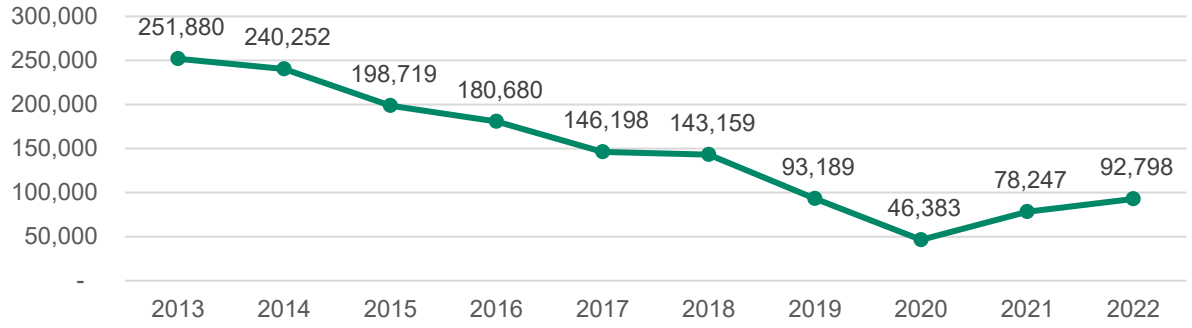
Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Financial Trends										
Operating Expenses per Passenger Trip	$7.44	$8.11	$9.98	$10.49	$13.30	$16.11	$21.56	$42.02	$25.66	$22.59
Operating Expenses per Revenue Mile	$6.13	$6.37	$6.62	$6.27	$6.84	$8.41	$7.42	$7.99	$6.41	$6.72
Operating Expenses per Revenue Hour	$88.35	$91.91	$94.66	$93.75	$94.17	$113.71	$100.42	$117.37	$95.49	$102.62
Farebox Recovery Ratio	11.5%	10.6%	9.5%	8.6%	7.8%	6.1%	7.1%	3.3%	4.5%	5.3%

Source: US DOT NTD Beloit Transit System 2021 Annual Agency Profile (Accessed 01/19/2023).

Ridership Trends

Ridership for fixed route services has been declining since 2013, leveling off in 2017–2018 at around 140,000 annual trips before dropping by 35% in 2019 to 93,000. Covid-19 significantly reduced transit demand, resulting in a 50% decrease in annual ridership between FY2019 and FY2020. Annual ridership grew by 21% between FY2021 and FY2022, showing a reduced but growing transit demand rather than pre-2019 ridership levels (Figure 2.3).

Figure 2.3: Fixed-Route Ridership (FY2013 to FY 2022)



Sources: US DOT NTD Beloit Transit System 2022 Annual Agency Profile & Beloit Transit System 2022 Annual Ridership (Accessed 01/19/2023, 1/15/2024).

A route-by-route summary of ridership (see Table 2.3) identifies routes within the system by length and by annual average ridership. An additional estimation of trips per revenue mile (using route mileage and the presently scheduled number of trips per day [3]) relative to the other BTS routes can help identify which route may or may not be performing as efficiently as others. Based on the estimated trips per revenue mile, Route #5 – Gateway Extra is the lowest-performing route, with an estimated 0.78 trips per mile driven. Route #6 – Crosstown Loop is the highest-performing route, with an estimated 4.66 trips per mile driven.

Table 2.3: Fixed-Route Ridership per Route for 2022

Route	Length (*Miles*)	2022 Annual Ridership	2022 Trips per Revenue Mile (*estimated**)
1 - West Line	10.31	16,673	2.26
2 - East Loop	9.31	10,017	1.38
3 - Walmart Line	23.31	16,067	3.81
4 - Clinic Loop	10.57	13,800	2.06
5 - Gateway Extra	17.18	692	0.78
6 - Crosstown Loop	19.65	18,768	4.66
Beloit–Janesville Express (BJE)	40.88	16,821	1.56

Source: Beloit Transit, 2022 Annual Ridership

**Estimated using route mileage and the scheduled number of trips per day for both regular and holiday operating schedules*

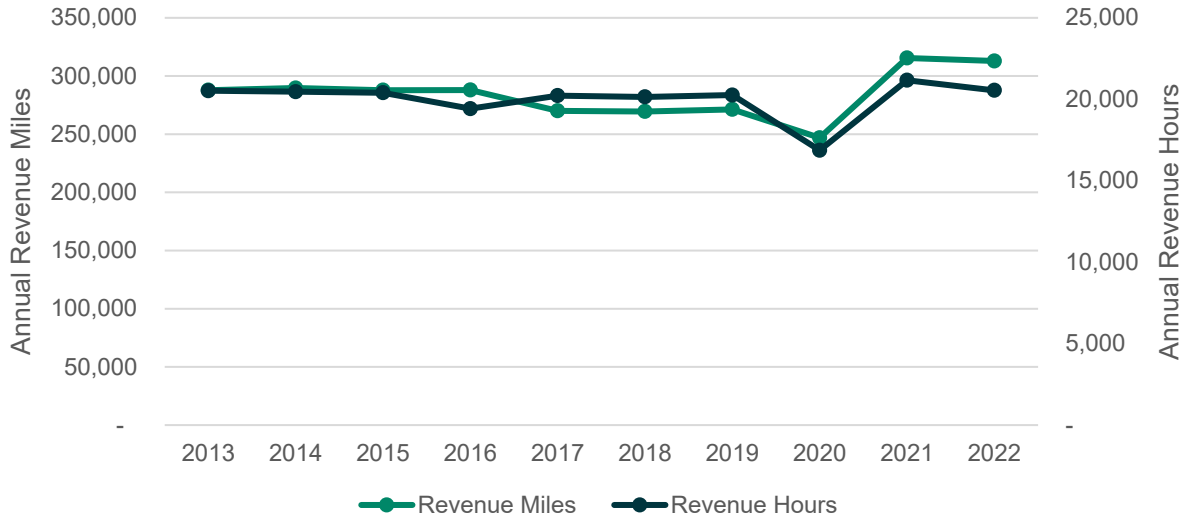
[3] Sourced from Beloit Transit System (BTS) published online routes summaries. Accessed August 2, 2023 from https://www.beloittransit.com/.

Service Effectiveness (Productivity) Trends

Vehicle Revenue Hours and Miles

Vehicle revenue hours and miles are defined by the National Transit Database (NTD) as the hours and miles that a transit vehicle is in operation and available to the general public. Figure 2.4 shows annual fixed route hours and miles share a similar trend between FY2013 and FY2022. Both metrics remained relatively steady through 2019. After the Covid-19 pandemic, both metrics increased rapidly; however, annual miles and hours dropped slightly from FY2021 to FY2022, even after the November 2021 system redesign.

Figure 2.4: Fixed Route Annual Revenue Hours and Miles (FY2017 to FY2022)

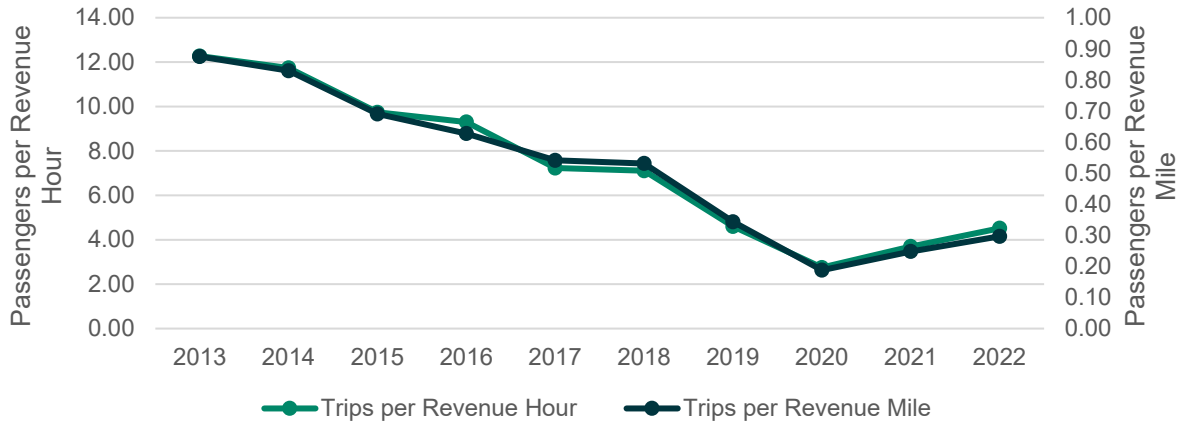


Source: US DOT NTD Beloit Transit System 2022 Annual Agency Profile (Accessed 01/15/2024).

Passengers per Revenue Mile and Revenue Hour

Passengers per revenue mile (PPM) indicates the average volume of passengers carried per mile on a transit vehicle, while passengers per revenue hour (PPH) is the average volume of passengers carried per hour the transit vehicle is in operation. The larger these metrics are, the more efficient the system is at transporting passengers. Figure 2.5 shows similar trend lines for both metrics, indicating Beloit Transit fixed route operational efficiency has been declining since FY2013. Following the pandemic, these metrics showed improvement in FY2021 as PPH returned to 80% of FY2019 levels and PPM returned to 71% of FY2019 levels. The observed downward trend in PPH and PPM follows the annual average ridership shown in Figure 2.3, indicating that while passenger ridership has decreased, service operation has largely remained the same, as confirmed in Figure 2.4. Without changes to the number of revenue hours and miles, Beloit Transit may expect to continue to see a decline in operational efficiency.

Figure 2.5: Fixed Route Passengers per Revenue Mile and Revenue Hour (FY2013 to FY2022)



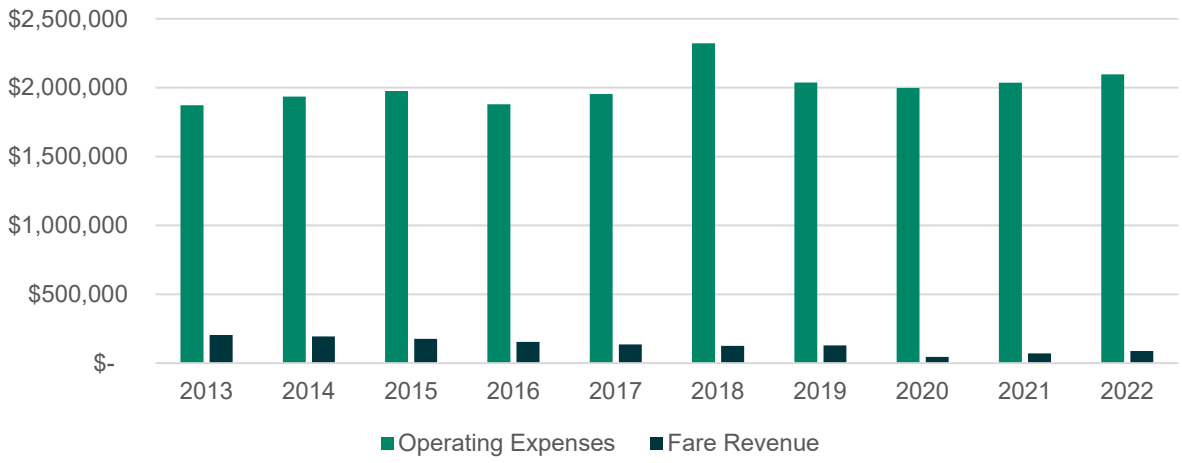
Source: US DOT NTD Beloit Transit System 2022 Annual Agency Profile (Accessed 01/15/2024).

Fixed Route Financial Trends

Operating Expenses and Fare Revenues

Annual fare revenues gradually trended downward between FY2013 and FY2021, while operating expenses generally remained stable. Fare revenue significantly declined (-65%) during the Covid-19 pandemic, indicating demand for fixed-route services was significantly impacted by the pandemic, as confirmed in Figure 2.3. Between FY2016 and FY 2021, operating expenses increased by about 8%, while fare revenue decreased by 54%. Comparing ridership (Figure 2.3) and fare revenue (Figure 2.6) trends indicates that fare revenue per passenger remained constant, hovering at approximately $0.81 to $0.98, with the exception of FY2019, when fare revenue per passenger was $1.38.

Figure 2.6: Fixed Route Annual Operating Expenses and Fare Revenues (FY2013 to FY2022)

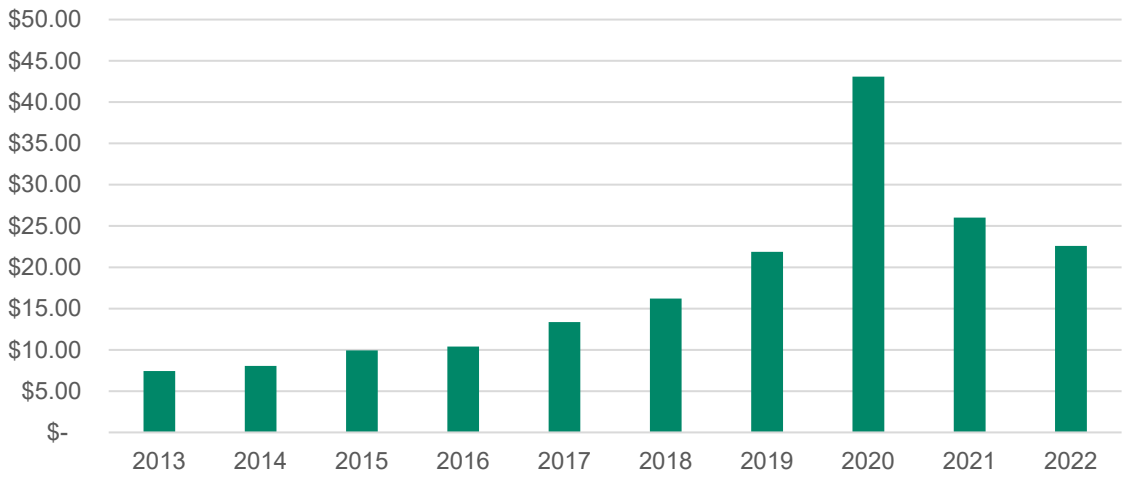


Source: US DOT NTD Beloit Transit System 2022 Annual Agency Profile (Accessed 01/15/2024).

Operating Cost per Passenger Trip

The operating cost per passenger trip is an indicator used to evaluate transit services' final effectiveness. Figure 2.7 indicates a significant rise (250%) in operating expenses per passenger from $7.43 in FY2013 to $26.03 in FY2021. This is an indication that the current transit service cost has increase, potentially due to the national trend of rising labor costs and operator shortages. The operating expenses per passenger trip in 2020 acts as an outlier, as ridership dropped by 50% (see Figure 2.3) due to the Covid-19 pandemic, while operating costs remained fairly consistent (see Figure 2.6).

Figure 2.7: Fixed Route Operating Expenses per Passenger Trip (FY2013 - FY2022)

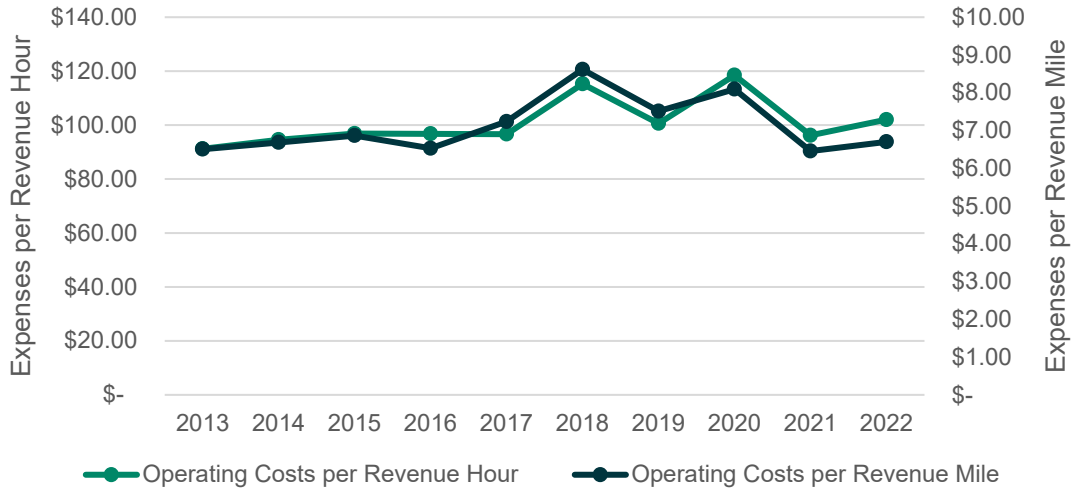


Source: US DOT NTD Beloit Transit System 2022 Annual Agency Profile (Accessed 01/15/2024).

Operating Cost per Revenue Hour and Revenue Mile

Unit operating costs is another indicator of service cost effectiveness. Increases in operating costs for both metrics in FY2018 then again in FY2020, as shown in Figure 2.8, are indicators of poor cost effectiveness.

Figure 2.8: Fixed Route Operating Expenses per Revenue Hour and Revenue Mile (FY2013 to FY2022)

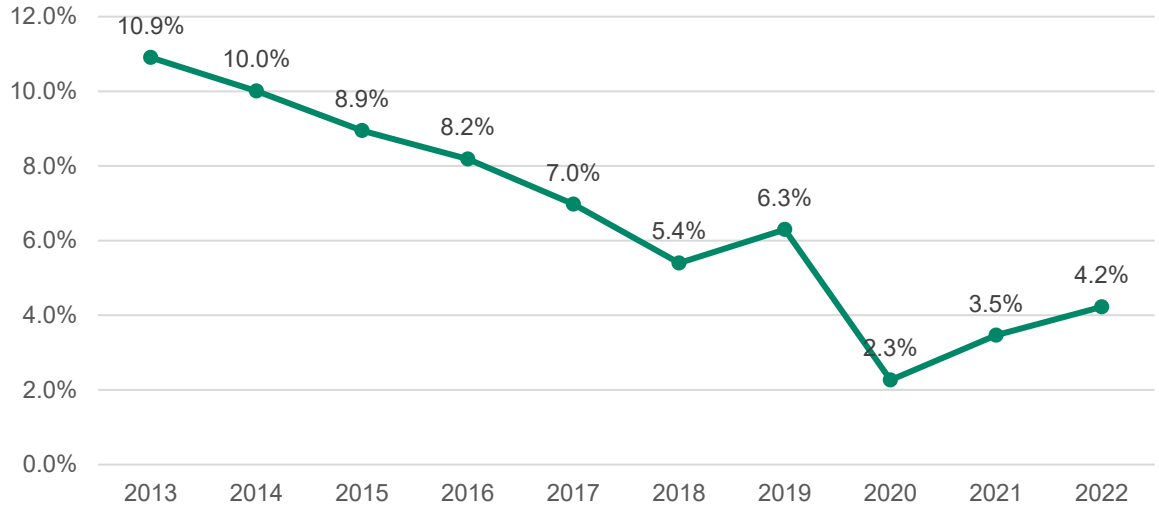


Source: US DOT NTD Beloit Transit System 2022 Annual Agency Profile (Accessed 01/15/2024).

