Bismark-Mandan Metropolitan Planning Organization

TRANSIT DEVELOPMENT PLAN

April 2019

SRF Consulting Group, Inc.

AECOM

Final Report

Bis-Man Transit Development Plan

Prepared for:
Bis-Man Transit and Bis-Man Metropolitan Planning Organization

Prepared by:

April 2019

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Executive Summary

Overview

The Bismarck-Mandan Transit Development Plan (TDP) is a short- to medium-range strategic plan intended to identify transit needs and proposed improvements for a five-year planning horizon. Preparation of the TDP has included coordinated efforts of Bis-Man Transit, the Bismarck-Mandan Metropolitan Planning Organization (MPO), the Bis-Man Transit Board, and stakeholders throughout the region.

Bis-Man Transit's overall ridership has been declining since the last update was completed in 2012. Over this period, fixed route ridership has declined by approximately 11 percent and paratransit[1] (curb-to-curb service for persons unable to use fixed route service) has declined by approximately eight percent. While ridership has been declining, the cost of providing service has increased as costs for labor, fuel, and vehicles, the three largest components of service cost, have increased.

A unique condition in the Bismarck-Mandan region is distribution of total system use between fixed route service and paratransit service. In similar metropolitan areas, fixed route service is the dominant element based on ridership, revenue miles, revenue hours, and most other factors, typically representing 85 to 90 percent of annual ridership. For the Bismarck-Mandan region, however, paratransit service has traditionally carried more passengers than fixed route service. Thus, identifying true peers for comparison (such as operating efficiency, service costs, and amount of service provided per capita) needs to be approached with some caution as the unique nature of the Bismarck-Mandan area system will affect comparison to other metro areas. Understanding the history of how public transit was initiated in the region is critical to having the appropriate sensitivity and perspective regarding the unique conditions in the metro.

The TDP study area is determined by the demand response service area, which encompasses the city limits of Bismarck and Mandan, the jurisdictions committing funds annually for service operations and capital expenditures.

The TDP Report documents examination of:

- Community demographics.
- Current fixed route service characteristics and productivity.
- Current paratransit service characteristics and productivity.

[1] Bis-Man paratransit door-to-door services are available to senior citizens 70 years of age or older and to individuals with any type of certifiable disability.

- Peer Group Analysis.
- Transit service goals and objectives.
- Public Outreach Summary.
- Service Alternatives.

Plan Recommendations

The plan includes recommendations organized as:

- Immediate/Near Term Changes: These represent minor changes to the current route paths to address input received from riders, persons attending public meetings, and discussions with drivers. These adjustments to the current system would be "revenue neutral", which reflect changes that do not result in a measurable increase/decrease in the current operating budget.
- One to Six Years Out: Recommendations for the system through the bulk of the six-year planning period have been organized into two alternate paths that are based on funding conditions. The alternate paths address conditions likely to exist if the current revenue and expenditures programs are followed or if additional revenue for transit operations is identified.

Immediate/Near Term

Minor changes to the current six routes of the fixed route network were developed based on input received at public meetings, a community survey and discussions with drivers. This concept focuses on incorporating changes into the current operating plan without making significant revisions to the route timetable, driver schedules and only minor changes to any route. Table ES-1 summarizes the immediate/near term route changes proposed; and many have already been implemented.

Table ES-1. Immediate/Near Term Service Recommendations

Route Name	Description
Brown Route	Travel through the ND 1806-19th Street SE-8th Avenue SE loop in only the eastbound direction
	46th Avenue SE-McKenzie Drive-40th Avenue SE-21st Street SE loop - Eliminate the 21st Street SE segment and stay on 40th Avenue SE from 21st Street to Memorial Highway
Blue Route	Kirkwood Mall Area – Northbound. Eliminating recirculation through the mall parking area in the northbound direction on 3rd Street. Create a new stop on 3rd Street north of Bismarck Expressway with paved access to the mall.
Black Route	Capitol Avenue to Divide Avenue – Relocate the route from States Street (a no stop area) to 11th Street.