Farebox Recovery Ratio

Farebox recovery ratio calculates the percent of total operating expenses recovered through fare revenues. Figure 2.9 shows a fairly linear downward trend from FY2013 to FY2022, with an increase then decrease in FY2019 and FY2020.

Figure 2.9: Farebox Recovery Rate FY2013 to FY2022 (Fixed-Route)



Source: US DOT NTD Beloit Transit System 2022 Annual Agency Profile (Accessed 01/15/2024).

3. Mobility Needs Assessment

An assessment of existing demographics, major corridors and activity centers, trip patterns, and commuting patterns was completed to better understand the mobility needs of Beloit.

3.1 Demographic Profile

It is important to understand how population groups are concentrated across a geographic area to successfully plan how best to apply transit services. A demographic profile was prepared for the City of Beloit to gain a better understanding of population and transportation needs, especially for transit-dependent populations. These are key population groups that are more likely to use transit, such as individuals under 18, minority populations, individuals with disabilities, zero-car households, and Limited English Proficiency (LEP) populations.

The following demographic profile compares demographics in key population groups for the City of Beloit and Rock County, as well as with the state of Wisconsin, to provide local and regional context. This profile was prepared using 2020 Decennial Census data and 2021 American Community Survey (ACS) 5-year Estimates at the place, county, and state geographic levels.

The City of Beloit has a significantly higher concentration of minority groups than the rest of the state and county, as well as a greater proportion of individuals in a state of poverty, zero-car households, and individuals with LEP. Spatial analysis reveals these populations to be concentrated in the downtown core to the west of 4th Street and along the eastern bank of Rock River, as shown in the following maps.

Population Density and Transportation Dependency

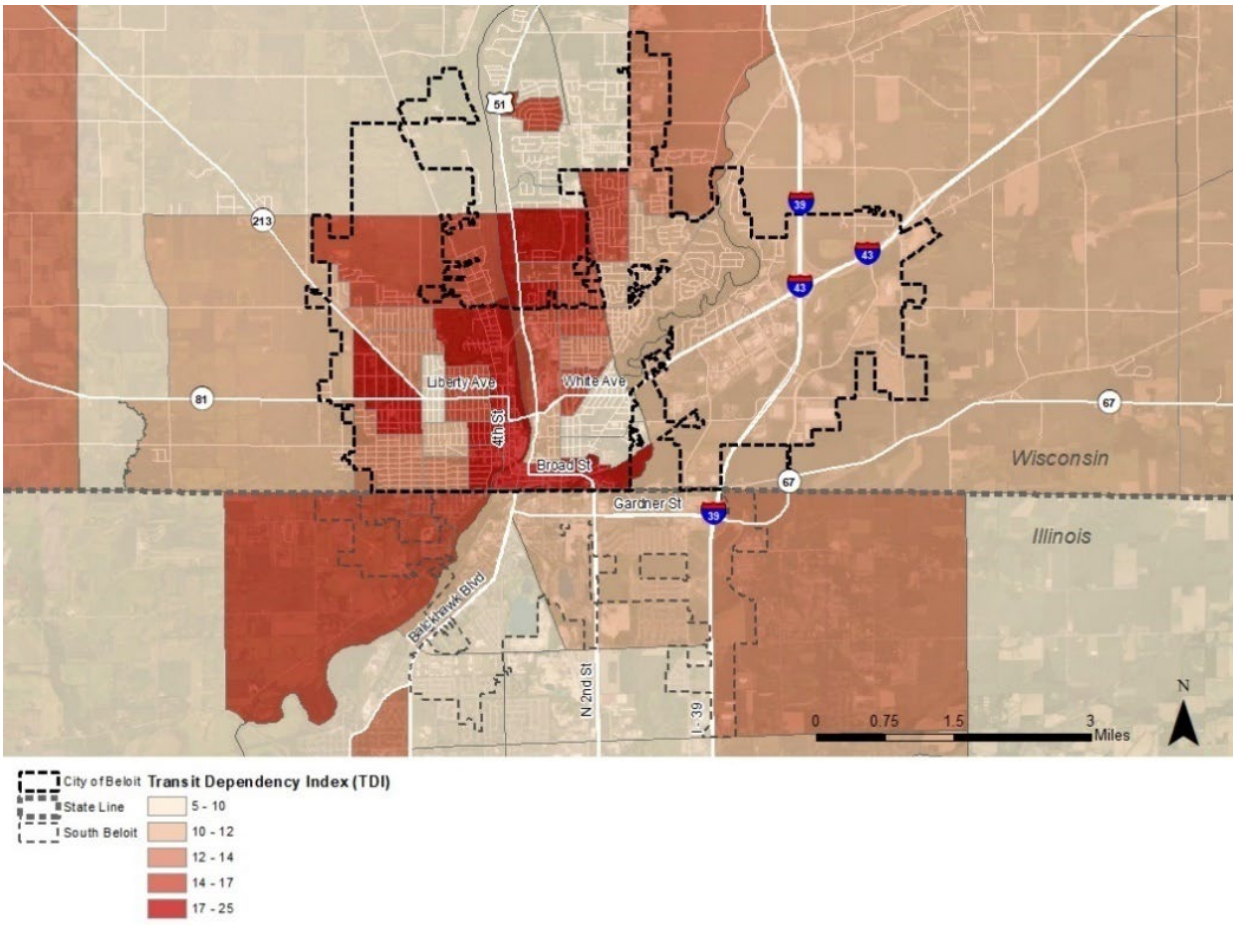
A Transit Dependency Index (TDI) is a composite of five US Census Bureau datasets that provides a geographic representation of where compounding demographic trends may make mobility difficult for vulnerable populations. A TDI may be used to identify areas where transit service may be an individual's primary form of transportation.

The five US Census Bureau datasets that make up the TDI include:

- Households without access to a vehicle
- Persons with disabilities
- Low-income (poverty status)
- Youth population (under 18 years of age)
- Elderly population (over 65 years of age)

The above demographic datasets are collected at the block group level and scored by assigning equal weight to intervals at natural breaks in the dataset. Figure 3.1 displays the results of the transit dependency analysis. The scoring results indicate where potentially high transit-dependent populations are located. Within Beloit, the census block groups with the highest TDI score are located on the Wisconsin side of the state line in Downtown Beloit, as well as east of downtown, following the riverbank to the north.

Figure 3.1: Transit Dependency Index (TDI) for Beloit and South Beloit

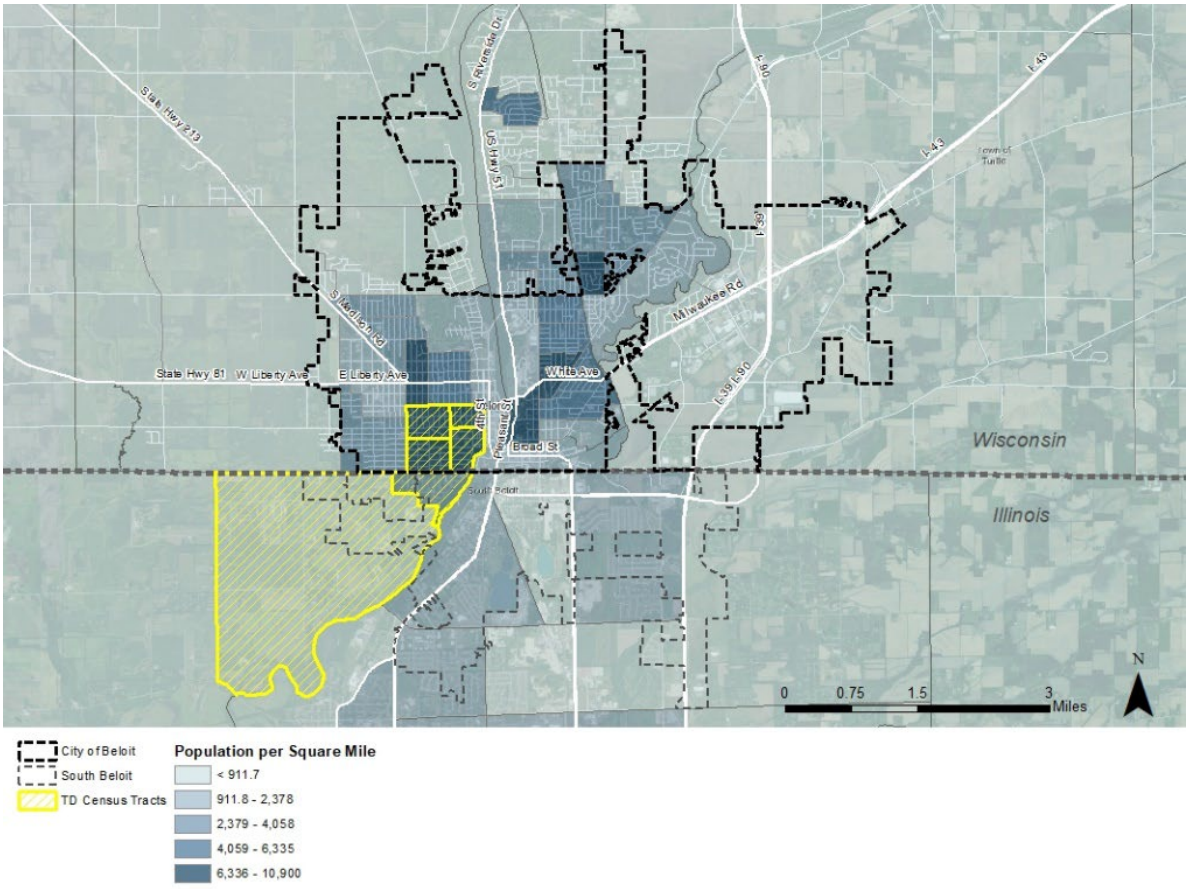


Source: U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Tables B01001, B23024, and B25044. Queried: 01/26/2023.

The US Department of Transportation (DOT) developed an indicator from 23 different variables that identifies communities and places that spend more, and take longer, to get to their destinations.[4] This indicator may also be used to help inform where there are concentrations of transit-dependent groups in the City of Beloit.

The census tracts identified by the DOT's Transportation Disadvantaged Community (TDC) Indicator[5] agrees with the TDI calculated in Figure 3.1, identifying at least one census tract in the City of Beloit as a transportation disadvantaged community. The census tracts identified by US DOT TDC indicator is shown in Figure 3.2. These census tracts are located on the west side of Downtown Beloit, directly on the border with the state of Illinois. Notably, a census tract directly across the border in South Beloit, IL, has also been also identified as a TDC.

Figure 3.2: Population Density and US DOT Identified Transportation Disadvantaged Census Tracts



Source: U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Table B01001. Queried: 01/26/2023.
US DOT Equitable Transportation Community Explorer: Applicant Explorer | US DOT Equitable Transportation Community Explorer (arcgis.com). Queried: 01/26/2023.

[4] US DOT Transportation Disadvantage Indicator Comparison, ESRI (2022): Exploring Disadvantaged Community Datasets (arcgis.com)
[5] US DOT Justice40 Initiative (2023): Justice40 Initiative | US Department of Transportation

Population and Age

Table 3.1 shows the overall population change in the City of Beloit, Rock County, and Wisconsin between 2016 and 2021. The annualized growth rate of Beloit is -1.2%, while Rock County and the state of Wisconsin are 0.3% and 0.4%, indicating the City of Beloit is losing approximately 2,200 residents per year compared to its surrounding region.

Table 3.1: Population Density and US DOT Identified Transportation Disadvantaged Census Tracts

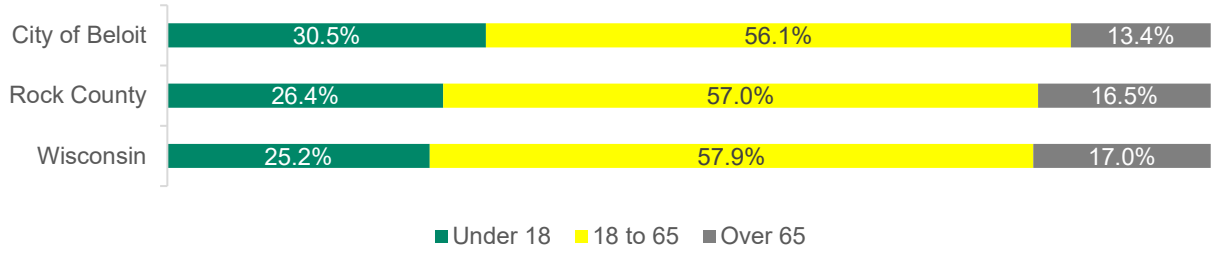
Geography	2016 ACS 5-Year Population	2021 ACS 5-Year Population	Difference	Percent Change	Annualized Growth Rate
City of Beloit	38,812	36,657	-2,245	-5.8%	-1.2%
Rock County	160,986	163,522	2,536	1.6%	0.3%
Wisconsin	5,754,798	5,871,661	116,863	2.0%	0.4%

Source: U.S. Census Bureau, 2011-2016 & 2016-2021 American Community Survey 5-Year Estimates, Table B01001. Queried: 01/26/2023.

Age distribution is mostly similar across the city, county, and state, with the median ages of 33.5, 39.8, and 39.6, respectively (shown in Figure 3.3: Age Distribution Comparison). However, the City of Beloit has a slightly larger proportion of individuals under the age of 18 at 30.5%, just under a third of the city's total population.

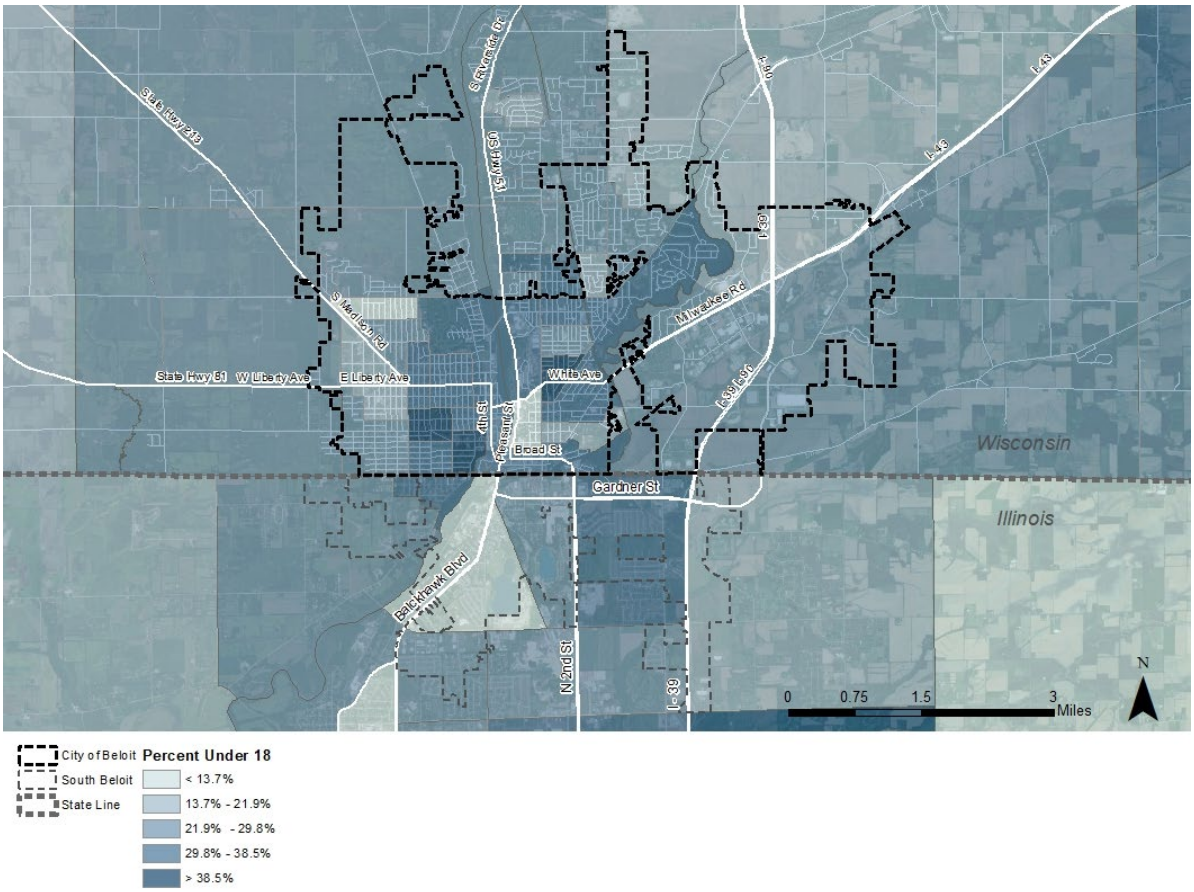
Figure 3.4 and Figure 3.5 display the population distribution for those under 18 and over 65. Note that population density is concentrated downtown, west of downtown, and north along the Prairie Avenue corridor (see Figure 3.2 on page 11). Because Figure 3.4 and Figure 3.5 only represent the share of population in each census block group over 65 or under 18, not overall population density, a darker color does not necessarily indicate a greater number of people over 65. Rather, of the people who live within that census block group, a darker color indicates there is a greater percentage over 65 or under 18.

Figure 3.3: Age Distribution Comparison



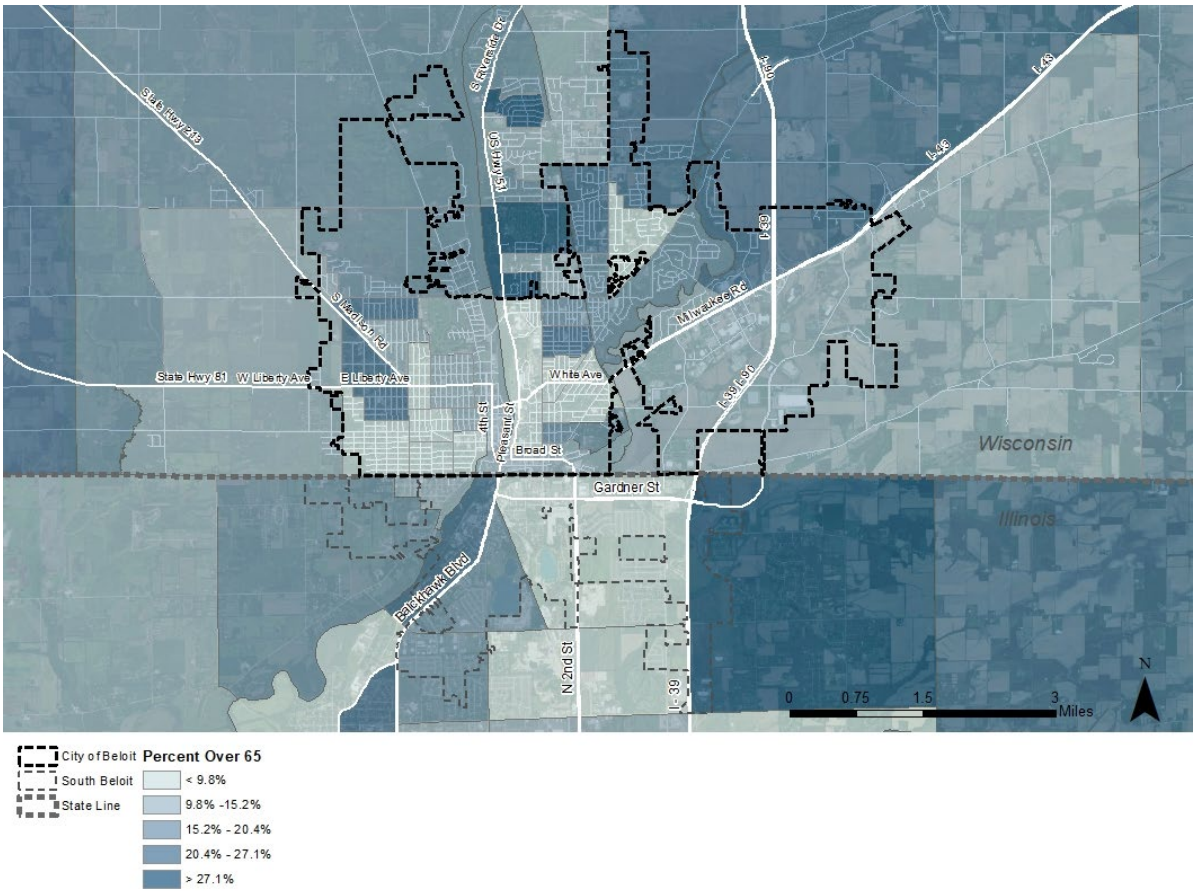
Source: U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Table B01001. Queried: 01/26/2023.

Figure 3.4: Beloit Age Distribution, Under 18



Source: U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Table B01001. Queried: 01/26/2023.

Figure 3.5: Beloit Age Distribution, Over 65



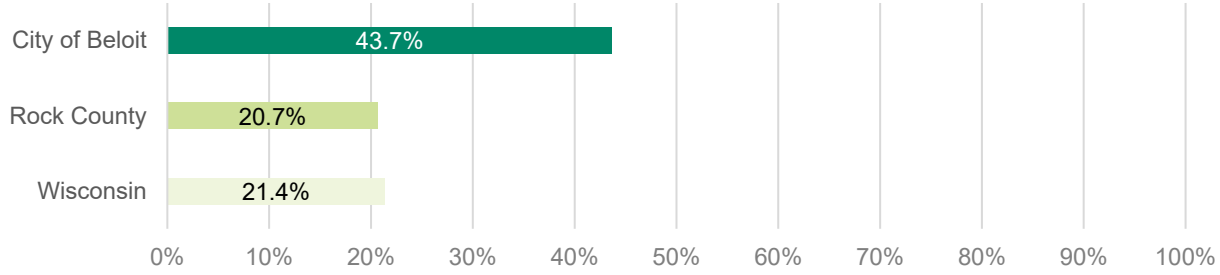
Source: U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Table B01001. Queried: 01/26/2023.

The population under 18 is generally spread evenly across the city; however, there is a slightly larger number concentrated downtown west of 4th Street and to the north and south along White Ave. The greatest share of the population over 65 is concentrated outside the city's boundaries to the north and northeast. Within Beloit, the census block groups with the highest ratio of individuals over 65 are to the east, north of Milwaukee Rd. There is also a generally high percentage to the far west along Liberty Ave and Madison Rd.

Race and Ethnicity

As shown in Figure 3.6, the City of Beloit has a higher percentage of its population identifying with a minority race and/or ethnicity (around 43.7%) when compared to Rock County and the state of Wisconsin (20.7% and 21.4%). This is roughly twice the proportion of minority groups present in the county and state.

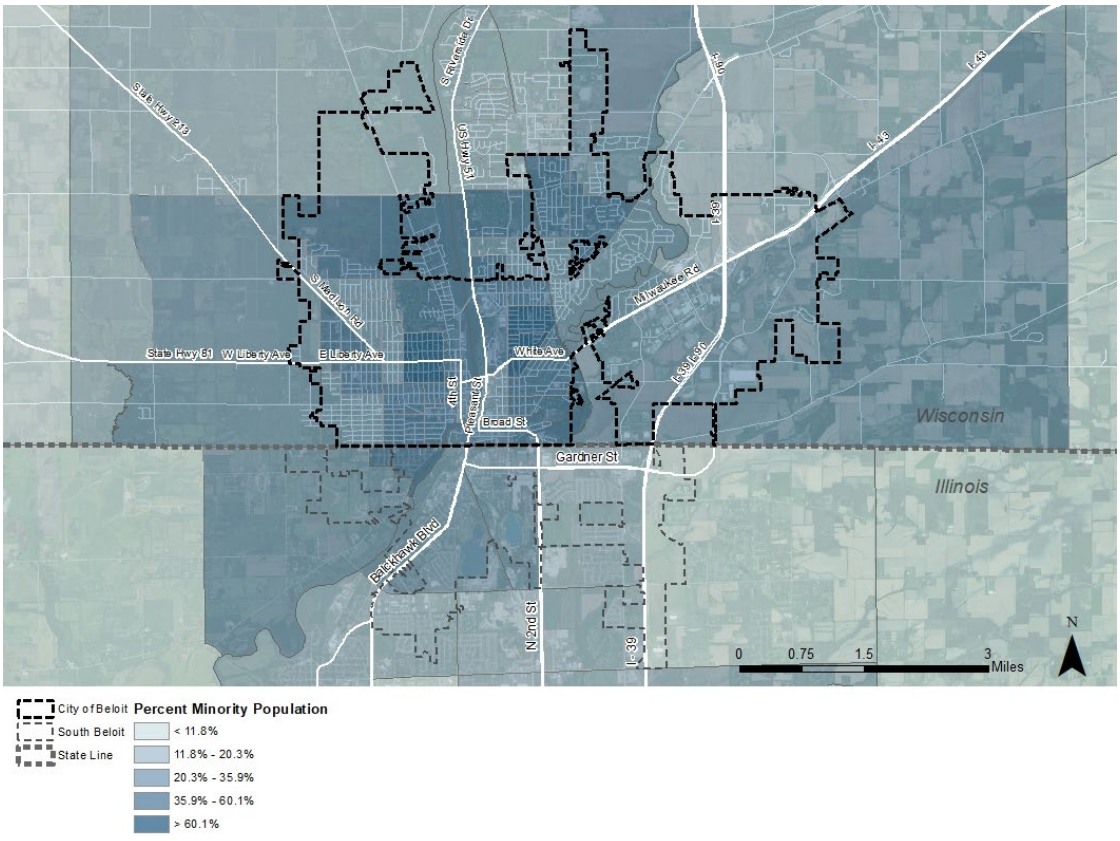
Figure 3.6: Beloit Minority Population Comparison [6]



Source: U.S. Census Bureau, 2020 Decennial Census, Table P2. Queried: 01/26/2023.

Figure 3.7 displays the distribution of the minority populations present across the City of Beloit and its surrounding areas. The city's minority population is generally evenly distributed across the city, with clusters of greater than 60% minority concentrated areas focused along Liberty Avenue and north of White Avenue.

Figure 3.7: Beloit Minority Distribution



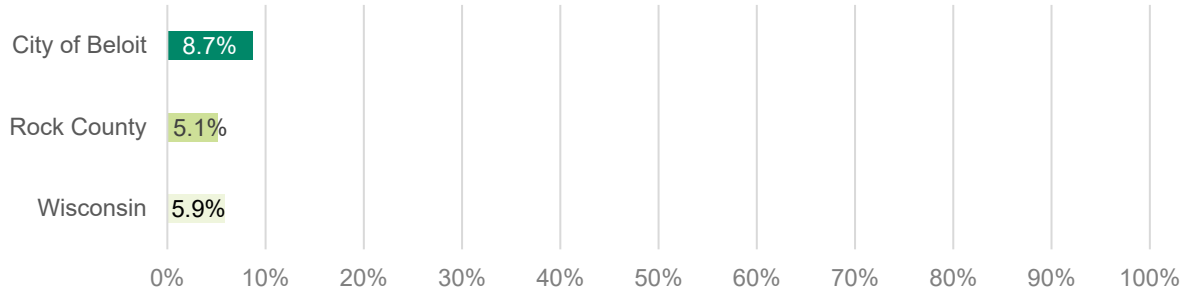
Source: U.S. Census Bureau, 2020 Decennial Census, Table P2. Queried: 01/26/2023.

[6] The minority population composition was factored by the U.S. Census Bureau through three categories: Diversity Index, prevalence rankings and diffusion score, and prevalence maps. It refers to the representation and size of racial and ethnic groups within the City of Beloit.

Low-Income Populations

Income level plays a major role in the decision between different types of transportation modes for an individual or household. The US Census poverty threshold in 2021 for a family of four with two children was $27,479. An analysis of the percentage of individuals in a state of poverty in the City of Beloit reveals a slightly higher proportion of 8.7% compared to Rock County at 5.1% or the state of Wisconsin at 5.9% (Figure 3.8).

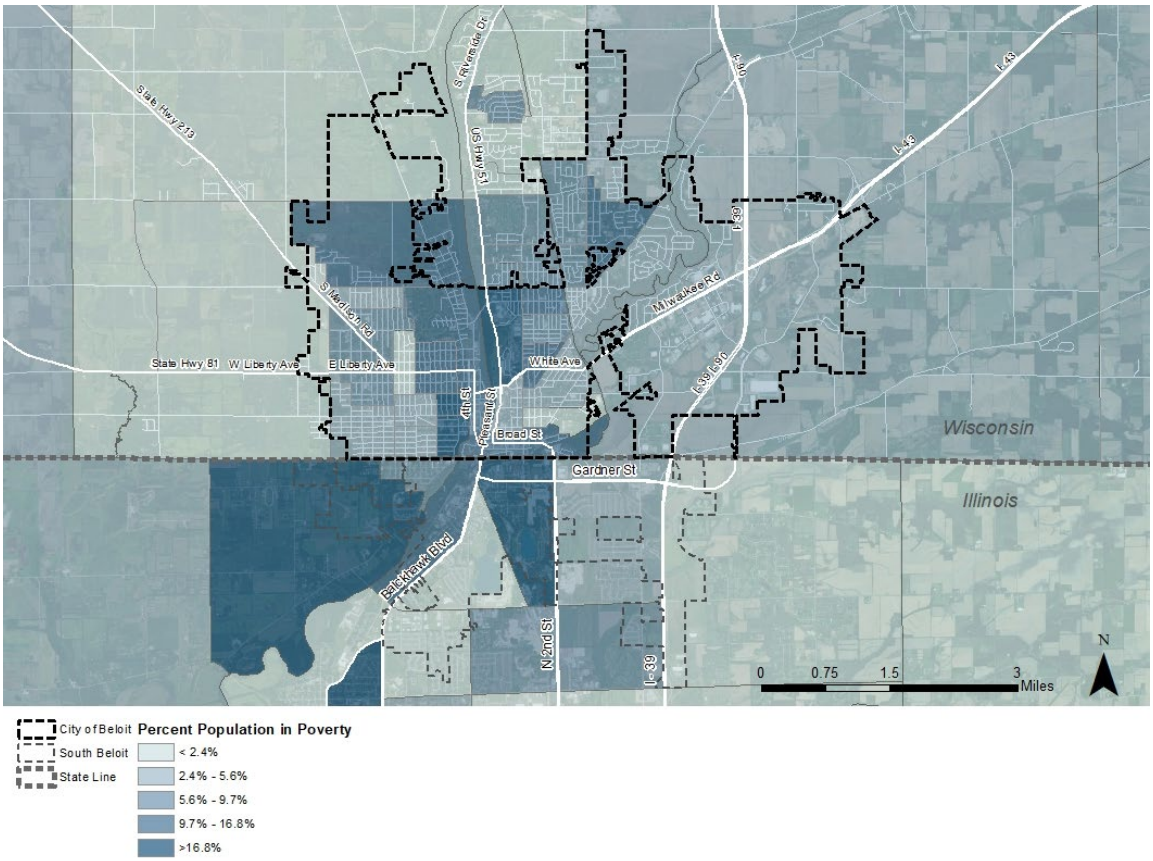
Figure 3.8: Population in Poverty Comparison



Source: U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Table B23024. Queried: 01/26/2023.

Spatial distribution of block groups with the highest concentrations of poverty is shown in Figure 3.9. There is a concentration of low-income individuals in Beloit west of 4th Street and along the east bank of Rock River. There are also census block groups with concentrations of poverty in South Beloit; however, these groups are located outside of the Beloit Transit System service area.

Figure 3.9: Beloit Population in Poverty

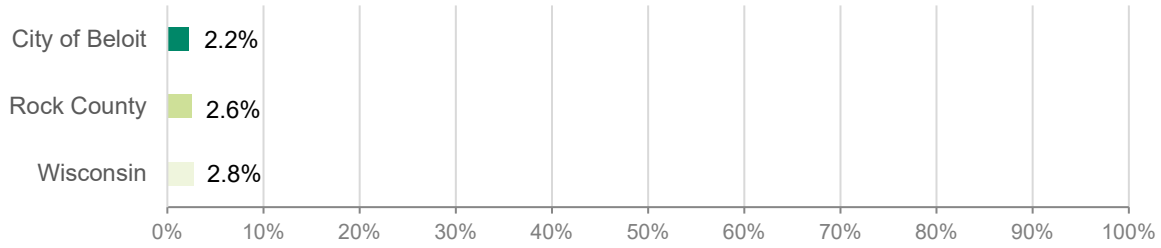


Source: U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Table B23024. Queried: 01/26/2023.

Limited English Proficiency

LEP is defined by the US Census as individuals who speak a language other than English or individuals who speak English less than well. In the City of Beloit, 2.2% of adults speak English less than well. This is a little above 800 of Beloit residents and just a little less than Rock County at 2.6% and the rest of the state at 2.8% (see Figure 3.10).

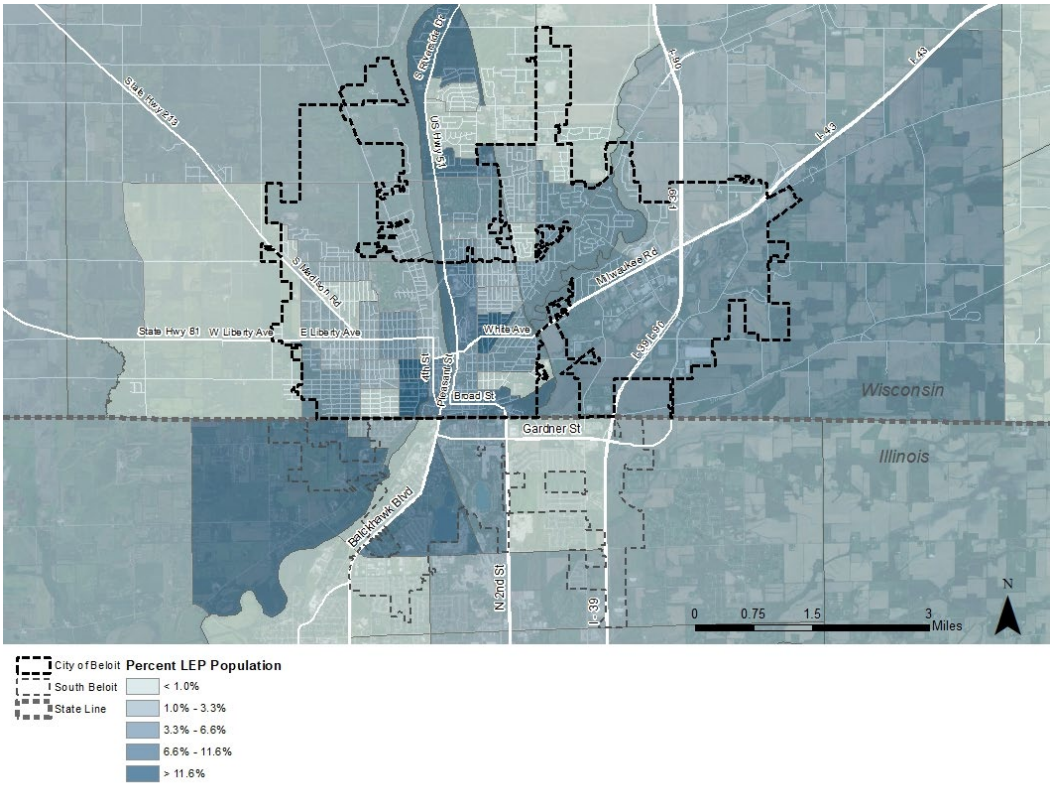
Figure 3.10: LEP Comparison



Source: U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Table B16004. Queried: 01/26/2023.

Concentrations of this population group are located in the same block groups as the city's low-income populations: west of 4th Street and along the east bank of Rock River (Figure 3.11). Spanish is the primary language among LEP populations in Beloit [7].

Figure 3.11: Beloit LEP Distribution



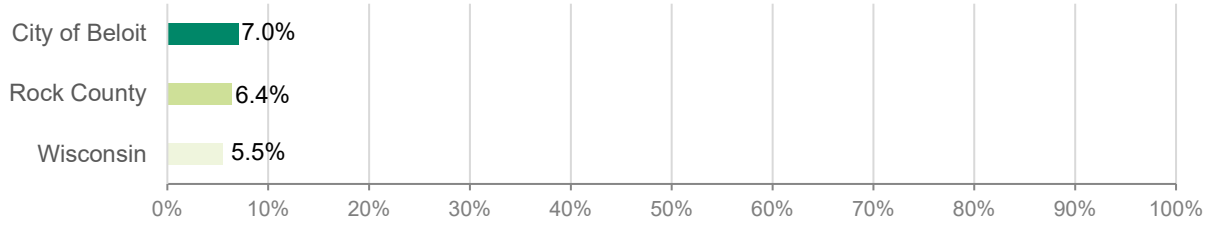
Source: U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Table B16004. Queried: 01/26/2023.

[7] U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Table B16004. Queried: 01/26/2023.

Persons with Disabilities

The City of Beloit, Rock County, and Wisconsin all have similar percentages of individuals with disabilities at 7.0%, 6.4%, and 5.5%, respectively (Figure 3.12). Individuals with disabilities are considered transportation disadvantaged.