One to Six Year Period

Over the last three years capital reserves have been used, in part, to support daily service operations. Capital reserve funds have been used to offset revenue from key federal and state sources that has not kept up with the cost of providing service. Bis-Man Transit has adjusted the level of service (both fixed route and paratransit) provided to better match funding levels, however, changes made have a negative impact on users and their level of use. Continuing to use reserve funds to balance out operating shortfalls, whether they are short or longer term) is not sustainable and is not recommended.

Two potential paths for service recommendations were provided, with selection of a direction being based on whether the current operating funding gap can be closed through revenue enhancement. The preferred path is to request and secure additional local funding for transit operations. If added funding cannot be found, by the end of 2020 the cash-on-hand in the capital reserve fund will be depleted, which will most likely result in the need to reduce service. Recommendations for the next six years are influenced by whether the operating funding gap can be eliminated. Eliminating the gap and creating a cushion will allow service to be expanded to better meet needs. Maintaining the current course will likely result in making service cuts.

Table ES-2 documents recommended actions reflective of which of the funding paths are taken; the current path that results in service reductions or an enhanced funding path that allows more service to be provided.

Table ES-2. One to Six Year Period Recommendations

Option	Description
Stay on Current Funding/Operating Cost Path (Service Reductions) – Not Preferred	
Fixed Route Service	Convert Purple and Brown Routes to 120-Minute Frequency
Paratransit Service	Eliminate >70 Years Age Qualifier for Paratransit
	Reduce Paratransit Hours – Eliminate Weekday Service After 7 PM
Increase Operating Funding (Service Expansion) - Preferred	
Mandan Service	Establish Mandan Flex Route. One vehicle/driver.
Bismarck Service	Black Route – Provide 30-minute frequency (all day or only in peak – depends on funding). One vehicle/driver
	Blue Route – Provide 30-minute frequency (all day or only in peak – depends on funding). One vehicle/driver.
	Red Route – One of two options: • Improve frequency to 60-minute. One vehicle/driver. • Create NW Bismarck Flex Route and 60-minute on east portion of Red Route. One vehicle/driver.
Facilities	
	Continue to evaluate transit hub at Front Avenue

Community Demographics

The most recent population estimate for the Bismarck-Mandan metropolitan area is 126,400 persons (2012-2016 American Community Survey), with the components being:

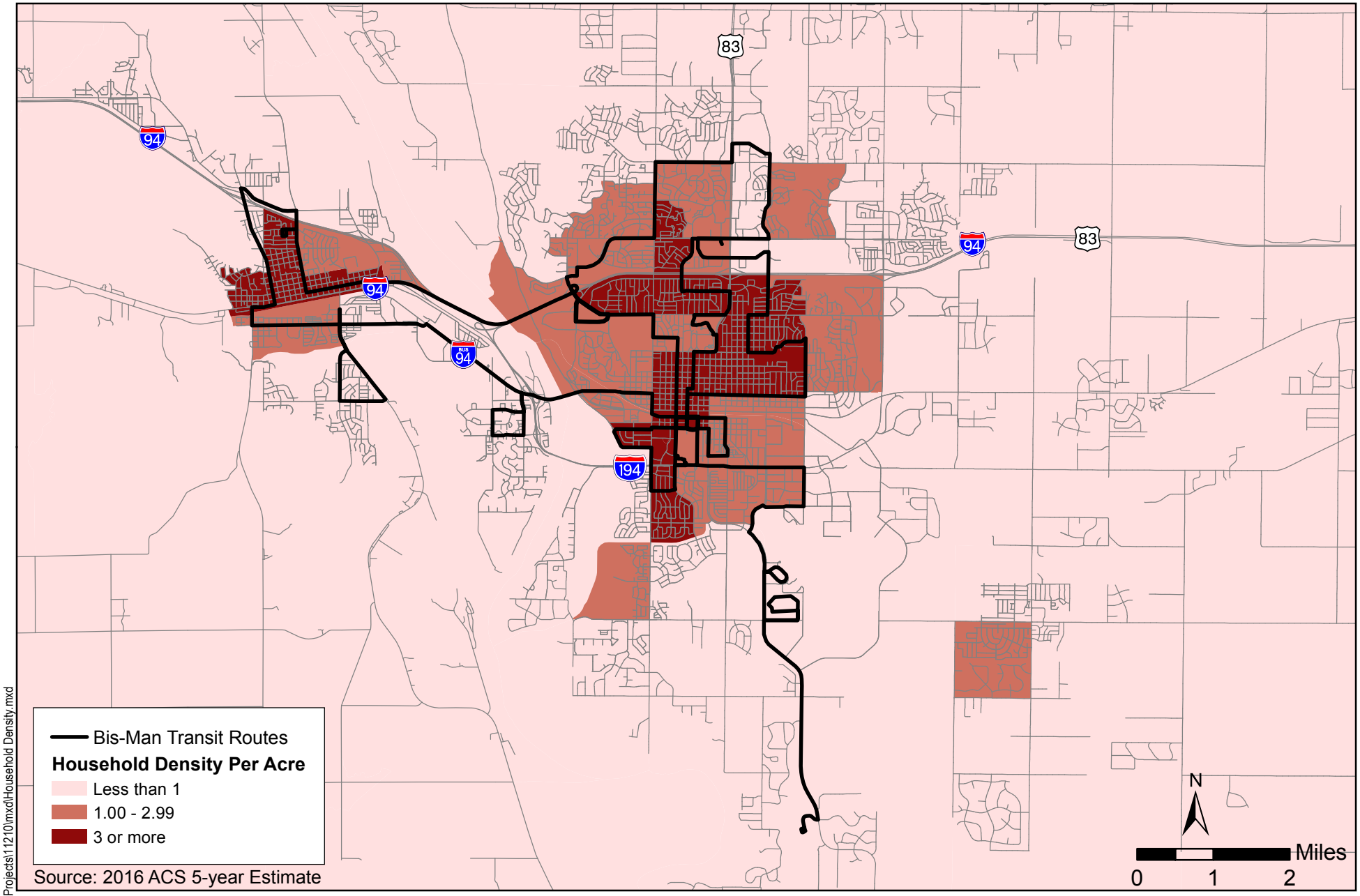
- Bismarck: 69,000
- Mandan: 20,600
- Lincoln: 3,700
- Remainder of Burleigh and Morton Counties: 33,100

Household Density and Transit Supportive Areas

Figure 1 shows the residential population density of Bismarck-Mandan Metro area and its neighboring communities. Dense pockets of households are located along the major highways (I-94 and I-94 Business and I-194). Figure 2 shows the transit supportive areas (TSAs) in the region. TSAs have at least three households or four jobs per acre. The TSAs within 0.25 mile of the transit route are shown in green while the TSAs outside 0.25 mile are shown in orange.

The current transit routes for Bis-Man Transit serve most of the TSAs in the metro. TSAs are the areas developed to a density that reasonably supports fixed route transit service. Current service coverage provides 78 percent of the total TSA acreage with convenient access (0.25 miles or less) to transit. Areas reflecting densities supportive of transit service, but outside the 0.25 mile acceptable walk buffer include:

- Around the Cottonwood Lake in Bismarck
- Northeast Mandan
- West Mandan
- Lincoln
- East Bismarck (around the Bismarck Expressway interchange on I-94)