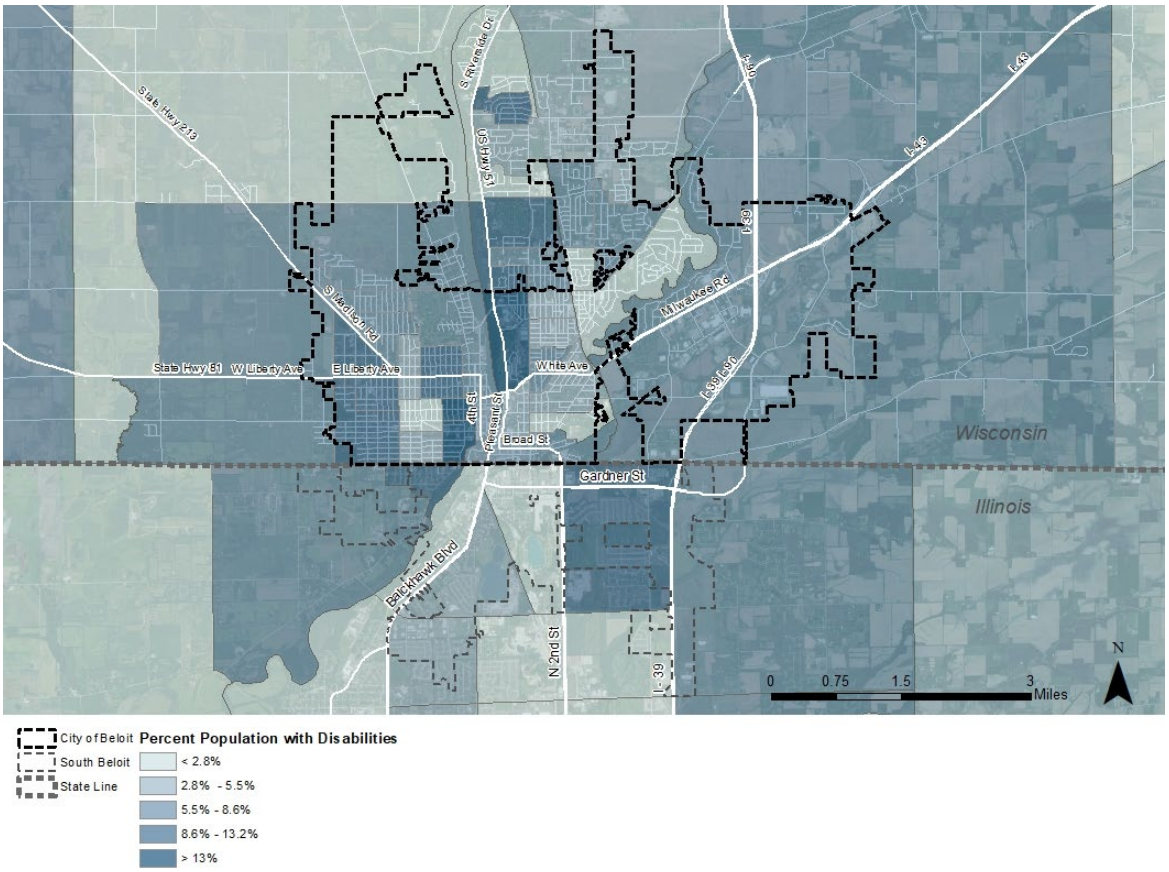
Figure 3.12: Individuals with Disabilities Comparison



Source: U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Table B23024. Queried: 01/26/2023.

Figure 3.13 displays the distribution of individuals with disabilities across Beloit and its surrounding areas. Concentrations of this population group appear to match a similar block group distribution as low-income and LEP groups. Individuals with disabilities are concentrated west of 4th Street and along the east bank of Rock River.

Figure 3.13: Beloit Distribution of Individuals with Disabilities

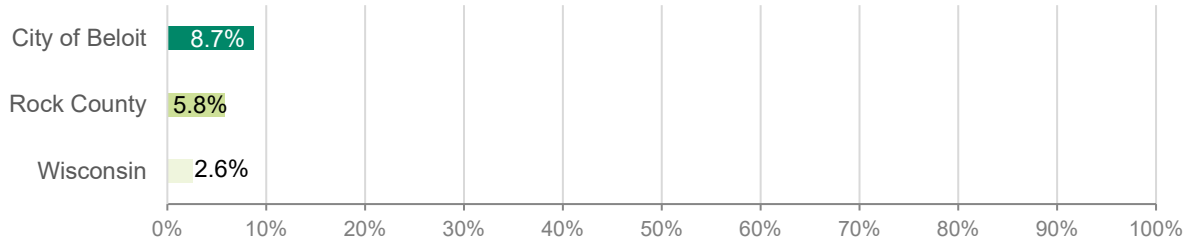


Source: U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Table B23024. Queried: 01/26/2023.

Access to Vehicles

Vehicle availability is another key factor in transportation mode choice. Although income can play a role in vehicle ownership, there are various other reasons an individual may not have access to a vehicle, including age, physical or mental limitations, or personal preference, among others. Figure 3.14 shows the percentage of zero-vehicle households for the City of Beloit, Rock County, and the state of Wisconsin.

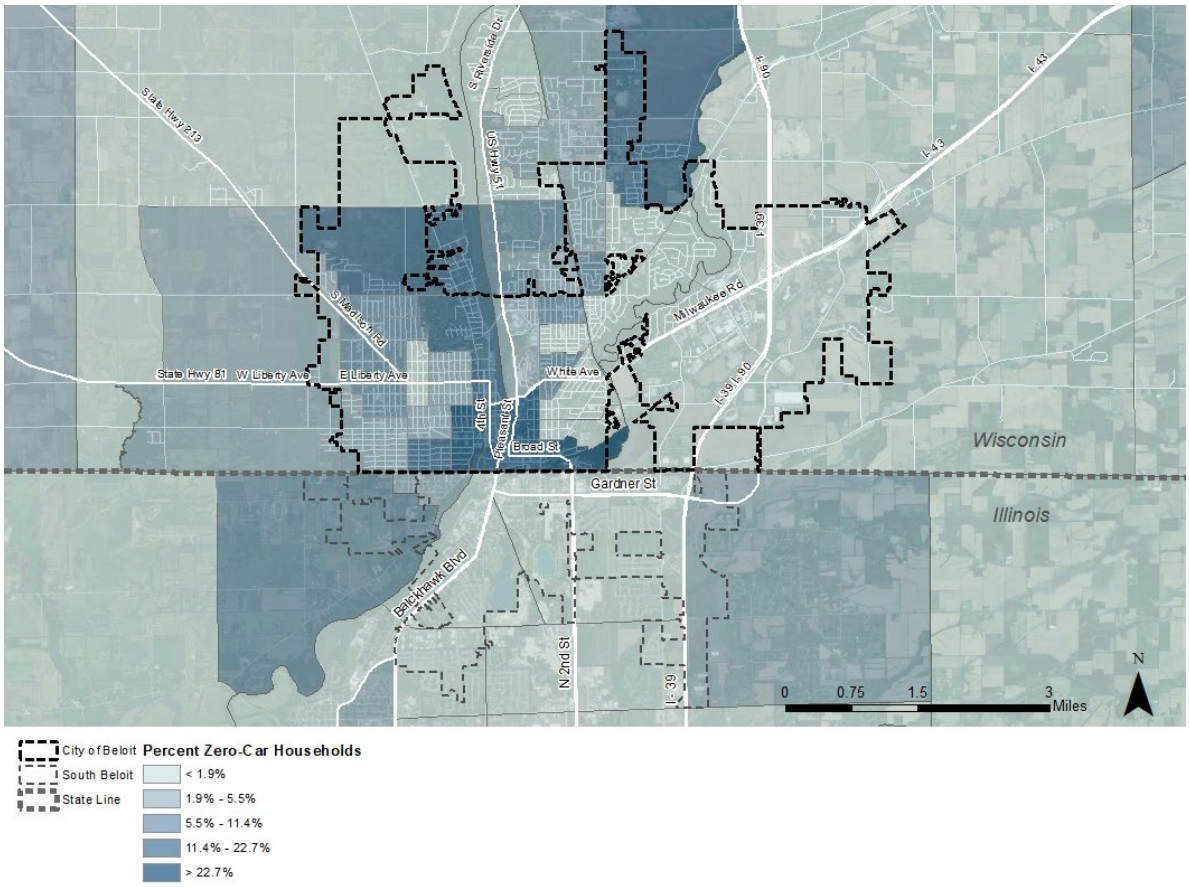
Figure 3.14: Zero-Car Household Comparison



Source: U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Table B25044. Queried: 01/26/2023.

Figure 3.15 identifies the spatial distribution of zero-vehicle households across Beloit and its surrounding areas. The majority of zero-car households appears concentrated downtown and generally on the west side of the city, with the exception of an area of concentration east of the hospital and clinics along Prairie Avenue.

Figure 3.15: Beloit Distribution of Zero-Car Households

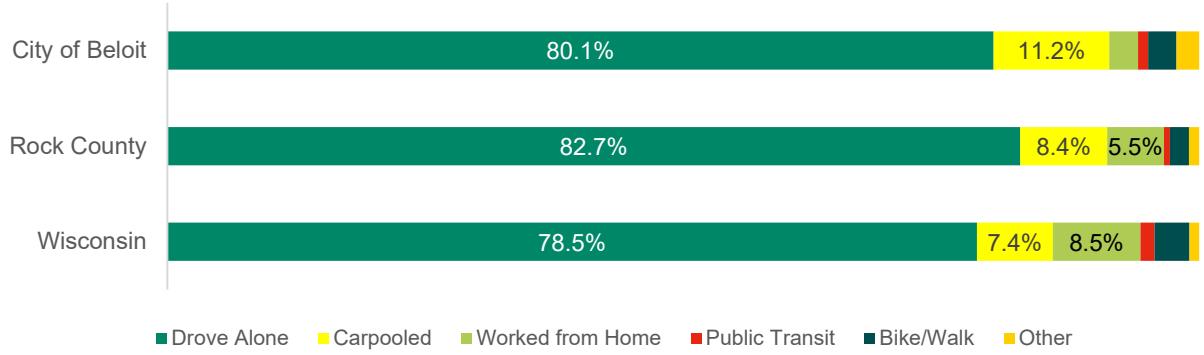


Source: U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Table B25044. Queried: 01/26/2023.

Means of Transportation to Work

When compared by city, county, and state, means of transportation to work varies slightly by mode. There is a marginally larger percentage of people who commuted by public transit in the City of Beloit (1.0%) in 2021 compared to Rock County (0.6%); however, the state of Wisconsin has a significantly larger share of its population commuting by public transit at 1.4% (Figure 3.16). There is a larger number of people in Beloit who commute by biking/walking or “other means,” totaling 4.9%. Commuters at all three geographic levels primarily travel to work via single-occupancy vehicles.

Figure 3.16: Means of Transportation Comparison

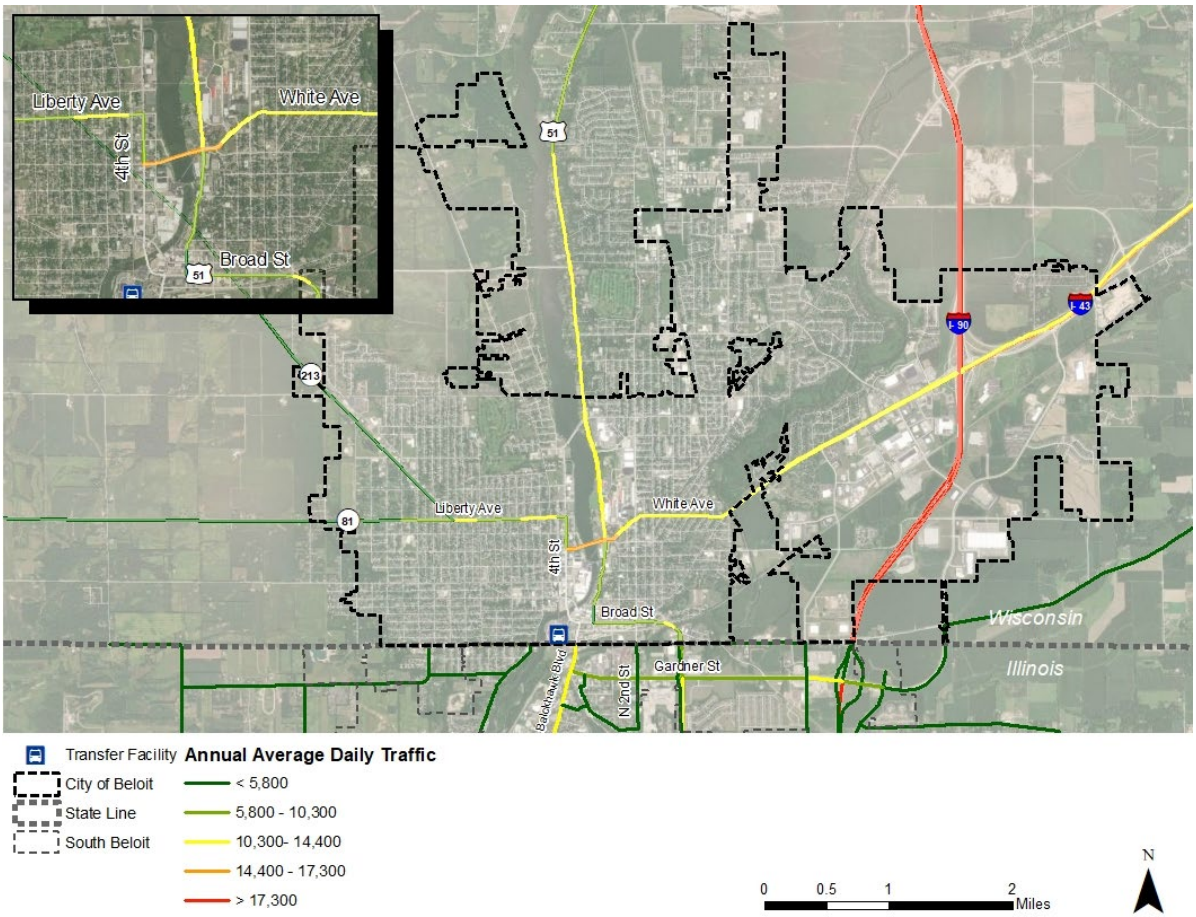


Source: U.S. Census Bureau, 2016-2021 American Community Survey 5-Year Estimates, Table B08301. Queried: 01/26/2023.

3.2 Major Corridors and Trip Patterns

The City of Beloit is located on the southern border of Wisconsin with easy access to major north-south highways including I-39/90 and US Highway 51, as well as east-west highways I-43 and State Highway 81. Downtown Beloit is not, however, divided by these major highways, as I-39/90 cuts through the far eastern quarter of the city and I-43 turns into State Highway 81 before reaching Downtown Beloit. As a result, Downtown Beloit is not significantly impacted by regional traffic but rather predominantly local trips. This is supported by the Annual Average Daily Traffic (AADT) counts for major roads in and around Beloit, as shown in Figure 3.17.

Figure 3.17: Annual Average Daily Trips in Beloit



Source: Wisconsin Department of Transportation Traffic Counts (2022): https://data-wisdot.opendata.arcgis.com/search Queried: 01/26/2023.
Illinois DOT Annual Average Daily Traffic (2018): https://gis-idot.opendata.arcgis.com/datasets/IDOT::annual-average-daily-traffic-2018/explore?location=42.499487%2C-89.043247%2C13.86. Queried: 01/26/2023.

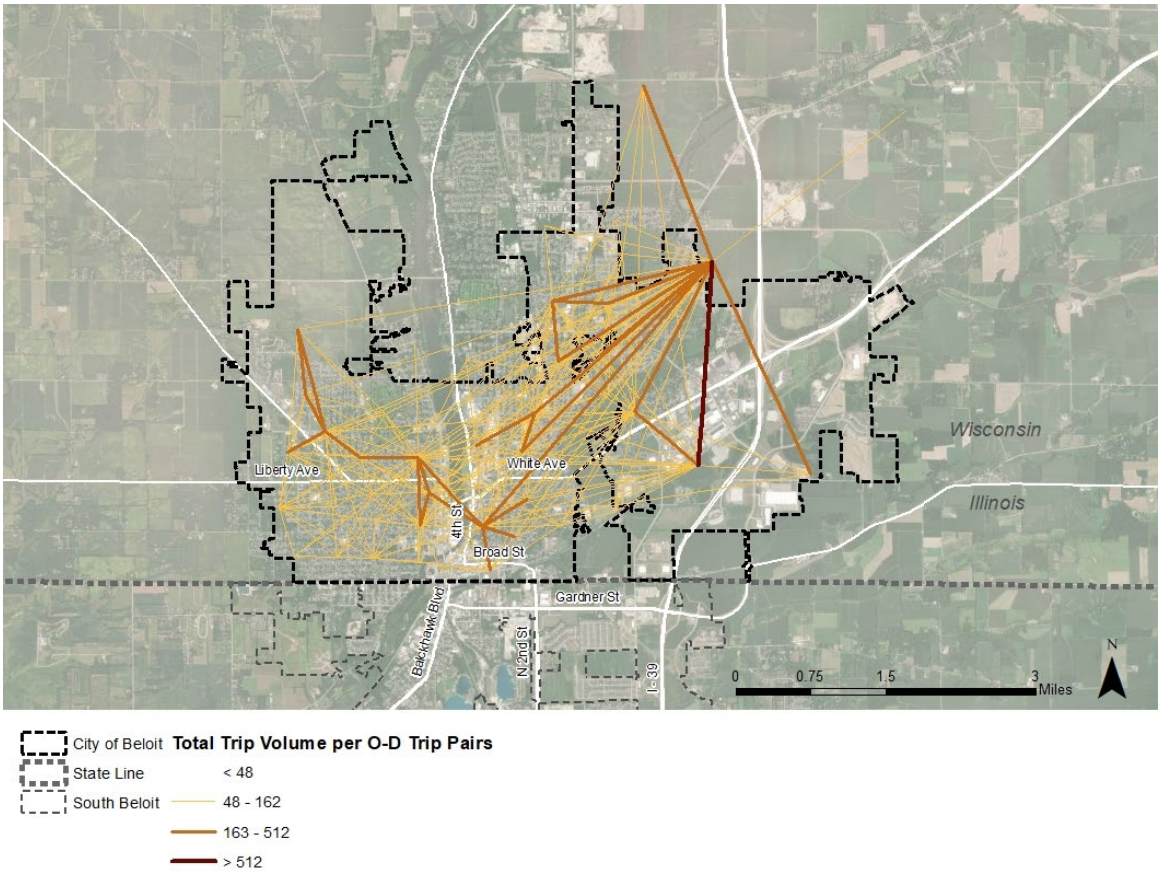
The road segments experiencing the greatest volume of traffic are the I-39/90 corridor and the section of US Highway 51 between White Ave. and Broad St. This segment of US Highway 51 in Downtown Beloit is a key access route to downtown activity centers and places of employment (as discussed in Section3.3 Employment and Activity Centers). Highway 51 follows the eastern bank of the river, acting as a throughway for inter-state traffic to the larger cities of Janesville to the north and Rockford to the south.