L:\Projects\11210\mxd\Household Density.mxd

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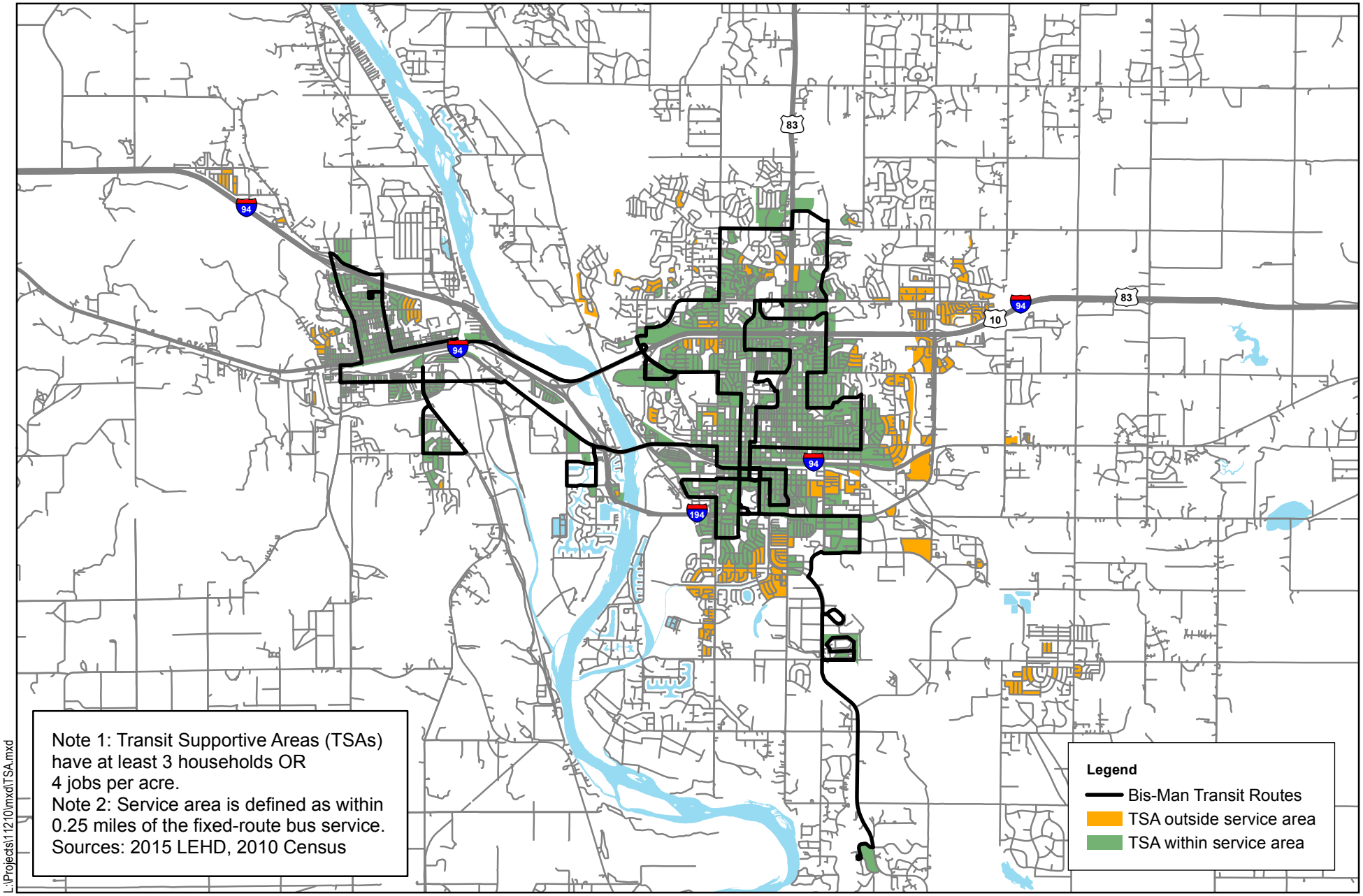
Household Density