Replica [8] is a dataset of activity-based travel model origin and destination counts that can be used to estimate total weekday trips. Lines can be drawn between Traffic Analysis Zone (TAZ) centroids for the highest volume Origin-Destination (O-D) trip pairs within Beloit. Lines with a higher volume of trips are shown in thick, dark orange lines. Lines with a lower volume of trips are shown in thin, light orange or yellow lines. These origin-destination pairs can be filtered by transportation mode and used to draw further insight into existing travel patterns for the Beloit area (Figure 3.18 through Figure 3.21).

[8] Replica's activity model methodology is provided here: https://documentation.replicahq.com/docs/seasonal-mobility-model-methodology-summary-places

Figure 3.18 and 3.19 illustrates the TAZs where trips by all modes and by transit modes, respectively, begin and end. Origin destination lines in Figure 3.18 illustrate a higher volume of trip pairs from downtown Beloit to northeast Beloit, as well as along the State Highway 213 corridor. The strongest trip pairs connect the TAZ south along State Highway 81 and the TAZ to the north, between I-90 and Park Avenue.

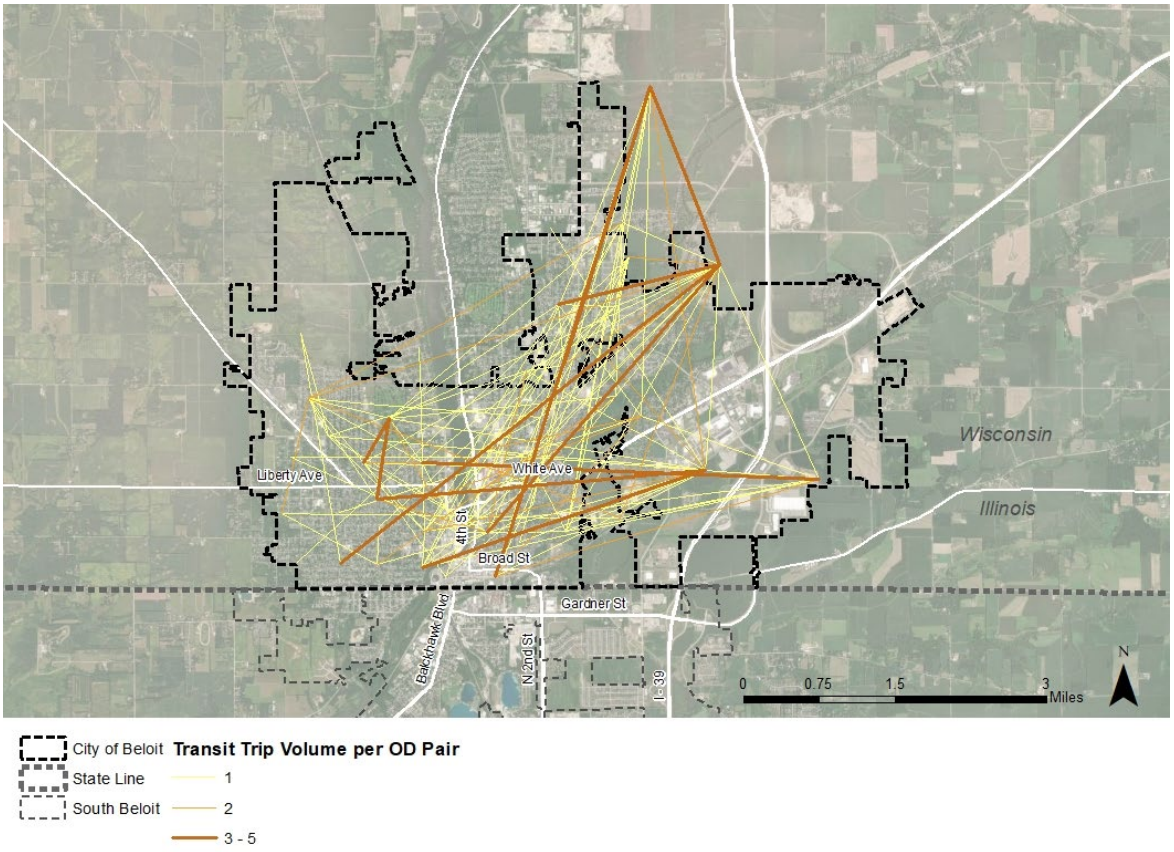
Figure 3.18: Trip Origin-Destination Pairs within Beloit for all Transportation Modes



Source: Replica, Beloit, WI Average Daily Trips (Fall 2023). Queried: 01/17/2024.

Comparatively, Figure 3.19 shows origin-destination trip pairs by transit only. The number of trips by transit have a significantly lower volume than the volume of trips by all modes, as reflected in the city's mode split of 80% single-occupancy vehicles and 1% transit. Spatial distribution of the strongest transit O-D pairs show more of a north-south and east-west travel pattern than the strongest all modes pairs shown in Figure 3.18.

Figure 3.19: Trip Origin-Destination Pairs within Beloit for Public Transit [9] Trips



Source: Replica, Beloit, WI Average Daily Trips (January 2023). Queried: 01/17/2024.

Employment and Activity Centers

Employment is an important factor in transportation and transit discussions. Even after the Covid-19 pandemic, large employment centers are common destinations for a significant number of work-related trips, which makes them important to understanding overall trip demand. In addition to work-related trips, there are many trips associated with personal needs, such as groceries and childcare, which further contextualize observed trip and traffic patterns. This section analyzes the location and density of employment as well as the location of various retail and services within the City of Beloit.

Employment locations were identified for employment density using the 2019 US Census Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES). LEHD LODES is one of the most reliable data sources for identifying locations of employers; however, it may over-represent the number of jobs at any given location. If an

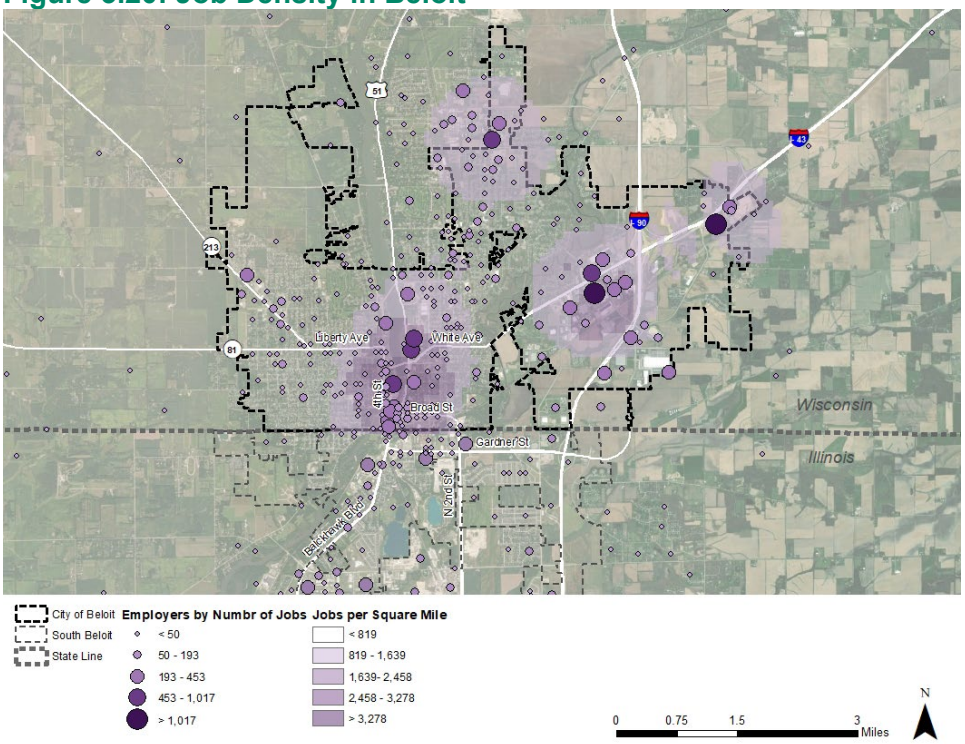
[9] "Transit trips" are defined as trips that primarily used public transit, such as buses, light rail, and subway.

employer has multiple locations or employs many remote workers, the total number of jobs will be reflected at a businesses' main location even if all employees do not necessarily commute there for work. The number of employees and list of major employers were refined using the Greater Beloit Economic Development Corporation's 2023 report on existing industries. [10]

Employment Density

Downtown Beloit is a major job center in the City of Beloit, with the highest concentration at greater than 3,278 jobs per square mile. This concentration includes the southern section of downtown and follows the river north along US Highway 51 (see Figure 3.20). The location pattern of this job center matches the traffic volume along the section of US Highway 51 observed in Figure 3.17.

Figure 3.20: Job Density in Beloit



Source: US Census Longitudinal Employer-Household Dynamics (LEHD) 2019 Origin-Destination Employment Statistics (LODES): https://onthemap.ces.census.gov/ Queried: 01/26/2023.

In addition to the downtown core, there are three other major centers of job concentrations. The first is at the northern end of the city, centered around the Beloit Memorial Hospital. The concentration of jobs in this area is associated with the hospital and related adjacent medical clinics and other related services.

The second concentration is generally divided into two areas near the junction between I-39/90 and I-43. The first is the Beloit Industrial Park, located to the west of the junction and includes several job centers along the Milwaukee Rd corridor. The area to the south and east of the junctions is identified by the Greater Beloit Economic Development Corporation as the Gateway Business Park and includes various commercial, warehousing, and manufacturing employers. The actual concentration of jobs in the Gateway Business Park shown in Figure 3.22 is likely underrepresented due to the age of the 2019 LEHD LODES dataset.

[10] Greater Beloit Economic Development Corporation (2023): https://www.greaterbeloitworks.com/site-selection/target-industries

The third concentration of jobs located outside of Downtown Beloit is largely associated with an individual contractor and trucking company, of which the trucking company may not necessarily employ many residents of the Beloit area due to its national reach and limitations of the LEHD LODES dataset. As a result, this last concentrated area of jobs is unlikely to have a major impact on trip and traffic patterns previously discussed.

Largest Employers

Table 3.2 identifies the top 14 employers located in the City of Beloit, as provided by a 2019 employer survey by the Rock County Development Alliance. Beloit's top employers predominantly represent the education, healthcare, and manufacturing industry sectors.

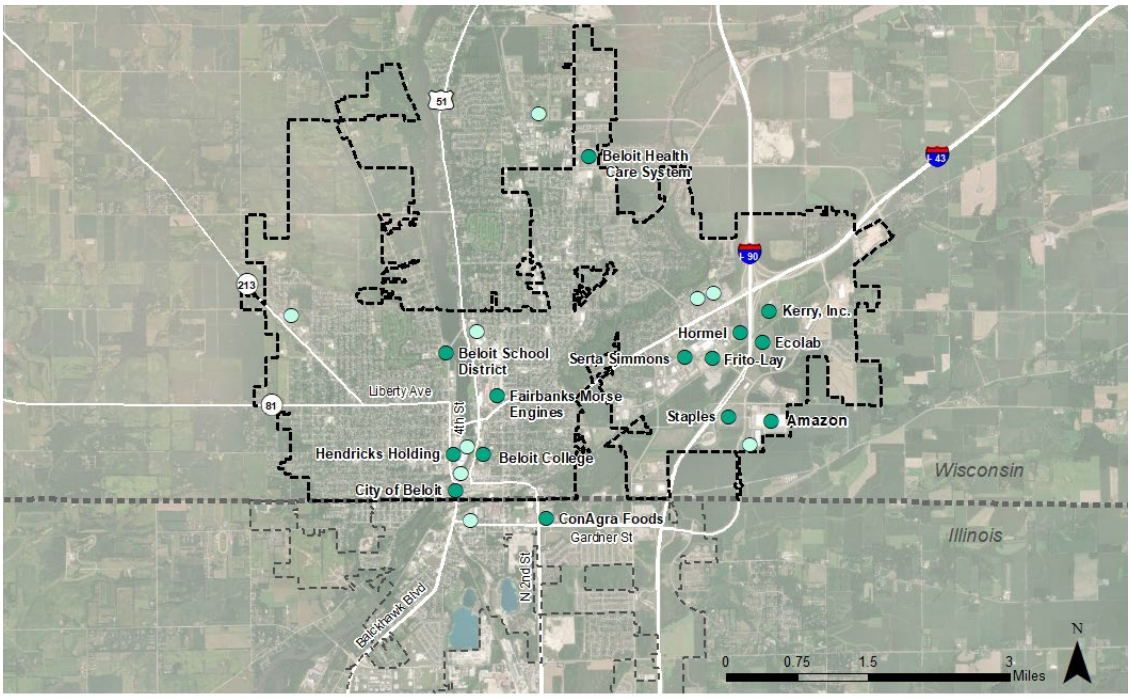
Table 3.2: Top Employers in Beloit

Rank	Employer	Address	Industry	Number of Employees
1	Beloit Health System	1969 Hart Rd	Healthcare	1,000+
2	Hendricks Holding	690 3rd St #300	Investment/Financial Services	1,000+
3	Kerry, Inc.	3330 Millington Rd	Manufacturing	500-999
4	Beloit School District	1633 Keeler Ave	Educational Services	500-999
5	Frito-Lay	2810 Kennedy Dr	Manufacturing	500-999
6	Fairbanks Morse Engines	701 White Ave	Manufacturing	500-999
7	Amazon Fulfillment	3150 Colley Rd	Warehousing	250-499
8	Ecolab	1630 Apex Dr	Manufacturing	250-499
9	Staples Fulfillment	3140 Colley Rd	Warehousing	250-499
10	Serta Simmons Bedding	1500 Lee Ln	Manufacturing	250-499
11	Beloit College	700 College St	Educational Services	250-499
12	City of Beloit	100 State St	Government	250-499
13	Hormel	3000 Kennedy Dr	Manufacturing	250-499
14	ConAgra Foods	1450 Plate Plaza Dr	Manufacturing/Wholesale	250-499

Source: Rock County Wisconsin Development Alliance, Largest Employers (2019): https://www.rockcountyalliance.com/major-employers. Queried: 01/26/2023.

In addition to the above, Blackhawk Technical College, located to the north of Beloit midway between Beloit and Janesville, should be mentioned as a major employer with approximately 588 employees. The college is located well outside of the city's border; however, it is highly likely that many employees and students at Blackhawk Technical College live in Beloit.

Figure 3.21: Major Employers

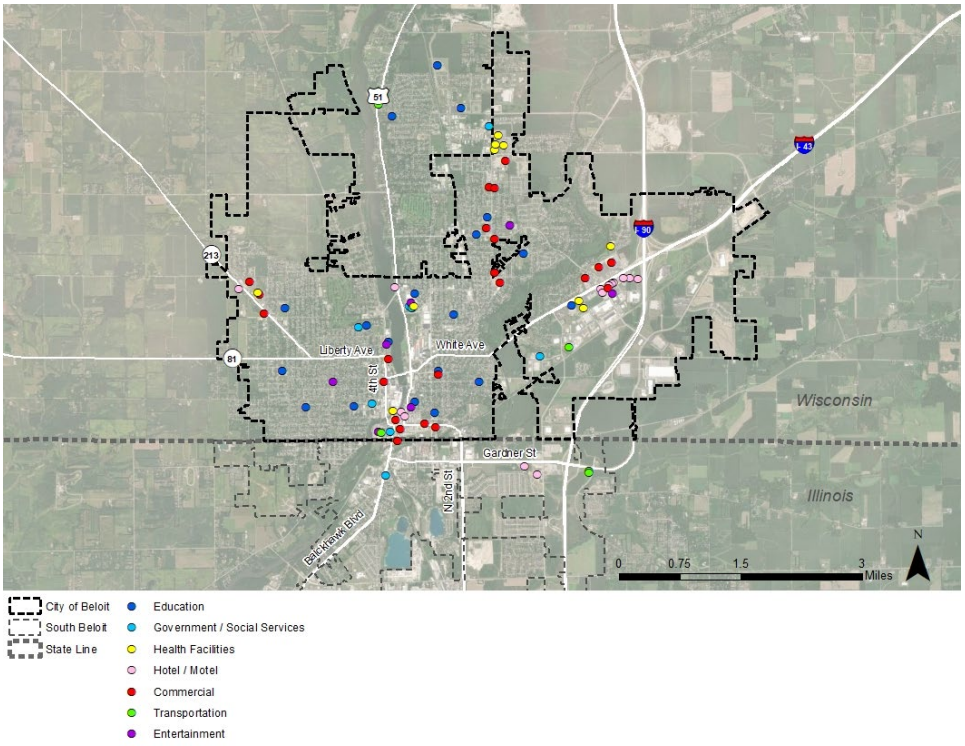


Source: Rock County Wisconsin Development Alliance, Largest Employers (2019): https://www.rockcountyalliance.com/major-employers. Queried: 01/26/2023.

Activity Centers

In addition to major employers, several major activity centers have been identified and categorized as Education, Government/Social Services, Hotels/Motels, Shopping, Transportation, or Entertainment (Figure 3.22) to help contextualize mobility patterns. The locations of major activity centers were identified based on aerial imagery observations and various other online sources of information. The microtransit zone proposed in Section 5, Service Model and Operation Plan, used this inventory of major activity centers and corridors to identify where a microtransit service zone may have the greatest and most efficient impact on overall mobility for Beloit residents.

Figure 3.22: Major Activity Centers



Source: Aerial map observations and various other online sources. Accessed 02/20/2023).

3.4 Mobility Needs

Based on the spatial distribution of overall population density (Figure 3.2) and employment density (Figure 3.20), there is a disconnect between where people live and major job centers. Figure 3.2: Population Density and US DOT Identified Transportation Disadvantaged Census Tracts shows a high concentration of people live in census tracts on the near west side of 4th Street, the near east side east of Pleasant Street, and north along Prairie Avenue between Bayliss and Cranston. Figure 3.20: Job Density in Beloit shows a high concentration of jobs downtown, but also to the north (near the hospital) and to the east, west of I-39/90. This distribution means employment-related trips are originating in the areas of higher population density (central and west) and traveling to areas of greater employment density (central, north, and east).

Trip patterns analyses shown in Figures 3.18 and 3.19 illustrate travel patterns currently served by all modes that may be a potential market for additional transit ridership. The highest volume trip O-D trip pairs for all modes travel between northeast Beloit and the east side of Beloit near major employers along State Highway 81.