Bis-Man Transit
Transit Development Plan

Note: Bis-Man Transit Fixed Routes are shown as of June 2018

Figure 1



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Transit Supportive Areas

Bis-Man Transit
Transit Development Plan

Note: Bis-Man Transit Fixed Routes are shown as of June 2018

Figure 2

Transit Dependent Population

Key indicators for transit dependency can be analyzed together for a comprehensive analysis of transit needs being served in the area. Although there is no defined formula to determine transit dependent areas, the U.S. Department of Transportation (USDOT) and Federal Transit Administration (FTA) state that car-less and lower income households are reasonable surrogates for transit dependent riders. Focusing on the rider attributes likely to lead to transit dependency, characteristics analyzed in this report are the following:

- Population size, distribution, and density
- Age of Population
- Automobile ownership
- Household income
- Population with limited English proficiency
- Disability

Elderly Population

The elderly population holds a major share of the transit market because of their decreased ability to drive a vehicle due to physical or financial constraints. Thus, they are more likely to ride fixed route or paratransit transit services.

People who are 65 years and older are commonly considered elderly. The 2016 American Community Survey (ACS) 5-year estimates show that the Bismarck-Mandan metropolitan area had 16 percent elderly population as compared to the statewide elderly population share of 14 percent. Figure 3 shows the elderly population distribution in the Bismarck-Mandan area.

The areas with 30 to 46 percent senior population are in the central part of the metro area currently being served by transit. Some areas with 20 to 29.9 percent senior population are in the northwest and south portions of Mandan, which are not in Bis-Man Transit's fixed route service area[2]. Most areas with higher elderly population are served by paratransit service, which extends not less than three-quarters of a mile from fixed routes. It is important to understand that the geography used for the analysis is block groups[3] and a large block group area may only include pockets of population.

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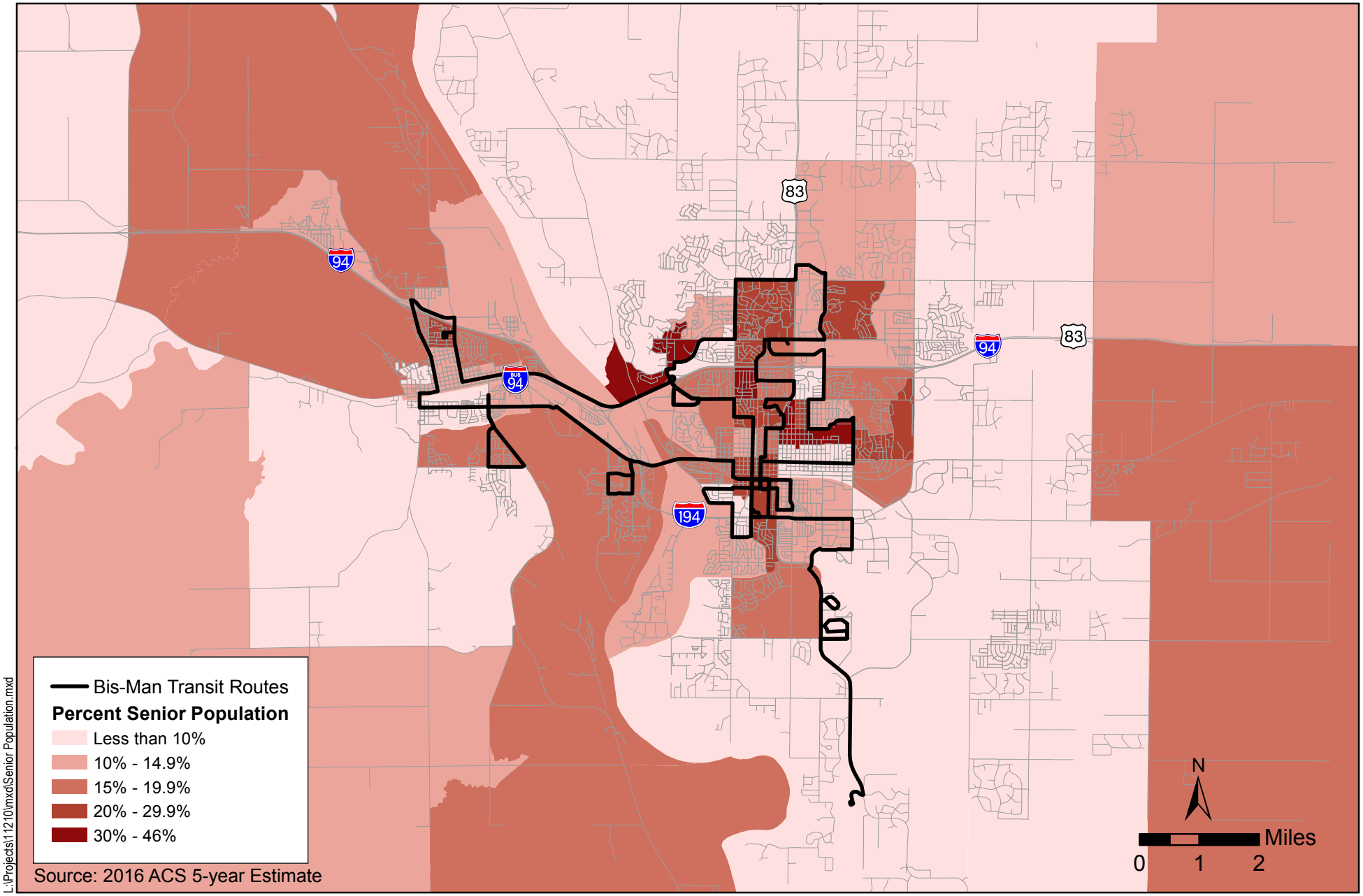
[2] Fixed route service area is defined as area within 0.25 mile of fixed route transit service.