A majority of the largest employers in the City of Beloit are from the manufacturing and warehousing industries. Employees of these sectors often work second or third shifts, which begin and/or end outside of Beloit Transit's typical operating hours of 6:00 AM to 6 :00PM on weekdays, and 9:00 AM to 3:30 PM on Saturdays. Beloit Transit does not operate on Sundays. Public comments during the public involvement efforts discussed in Section 4, Public Involvement, emphasized that expanded service hours is a priority for the community, especially for workers of these second and third shifts.

4. Public Involvement

In addition to quantitative data, public input was gathered to identify mobility needs as well as introduce the community to microtransit. Community and stakeholder engagement helped the project team better understand community mobility needs, public interest in microtransit, and potential demand for a microtransit service.

4.1 Project Team

The project team consisted of staff from the City of Beloit, Beloit Transit, Stateline Area Transportation Study (SLATS), and AECOM. The project team met biweekly throughout the project to review existing conditions, coordinate public involvement, and review microtransit zone alternatives.

4.2 Public Engagement Events

Two rounds of public engagement were leveraged to first understand existing mobility needs and introduce microtransit to the community, then hear feedback on proposed microtransit zones. All public engagement events were advertised on the Beloit Transit website and at the Beloit Transfer Center in both English and Spanish a minimum of 3 days before each event. Both rounds of public engagement were covered by local news outlets. The full schedule of organized public engagement events is as follows:

First Round of Public Engagement: May 1, 2023

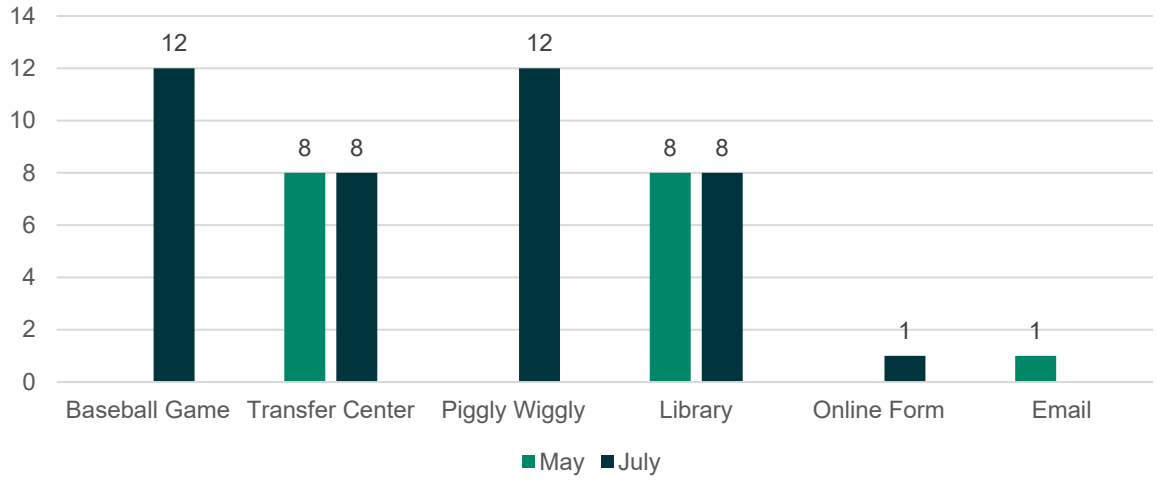
- Tabling at the Beloit Transfer Center, 7:00 – 9:00 AM
- Public Meeting at the Beloit Public Library, 4:00 – 6:00 PM

Second Round of Public Engagement: July 23 – 24, 2023

- Tabling at the Beloit Sky Carp Baseball Game, 1:00 – 3:00 PM
- Tabling at the Beloit Transfer Center, 7:00 – 9:00 AM
- Tabling at the Piggly Wiggly Grocery Store, 7:00 – 9:00 AM
- Public Meeting at the Beloit Public Library, 4:00 – 6:00 PM

At least 17 members of the community were directly engaged in the first round of events and 41 were engaged in the second round of events for a total of 58 recorded interactions over the course of the project. The total number of people engaged by location are summarized in Figure 4.1 below.

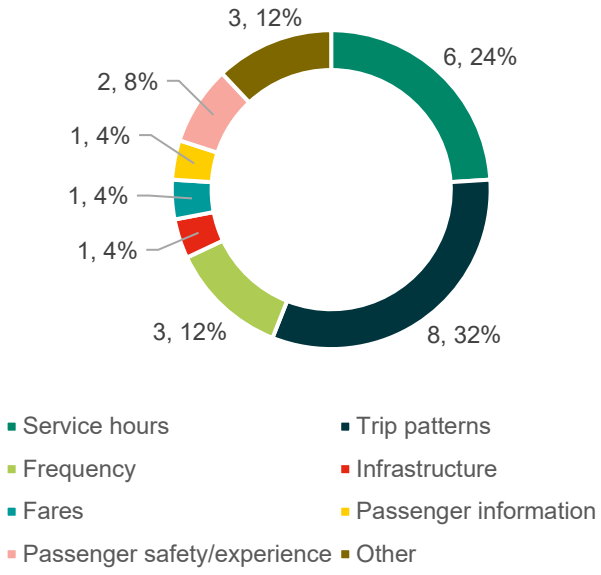
Figure 4.1: Number of People Engaged by Date and Location



4.3 Public Feedback

During the May and July 2023 public meetings, attendees were asked to discuss their input on current and future transit in Beloit. The public feedback can be summarized into seven common themes, including service hours, current community trip patterns, frequency of service, infrastructure needs, fares, availability of passenger information, and passenger safety/experience. A breakdown of the comments is summarized by theme in Figure 4.2: Public Feedback Theme Breakdown.

Figure 4.2: Public Feedback Theme Breakdown



Highlights:

32% of public comments touched **on adjustments to the trip patterns**, including current and future services. These comments mostly examined specific route improvements that would make mobility across Beloit more efficient for riders.

24% of public comments included requests for **service hour expansions.** Feedback from this area highlighted the value of extending service hours into the evening to improve ridership for workers and baseball game attendees, including services such as microtransit.

12% of public comments included requests for **more frequent service**, both for current routes and future services. These comments discussed higher frequency fixed route service, especially to regional connections.

4% of public comments highlighted the need for **improvement of bus stop infrastructure**, including Americans with Disabilities Act (ADA) enhancement and extending access.

8% of the comments touched on **the safety and experience of passengers**, especially if microtransit is contracted through a third-party transportation network company like Uber or Lyft.

Specific requests and suggestions to advance the City of Beloit were also received. Some select comments include:

- “Need to figure out how to get people from the **east and west to the Prairie Ave** corridor.”
- “Microtransit could be **helpful for those who now rely on family and friends** to get around.”
- “Ideally, microtransit will **connect with transit options in Northern Illinois** and facilitate travel to Northpointe and other locations in Rockton, Rockford, Roscoe, and South Beloit.”
- “Need transit on **the west side** of Beloit.”

5. Service Model and Operation Plan

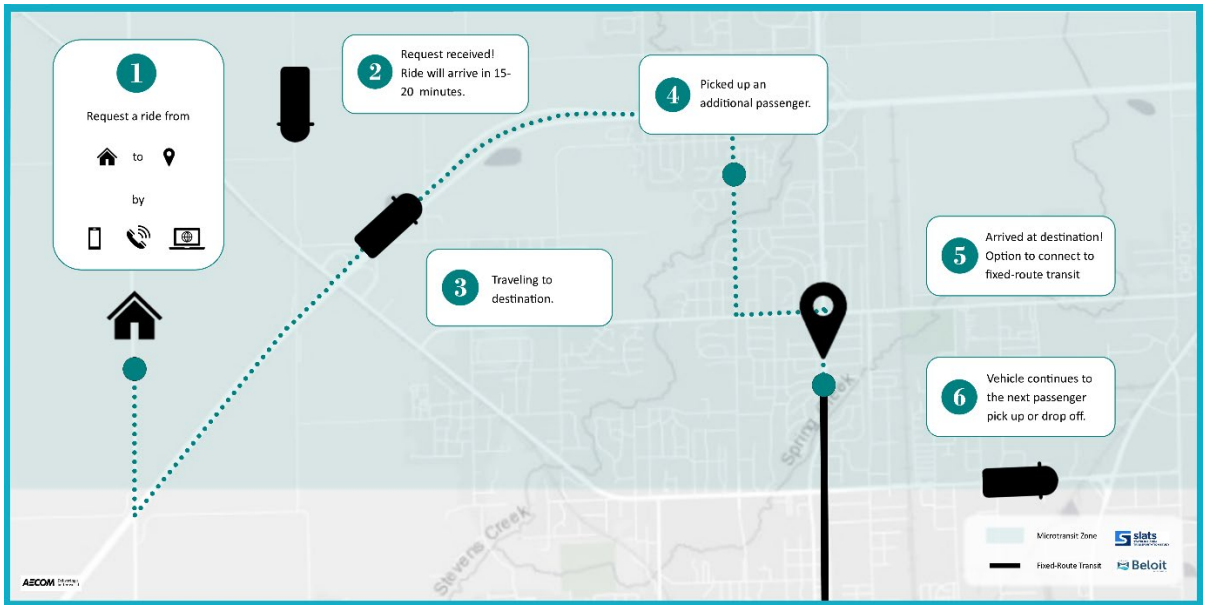
Microtransit is an alternative transportation service that offers flexible, on-demand service with dynamic and pooled routing. It can be used best in low density areas that would not fully benefit from fixed route service. Microtransit is a 'curb-to-curb' service for short and local trips, typically with vans or shuttles. Microtransit also provides flexibility of service including stop types. In some uses, providers choose to use curb-to-curb service similar to paratransit service and in other zones or services "virtual stops" can be implemented. This is when a nearby stop location is provided in the app to allow for more efficient routing. This model directs riders to walk a block or two for pickup to allow for more direct routing for bus operator.

Microtransit allows for first/last mile connections to fixed routes, encouraging the use of an existing transit service.

5.1 Microtransit Process

A microtransit trip begins with a rider requesting a ride through a smart phone application, call center, or online portal. The request is then sent to a microtransit driver, and an estimated pick-up time is created based on vehicle or driver availability. There is also potential for a pooled ride if the operating software deems it efficient. An example is shown in Figure 5.1.

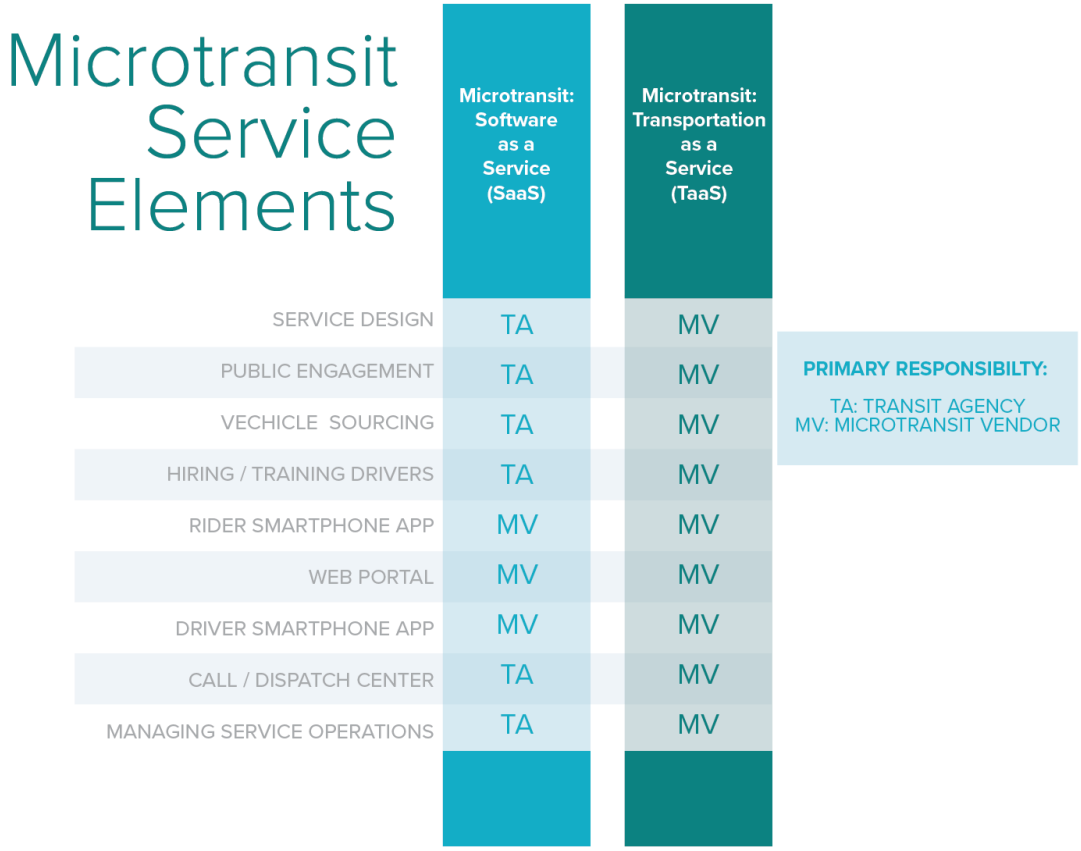
Figure 5.1: Microtransit Service Process



5.2 Microtransit Service Elements

The two service models for microtransit are Software as a Service (SaaS) and Transportation as a Service (TaaS) (Figure 5.2: Microtransit Service Elements). The implementation strategies of microtransit depends on the division of tasks between the transit agency and the vendor service. The feasibility of these model options for Beloit will be addressed after need, cost, and resources are analyzed. Choosing a service design is important for implementation and determines the timeline, as well as cost of the overall service.

Figure 5.2: Microtransit Service Elements



Software as a Service (SaaS)

SaaS is a mixed provider approach that relies heavily on the transit agency. The vendor provides the software for the trip scheduling, the rider app or website, and the driver app. The transit agency would provide the drivers, vehicles, and operation management. It is recommended that Beloit provide dynamic vehicle routing capacity; passenger aggregation; rider and driver apps; support for booking by phone and cash payments; backend administrative tools; and ongoing technical, operational, and marketing support. This type of service design is less costly and gives more control to the transit agency; however, the agency would need to extend resources to make the system efficient.

Transportation as a Service (TaaS)

TaaS is a turnkey service whereby the microtransit vendor supplies all the necessary service and software for the transit agency. This includes the software for the trip scheduling, the rider app or website, the driver app, drivers, vehicles, operations management, marketing support, and administrative tools. This type of service gives the vendor more control over the microtransit system and is more costly, though it can be implemented faster and relies very little on the transit agency's resources.

Microtransit Benefits

Microtransit is an efficient transportation alternative that can be scaled to the demand. This allows the city to adjust zones based on the market after a trial or set period of time. Microtransit offers an opportunity to fill the gaps that fixed routes cannot fully cover in a convenient and affordable way. It provides a needed alterative to allow vulnerable and underserved populations in Beloit the chance to connect with the community, have access to employment or education opportunities, and have reliable transportation to appointments.

6. Service and Implementation Plan

Based on the findings from the market analysis, fixed route analysis, and feedback from the public involvement process, three zones were identified for potential microtransit service including:

- Gateway Area
- North Beloit
- West Beloit

The Remix planning tool was used to draw out and analyze the microtransit zones. The city staff reviewed these three zones and modified them to include additional neighborhoods and places of interest.

6.1 Activity Centers and Employers

A breakdown of the number of jobs for each zone is shown in Table .1. The spatial distribution of job density relative to the three zones is shown in Figure 6.1. Locations of activity centers and the three zones are shown in Figure 6.2.

Table 3.1: Number of Jobs per Microtransit Zone

	Jobs
Gateway Zone	2,900
North Zone	3,300
West Zone	700

Source: 2021 5-year American Community Survey (ACS)

The **Gateway Zone** is centered on the Gateway Business Park, including many of the businesses and activity centers are dispersed throughout the zone and difficult to serve with fixed route service. The area includes a large number of major employers (total of 2,900 jobs).

Major employers and activity centers in the Gateway Zone include:

- Piggly Wiggly Grocery Store/Transfer Point
- Van Galder Bus Stop/(Regional) Transfer Point
- Walmart/Shopping Center (with bus stop)
- Amazon Distribution Center
- Future Ho-Chunk Casino
- Kerry , Inc.
- Hormel
- Several hotels
- Various other commercial and industrial businesses

The **North Zone** is centered on the hospital and clinics on the northern edge of Beloit. It includes the largest number of employers (total of 3,300 jobs). Most of the jobs in this zone are along the Prairie Avenue Corridor and within close proximity of a fixed route.

Major employers and activity centers in the North Zone include:

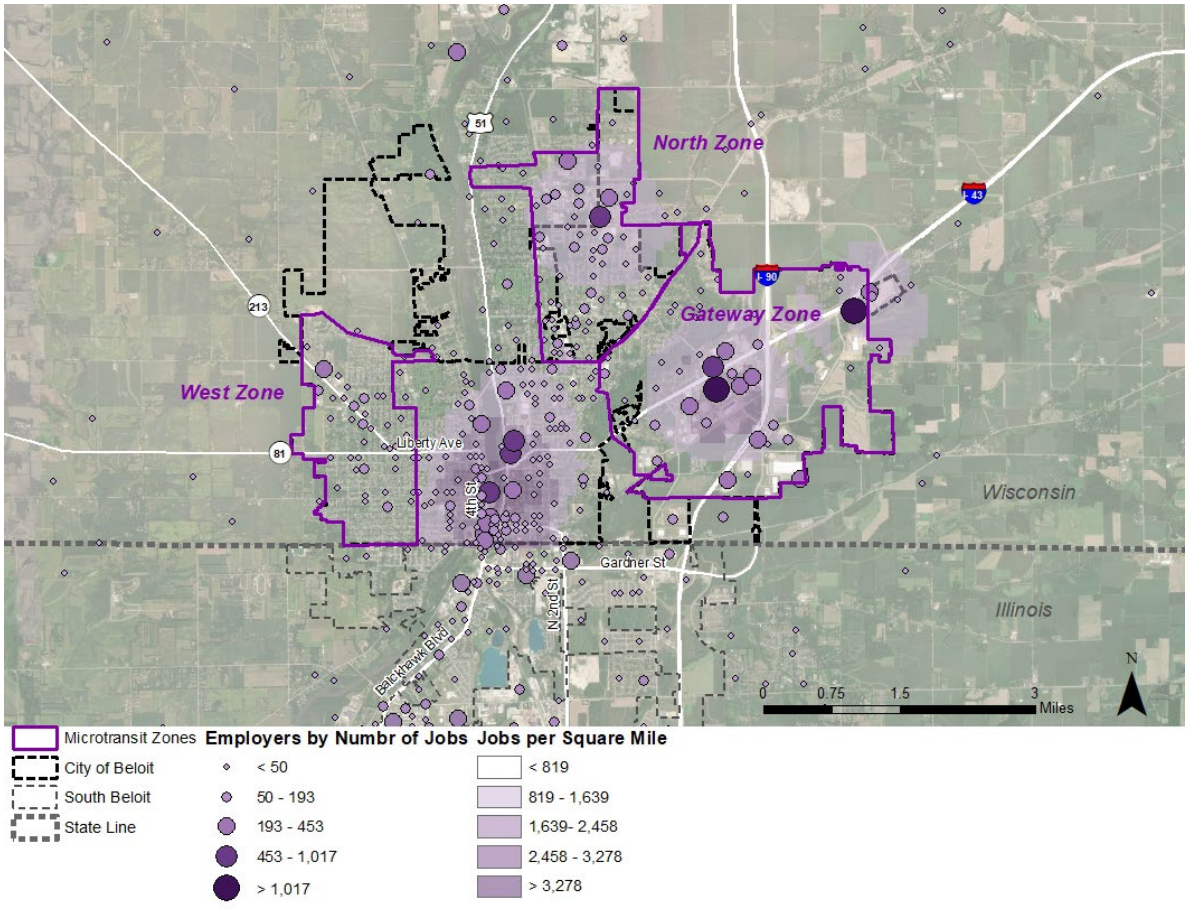
- Piggly Wiggly Grocery Store/Transfer Point
- BJE Stop/Transfer Point
- Beloit Memorial Hospital
- Various medical clinics
- Various other commercial and industrial businesses

The **West Zone** includes the fewest jobs (700) with the only major employer being Woodman's Grocery Store, at the northwest end of the zone.

Major employers and activity centers in the West Zone include:

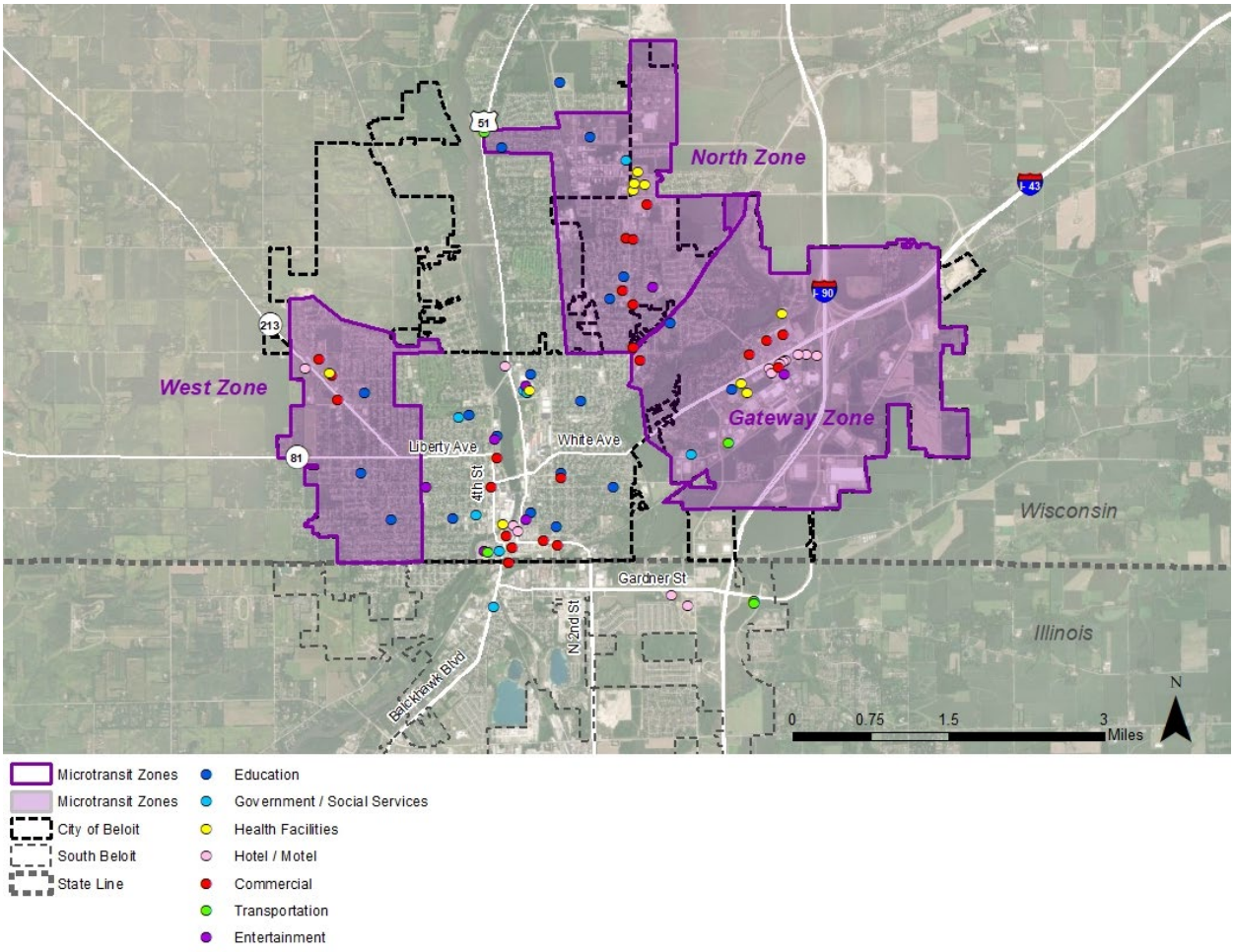
- Connection to Beloit Transit Center (adjacent to ABC Supply Stadium and City Hall)
- Woodman's Grocery Store/Transfer Point
- Schools
- Various other commercial and industrial businesses

Figure 6.1: Three Microtransit Zones and Job Density



Source: US Census Longitudinal Employer-Household Dynamics (LEHD) 2019 Origin-Destination Employment Statistics (LODES): https://onthemap.ces.census.gov/ Queried: 01/26/2023.

Figure 6.2: Three Microtransit Zones and Activity Centers



Source: Aerial map observations and various other online sources. Accessed 02/20/2023).

6.2 Service Plan

Through the analysis, the three zones were evaluated and prioritized based on the suitability for microtransit service. Key components in the analysis were land use/development patterns, existing fixed route service, population and employment, and transit generators located in the area.

Adjustments to the current Beloit Transit fixed route services were made to optimize the overall transit service in the zones. A detailed description is provided below.

New service such as microtransit should be implemented in phases to allow the agency to test the operations of the service and to allow the new service model to mature, develop a market, and attract riders.

The phased approach for the microtransit plan is as follows:

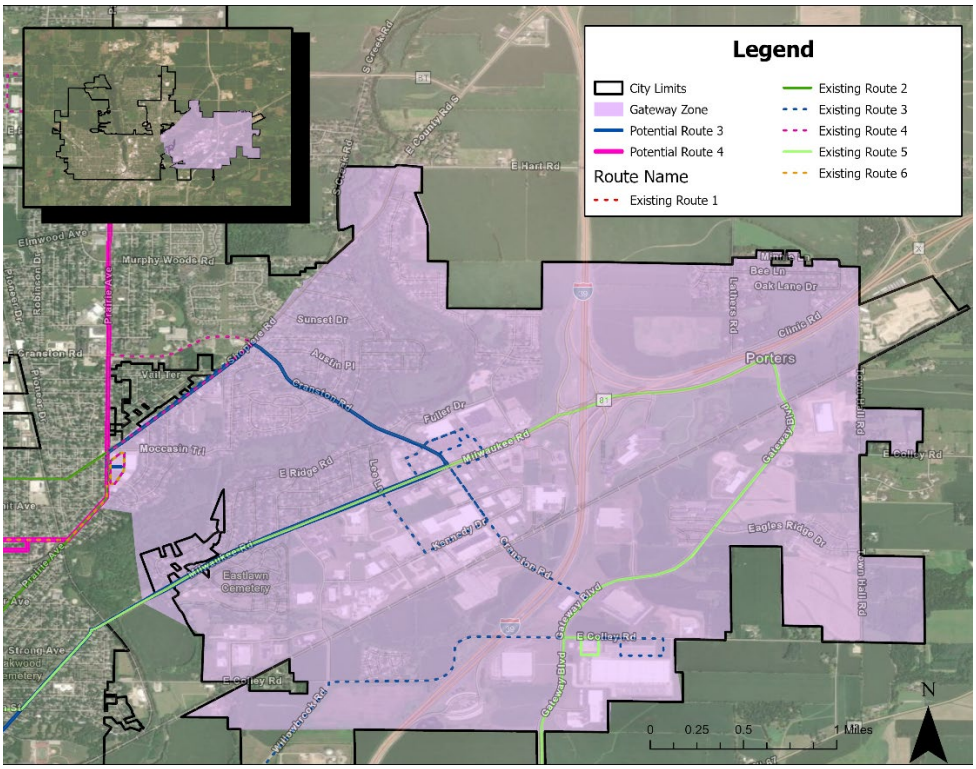
- Phase 1 – Gateway Zone Pilot (Recommendation)
- Phase 2 – North Zone
- Phase 3 – Other concepts including a potential zone in West Beloit

Phases 2 and 3 should only be implemented if the ridership and metrics of the Phase 1 pilot zone meet the defined performance measures. In addition, further analysis of Phases 2 and 3 may be needed as part of the upcoming BTS Transit Development Plan (TDP).

Phase 1: Gateway Zone Pilot Program

This zone encompasses eastern Beloit following the city limit boundaries to the east, Shopiere Road to the west, and the city limits to the south (south of Colley Road) and north. Major manufacturing and distribution center employers are located in the zone including Amazon, Kettle Foods, and Frito-Lay. The intersection of Milwaukee Road and Cranston Road includes retail centers such as Walmart and Menards. In addition, two large multifamily complexes (Hawks Ridge and Gateway Estates) are located along Gateway Boulevard. The area continues to attract new businesses with easy transportation access to I-39/90. The future Ho-Chunk Casino is also expected to open in this area within the next few years.

Figure 6.3: Gateway Microtransit Zone



Existing Transit Service

The Gateway area is currently served by Route 3 and Route 5.

Route 3 operates from 6:00 AM to 6:00 PM on weekdays and provides service between the Downtown Beloit Transfer Center, Walmart, the Gateway area, and the Piggly Wiggly. It is a one-way loop with various route segments traveling in low density areas in southeast Beloit. The annual ridership on the route is 16,067 which ranks 3 of the 6 fixed routes (Figure 2.1). The route provides key connections to major activity centers such as downtown and the two transfer points in the east, but it also operates long segments in lower ridership areas along Stateline Road, Willowbrook Road, and Colley Road.

Route 5 is a limited service one-way loop route with four trips per day on weekdays serving the Gardner Street and Gateway Boulevard corridors. The route provides connections from the Downtown Beloit Transfer Center to the businesses and apartments along the Gateway Boulevard corridor with a stop at the FasMart in South Beloit, IL, for connections to the intercity bus serving Madison, WI, and Chicago O'Hare Airport. Route 5 has the lowest ridership in the system with 692 annual riders.

Why Microtransit?

The Gateway is a growing employment center in Beloit. The area includes key retail centers such as Walmart and Menards and large distribution and manufacturing employers including Amazon and Frito-Lay. Based on the market assessment and public outreach, there is a need to connect residents from other parts of Beloit to the Gateway area for employment opportunities. A key challenge in serving the area with the current fixed route transit is the low density and dispersed land use and development patterns in the Gateway area. The current service is composed of one-way loops operating out of direction to provide connections to the employer and residential locations. Zone-based, on-demand transit service, like microtransit, would provide better coverage to the area. Microtransit is better suited for low density areas, and the flexibility of the service allows for more direct trips to the employers in the zone. Microtransit is designed to support and feed into the fixed route service and would provide direct connections to Route 3 at the Walmart and Routes 2, 4, and 6 at the Piggly Wiggly.

The connection to Route 6 is an important workforce transportation link between the residential area in West Beloit and the employment opportunities in the Gateway Zone.

Key reasons to implement microtransit:

- Out of direction travel on the existing fixed route
- Low density land use
- Connections to large employers and Walmart
- Dispersed transit generators

Fixed Route Service Adjustments

The microtransit zone would take over portions of Route 3 and all of Route 5. Route 3 would become a bi-directional service operating along the Milwaukee Road, Cranston Road, and Shopiere Road corridors with faster and more direct service to key transit generators—Beloit Transfer Center, Walmart, and Piggly Wiggly. The new service would reduce the travel time between Downtown Beloit and the Walmart from the current 20 minutes to 13 minutes. The Gardner Street segment in South Beloit would no longer be served as part of the new microtransit zone; however, the zone would continue to provide a connection to the intercity bus stop at the FasMart.

Microtransit Zone Characteristics

The proposed service would operate Monday through Friday from 6:00 AM to 6:00 PM. The average wait time for each trip is estimated to be about 20 minutes, although some trips may have longer wait times and others shorter. Based on the assessment using the Remix tool, the service would need one vehicle for implementation, and the average trip distance would be 3 miles.

- Service will operate weekdays only
- Span of service from 6:00 AM to 6:00 PM

- Industry standard wait time average of 20 minutes
- Aim for 50% or more pooled/shared trips for more efficient service
- Contract with a vendor for SaaS service
- One vehicle for initial pilot

O&M and Capital Costs

The service would operate one vehicle for 12 hours, which is a similar span of service to the existing fixed routes. The microtransit service would replace Route 5, which currently operates 4.5 hours per day. With discontinuation of Route 5 and its 4.5 daily revenue hours, the remaining 7.5 hours would be the cost of the new Gateway service in addition to the cost for the microtransit software.

SaaS is the best choice for Beloit Transit because of the assumed level of demand for service and the potential to use existing vehicles from the fleet for the service. Beloit Transit currently has a van that could be used for microtransit. In addition, there may be opportunities to partner with SMTD to utilize one of its cutaways or vans for the spare microtransit vehicle. Operating the service with existing vehicles will not add additional capital costs other than purchasing and installing the microtransit software. It is estimated that the annual cost for the SaaS software would be between $40,000 and $50,000 with an initial cost of installation of $6,000 as shown in Table 6.4. The SaaS microtransit costs include the software for up to two vehicles and dispatch support.

Table 6.4: Total Capital Cost Microtransit per Year with Two Vehicles

	SaaS Software	Software Installation	Total (Estimate)
Microtransit SaaS	$40,000-50,000	$6,000*	$46,000-$56,000

*Based on FY2023 cost estimated and 2-year SaaS agreement, *Software installation is a one-time cost*

Total costs for Phase 1 Gateway Zone operations will be based on the number of hours the service operates. Currently Route 5 operates peak periods only for a total of about 4.5 revenue hours per day. In Phase 1, the microtransit zone will replace Route 5. If the Gateway Zone service operates for 4.5 hours (the same as Route 5) then the total cost of the service will be the same as Route 5 or cost neutral for operations plus $40,000 - $50,000 capital costs for the software per year. A breakdown of potential scenarios and costs are shown below in Table 6.5.

Table 6.5 Gateway Zone Service Characteristics and Annual O&M Costs

Scenarios	Daily Revenue Hours	# of Vehicles	Days of Week	Current Route 5 O&M Costs *	Additional O&M Costs over Current Route 5	SaaS Software Cost	Total Additional Costs
Route 5 (Current)	4.5 hrs	1	M - F	$91,440	N/A	N/A	N/A
Gateway Zone Microtransit (4.5 hours of service)	4.5 hrs	1	M - F	N/A	$0	$40,000 - $50,000	$40,000 - $50,000
Gateway Zone Microtransit (12 hours of service)	12 hrs	1	M - F	N/A	$152,400	$40,000 - $50,000	$192,400 - $202,400

**Costs are based on the current BTS rate of $80 per revenue hour and 254 weekdays per year*

Recommendations for Phase 1

The primary objective is to provide a microtransit pilot project option that focuses on the needs of the community as well as optimizing service resources. Information and comments gathered from the public outreach in May and July 2023, staff input, and technical analysis helped establish the recommendations.

It is recommended to implement a 1-year pilot project for the Gateway Zone for 12 service hours. Due to the makeup of the employment and activity centers, the Gateway area is the best fit for a microtransit zone in the service area. It is recommended to implement the SaaS model. This is the most cost-effective approach and would allow Beloit Transit to use its own vehicles and drivers. In addition, it is important for the agency to utilize the microtransit software to optimize the service through improved app-based trip scheduling and monitoring, pooling of trips, data tracking and analysis, and capacity tracking. If Beloit Transit prefers a cost neutral operations approach, the microtransit service would operate 4.5 hours per day similar to the Route 5. This would reduce the costs associated with operating more revenue hours and reduce the microtransit software capital costs for operating additional service.

Beloit Transit will need to continue to provide equitable service that meets the requirements of the Title VI Civil Rights Act of 1964 (Title VI). Title VI ensures that no person shall be excluded from participation in, denied benefits of or be subjected to discrimination on the basis of race, color, or national origin under any program receiving federal financial assistance. The introduction of the Gateway Zone would not have disparate impacts or disproportionate burden on Title VI populations. The plan continues to provide fixed route service along the Cranston Road and Shopiere Road corridors with Route 3. Additional Title VI analysis will be needed with the introduction of other microtransit zones.

For ADA/paratransit service, it is recommended to serve the microtransit zones with wheelchair accessible vehicles. There may also be opportunities to commingle microtransit and paratransit trips in the zone.

Although some agencies have implemented a premium fare for microtransit service, it is recommended to introduce the service with same fare as the local bus fare at $1.50. This will allow for the service to be fully incorporated into the route system and make it simpler for riders to understand and use. In addition, the microtransit service (if marketed well) has the opportunity to generate more ridership and potentially fare revenue than the existing Route 5.

To make the microtransit service successful, it will be important for Beloit Transit staff to market the new service to residents and visitors. The agency should also partner with local employers to market the service to employees. The City and Chamber of Commerce should market the service on social media, and Beloit Transit should use bus ads on the current fleet.

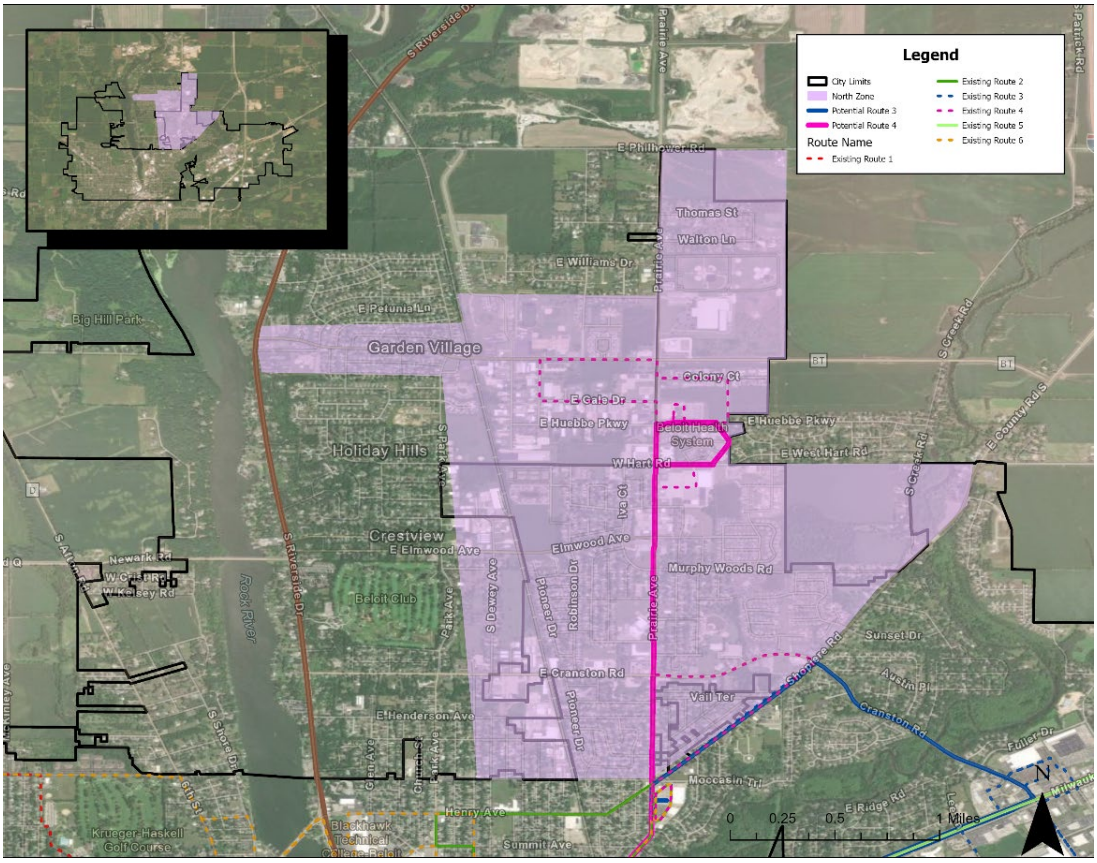
Total Year 1 Estimated Cost: $192,400 - $202,400

Phase 2: North Beloit Zone

If the Gateway Zone is successful and Beloit Transit decides to expand the microtransit service, a second zone in North Beloit could be implemented. The zone concept that was considered as part of this study follows the city limits of Beloit from Bayliss Avenue to the south, the east city boundaries, Philhower Road to the north, and portions of Garden Village to Riverside Drive to the west. The extension to the west would provide a northern connection between Beloit Transit and the Beloit–Janesville Transit route. Currently the two services only connect in Downtown Beloit.

The zone, as shown in Figure 6.4, is designed to provide additional coverage to the hospital and the medical offices in the area. In addition, it would provide new service to portions of northern Beloit including the neighborhoods to the east and west of Prairie Road. Connections to the Gateway Zone and fixed route service could be made at the Piggly Wiggly.

Figure 6.4: North Beloit Zone



Existing Transit Service

The North Zone area is currently served by Route 4. **Route 4** operates from 6:30 AM to 5:30 PM on weekdays and provides service between the Piggly Wiggly and the Beloit Hospital. It also includes a one-way loop north of the hospital to Inman Parkway. The annual ridership on the route is 13,800, which ranks 4 of the 6 routes.

Why Microtransit?

North Beloit is a residential area along Prairie Avenue that includes retail, commercial, medical offices, and the Beloit Hospital. The zone would also provide a direct connection between Beloit Transit and the Beloit–Janesville Express in the northern part of the city. This would eliminate out of direction travel for some residents having to make the connection in Downtown Beloit. Microtransit is better suited for low density areas, and the flexibility of the service allows for more direct trips to the employers and activity centers in the zone. Microtransit is designed to support and feed into the fixed route service and would provide direct connections to Routes 2, 3, 4, and the Gateway Zone at the Piggly Wiggly.

Key reasons to implement microtransit:

- Out of direction travel for the existing fixed route with the loops in the north
- Low density land use
- Connections to the hospital and the Piggly Wiggly
- Connections to the Beloit–Janesville Express

Fixed Route Service Adjustments

The microtransit zone would take over portions of Route 4. As shown in Figure 6.5, Route 4 would operate on Prairie Avenue to Beloit Hospital to the north. The route would no longer operate the northern loop and would instead continue south to the Piggly Wiggly and downtown to the Beloit Transfer Center. The current route only operates between the Piggly Wiggly and the northern loop by the hospital. The new microtransit zone would provide coverage to the areas north of the hospital and would allow additional time to continue south the downtown. The specific routing between the Piggly Wiggly and the Beloit Transfer Center was not defined as part of this study but can be planned through upcoming studies including the TDP.

Microtransit Zone Characteristics

The North Zone as shown in Table 6.6, is 2.6 square miles and would reach a population of 2,800 people and over 2,500 jobs. Table 6.6 displays an overview of the operating costs for the North Beloit Zone.

The service would operate Monday through Friday from 6:00 AM to 6:00 PM. The average wait time for each trip is estimated to be about 20 minutes, although some trips may have longer wait times and others shorter. Based on the assessment using the Remix tool, the service would need one vehicle for implementation, and the average trip distance would be 3 miles.

- Service will operate weekdays only
- Span of service from 6:00 AM to 6:00 PM
- Industry standard wait time average of 20 minutes
- Aim for 50% pooled/shared trips
- Contract with a vendor for SaaS service
- One vehicle for initial pilot

O&M and Capital Costs

The service would operate one vehicle for 12 hours, which is a similar span of service to the existing fixed routes. The zone would not replace any fixed route service. The Phase 2 North Zone should be considered for implementation if the Gateway Zone pilot is successful and if Beloit Transit has the additional resources to implement a new zone. As shown in Table 6.6, total costs to implement a new zone is estimated in range of $258,000 - $268,000 per year. If Beloit Transit uses only two vehicles between the Gateway and North Zones, there will be even further savings for the SaaS software. For the North Zone, there is no existing fixed route service that will be replaced so there will be no cost savings by utilizing an existing route's revenue hours and costs.

Table 6.6: Total Annual Operating Cost by Revenue Hour for the North Beloit Zone

Scenarios	Daily Revenue Hours	Number of Vehicles	Days of Operation (weekly)	O&M Costs*	SaaS Software Costs	Total Costs
#1 – North Zone	12	1	M-F (5 days)	$243,000	$15,000-$25,000	$258,000-$268,000

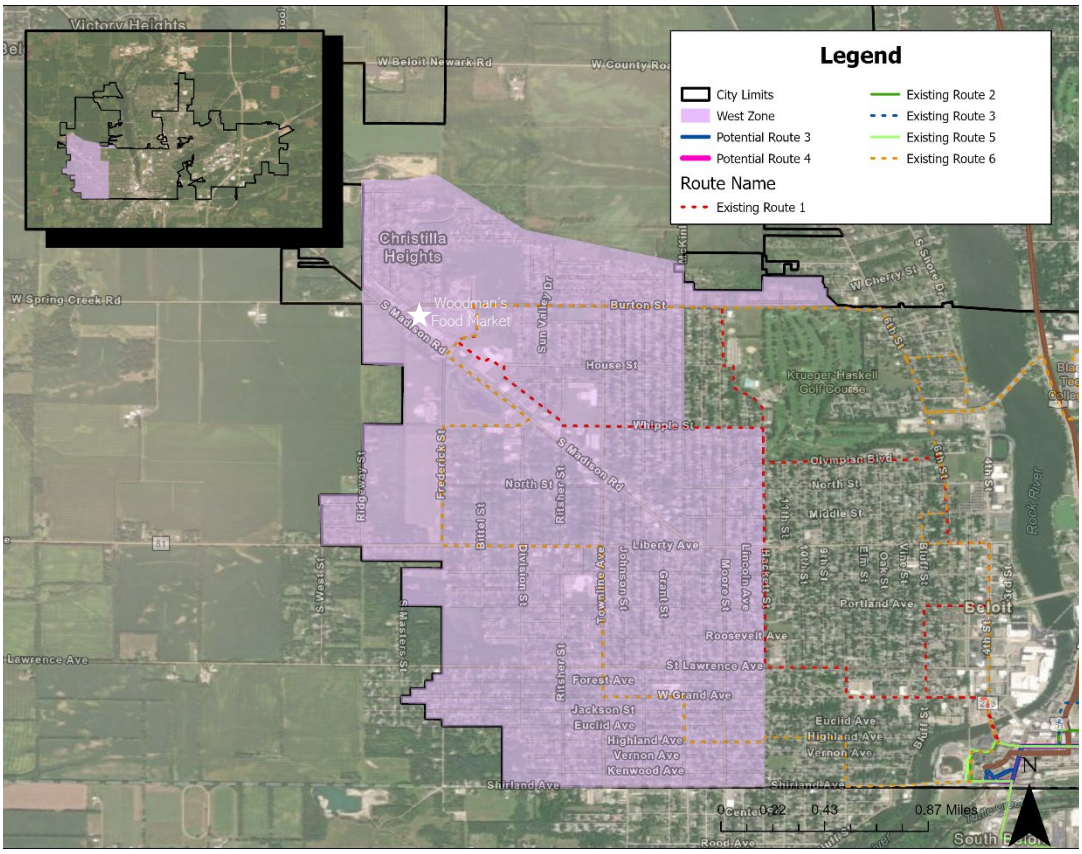
**Costs are based on the current BTS rate of $80 per revenue hour and 254 weekdays per year*

Future Consideration

Other microtransit zones should be evaluated if the pilot program is a success. Although there are not additional recommended zones as part of this plan, further analysis of potential microtransit needs should be a key component of a future TDP, which assesses the entire transit network including routing, frequency of service and service hours. As shown in Figure 6.5, there may be options for microtransit in other parts of the city including the west side. This is currently the highest ridership area, and in most cases, fixed route service may be the best fit for the primary corridors such as 4th Street, 6th Street, Hackett Street, and Burton Street. The TDP effort will provide a detailed analysis of mobility needs, potential solutions, and how microtransit may support the fixed route system.

Through this microtransit study, the project team and Beloit Transit staff developed a microtransit concept on the west side that can be further evaluated through future planning efforts. The zone would provide microtransit coverage west of Hackett Street with fixed route service along the 4th/6th Street corridors. In this concept, both the fixed route and microtransit would provide connections to the Beloit Transfer Center and Woodman's Grocery Transfer Point.

Figure 6.5: Concept for West Beloit Zone



Alignment of the Microtransit Study with the Zero Emission Bus (ZEB) Transition Plan

The ZEB Transition Plan assessed the existing routing, fleet, facilities, garage and local utilities to provide an implementation plan for future transition to electric vehicles. The study concluded that Beloit Transit is well positioned to incorporate battery electric buses (BEB) into the fleet. Beloit Transit currently has one electric bus through SLAT STP-U[11] and has another on order.

This Microtransit Study does not recommend adding new vehicles to the fleet in Phase 1, as there are currently opportunities to utilize a spare van and potentially partner with SMTD for use of another cutaway vehicle. If additional microtransit zones are added there may be a need for more cutaway vehicles. Although the electric vehicle technology has been mostly part of full size bus plans, there are more BEB cutaway vehicles available in the market now. Beloit Transit could implement a cutaway BEB program as part of the full microtransit implementation. As part of the plan, the agency would need to follow the recommended plan of determining power needs, updating facilities and coordinating with the utility company to initiate the process of transition to BEBs.

Performance Measures

Key performance indicators (KPIs) should be developed to monitor standards for efficiency and service quality at a minimum and should be included in a contract with a microtransit vendor. These standards will be used to guide future service evaluation; set standards for future service

[11] The Surface Transportation Program – Urban (STP-U) enhances highways eligible for federal aid within urban settings.

changes; and to ensure compliance with ADA, Title VI, and other local, state, and federal requirements.

Examples of service standards used to monitor efficiency, effectiveness, and productivity include:

- **Passengers per Revenue Hour**: The total number of passengers divided by the total number of revenue service hours provides a data point for monitoring ridership as it relates to total vehicle hours operated. This key productivity measurement works as an effective tool for future service planning. Improving ridership is often the goal of planning bus service; however, it is just as important to plan for additional ridership with a "right-sized" service area. Three passengers per revenue hour or more is considered a best practice for microtransit.
- **Operating Cost per Trip:** The total operating costs are divided by total trips to calculate the cost for each trip on the service. This is designed to track the cost effectiveness for the system as it relates to ridership over time.
- **Percent of Pooled Trips:** This includes the percentage of total trips that have two or more passengers per trip. This is a key efficiency indicator showing that service is being optimized through shared rides, and potentially contributing to environmental sustainability.

Service quality standards help staff evaluate system performance pertaining to reliable and high quality service, which encourages ridership. The recommended service quality performance standards include the following:

- **Percent of Trips within the Average Wait Time**: Prior to implementation of service, Beloit will need to define the average wait time for passengers of the service. This planning effort has assumed an average wait time goal of 20 minutes. This KPI tracks the percentage of trips that fall within the defined wait time.
- **Missed Trips**: The total number of trips missed per day. This measures the overall reliability and quality of the service. A missed trip is defined as a pickup that is later than a defined time period from the planned trip pickup window. For example, some services define missed trips as trips that are later than 15 minutes after the promised pick up time.

In addition to the key indicators described above, For the purposes of the NTD, the Federal Transit Administration (FTA) requires that all agencies operating transit service, including microtransit, report performance data on a monthly basis. According to the FTA Report Manual [12], service providers should report the following operating data:

- Passenger boardings
- Vehicle revenue miles
- Vehicle revenue hours
- Vehicles operated in revenue service

[12] 2022 NTD Reporting Policy Manual, *Federal Transit Administration*: https://www.transit.dot.gov/ntd/2022-ntd-reporting-policy-manual

6.3 Applying Lessons Learned

Microtransit projects nationally provide several lessons learned that the city may consider when implementing its service:

- Plan for the increased ridership demand potentially resulting from an on-demand service that is more convenient and efficient.
- Establish level of service metrics, which may be different from those used for fixed-route or other demand-responsive services.
- Design a service that is equitable and accessible to diverse rider populations by operating a call center and accepting pre-paid debit cards.
- Include an option for pre-booking trips when designing the service.
- Provide flexible service that includes curb-to-curb service for non-ambulatory passengers and virtual stops for ambulatory riders.
- Identify priorities of service by balancing wait times with the size of the service zone and the number of vehicles.

6.4 Implementation Plan

Through the planning process, the following items should be addressed prior to implementation:

- City Council approval: In order to move ahead with implementation, it is important that the City Council approve the transit recommendations.
- Regional connections: The service should be coordinated with the existing SMTD service to provide easy connections between the two services. This could include scheduled transfers and fare coordination.
- Operating characteristics: Plan operating characteristics for transit including service hours, frequency of service, days of the week, and vehicle type.
- Fares: Develop a fare structure including transfers, day passes, and monthly passes. In most cases, the fares can be the same as the existing Beloit Transit trips ($1.50 regular cash fare).
- Contracting: It is most likely that the service will be operated by Beloit Transit; however, it is important to consider contractors if turnkey is selected.
- Garnering support: The city should coordinate with key stakeholders including major employers, such as Amazon, and transit generators including Walmart and Beloit Hospital.
- Marketing: It is critical to market the service. This includes branding the service on vehicles and also providing public information through signs, social media, the transit service website, and public outreach.
- Monitoring the service after implementation: Once the new service is in place, performance should be monitored.

Table 6.7 is a detailed three-step implementation plan that breaks down the process step by step from administrating to financing microtransit.

Table 6.7: Implementation Steps

Step 1: Planning	Step 2: Contracting and System Start-up	Step 3: Implementation and Monitoring Service
Administration		
✓ Analyze demographics and existing transit performance data ✓ Define and analyze preliminary microtransit zones ✓ Integrate accessibility and equity into service design ✓ Estimate capital and operating costs for SaaS service models ☐ Identify potential funding sources ✓ Develop an implementation plan ☐ Finalize Service Design ☐ Select the Microtransit Scenario ☐	☐ Write and release RFP to procure a SaaS vendor ☐ Develop a branding and marketing campaign that includes elements such as: ▫ A new logo ▫ Vehicle wrap ▫ New rider guide ▫ Website content ▫ Direct mail postcard ▫ Promotion and education video ☐ Develop a detailed operations plan and safety plan that includes vehicle storage, vehicle maintenance, cleaning, and safety procedures. ☐ Train drivers, maintenance staff, and administrative staff on key elements of the service: ☐ Safety procedures ☐ Use of the dispatching software ☐ Use of the rider-facing booking tools ☐ Process for riders who cannot book rides using the smartphone application or website ☐ New fare structure (if applicable) ☐ Launch the Marketing Campaign, including press releases, ribbon cutting event, service promotion (e.g. 1 month fare-free)	☐ Prepare Title VI review to ensure that the level and quality of the services are provided in a non-discriminatory manner ☐ Update and establish regular procedures for maintaining system goals, objectives, and strategies based on first year of service ☐ Develop method for collecting feedback from riders; customer comments should be documented by microtransit vendor contractor for analysis by Beloit Transit ☐ Prepare educational materials that colleges and employers can use to promote the microtransit service to their students and employees ☐ Assess service for potential service improvements, reviewing rider and stakeholder feedback

Step 1: Planning	Step 2: Contracting and System Start-up	Step 3: Implementation and Monitoring Service
Operations		
N/A	☐ Field test locations that may be more difficult to access or present safety concerns such as operating in retail parking lots. ☐ Modify the operations and safety plans as necessary based on the field test. ☐ Test dispatching software prior to training drivers, maintenance, and administrative staff ☐ Test rider-facing smartphone app and website applications prior to training drivers, maintenance, and administrative staff ☐ Install driver tablets on the vehicles ☐ Launch service ☐ Track operational data for performance standards ☐ Report NTD data on an annual basis	☐ Adjust the microtransit service area based on demand including updates to frequency, service hours, and service days ☐ Update service based on development of new transit generators including high density residential, large shopping centers, and new employers ☐ Track operational data for performance standards
Financial		
✓ Conduct a microtransit study to estimate capital and operating costs as well as ridership projections ☐ Research and apply for grant funding	☐ Coordinate funding for service ☐ Fulfill funding reporting requirements	☐ Identify additional sources of funding ☐ Monitor potential grant and funding opportunities ☐ Fulfill funding reporting requirements