[3] Year 2016 American Community Survey Block group level data was used for analysis instead of 2010 lower geography (block level) data. Since many new developments have occurred in the metro region since 2010, 2016 data was preferred.



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Senior (65 Years and Over) Population Distribution

Bis-Man Transit
Transit Development Plan

Note: Bis-Man Transit Fixed Routes are shown as of June 2018

Figure 3

Youth Population

Like senior population elevated need for mobility support through transit, youth population cohorts also have mobility needs that can be supported through transit service. Youth population cohorts include people under 18 years of age. Youth population do not likely have access to a vehicle they can drive due to legal age for possessing a driver's license and no/limited number of vehicles in the household. Transit is likely to offer much needed access to shopping, work or school to this population group.

Documented in 2016 ACS 5-year estimate data, youth population cohorts represent approximately 22 percent of total population, which is consistent with the North Dakota average of 23 percent of total population. Figure 4 shows the distribution of youth population in the Bismarck-Mandan metro area.

High concentrations of youth population are along the edges of the metro area and most higher concentration areas have some level of access to fixed-route service. Areas north of 43rd Avenue and west of University Drive (including Lincoln) contain higher (30-41 percent) concentrations of youth population. However, these are not currently served by fixed-route service.

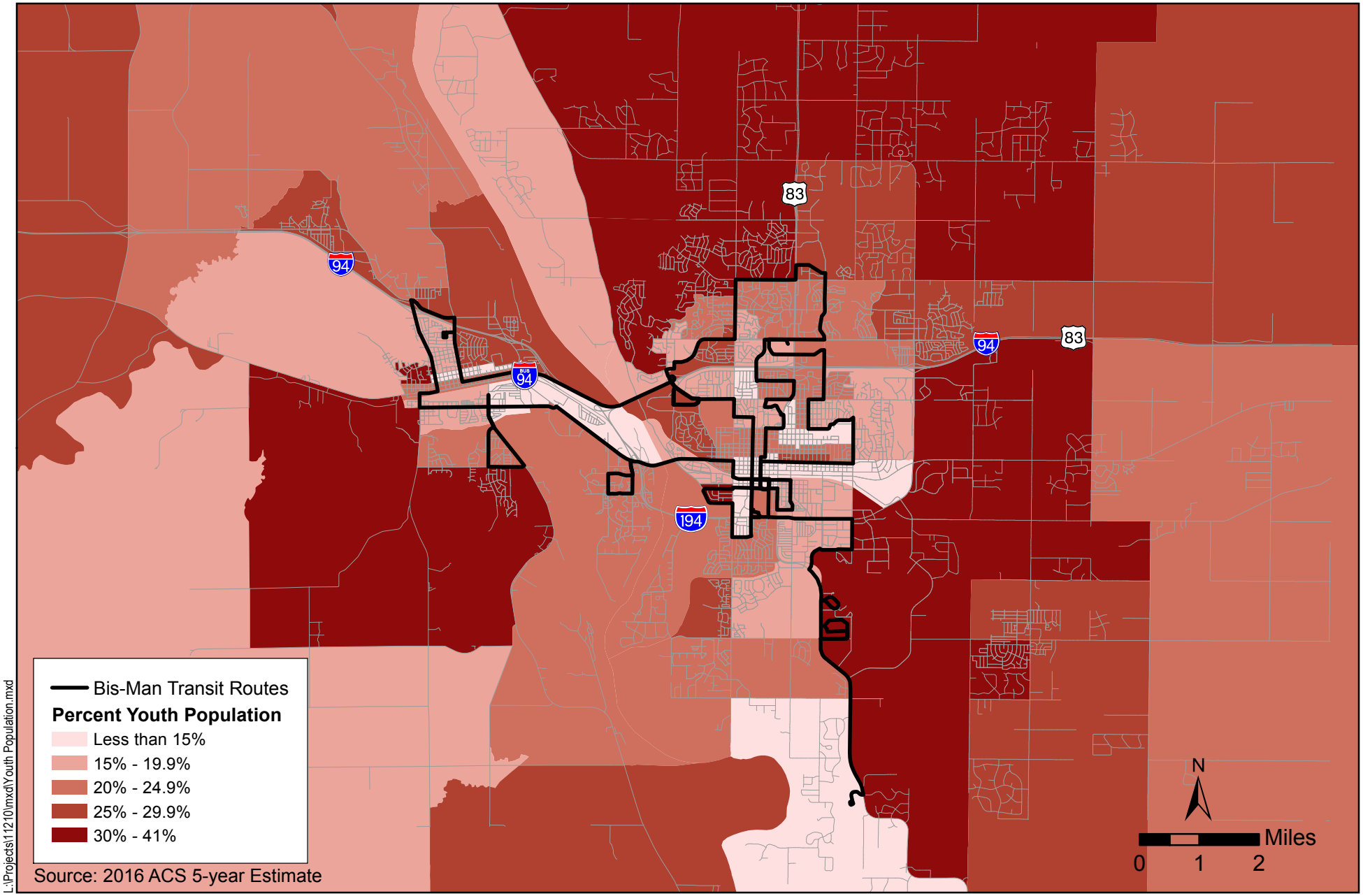
Households Below Poverty Level

Due to the relatively high cost of owning and maintaining a personal vehicle, many people with a low income are likely to use transit when it is available. According to the 2016 ACS 5-year estimates, the median household income for the Bismarck-Mandan metro area was $59,992, which was higher than the statewide median household income of $59,114. Figure 5 shows the distribution of households below poverty level[4] in the Bismarck-Mandan metro area. All areas with higher percentages (15 to 25 percent) of households below poverty level are currently within the service area for transit.

Zero Car Households

Figure 6 shows the distribution of zero vehicle households. Most of the higher zero-vehicle household density areas are along the fixed route network with an exception of Lincoln.

[4] The Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is in poverty. If a family's total income is less than the family's threshold, then that family and every individual in it is considered in poverty.



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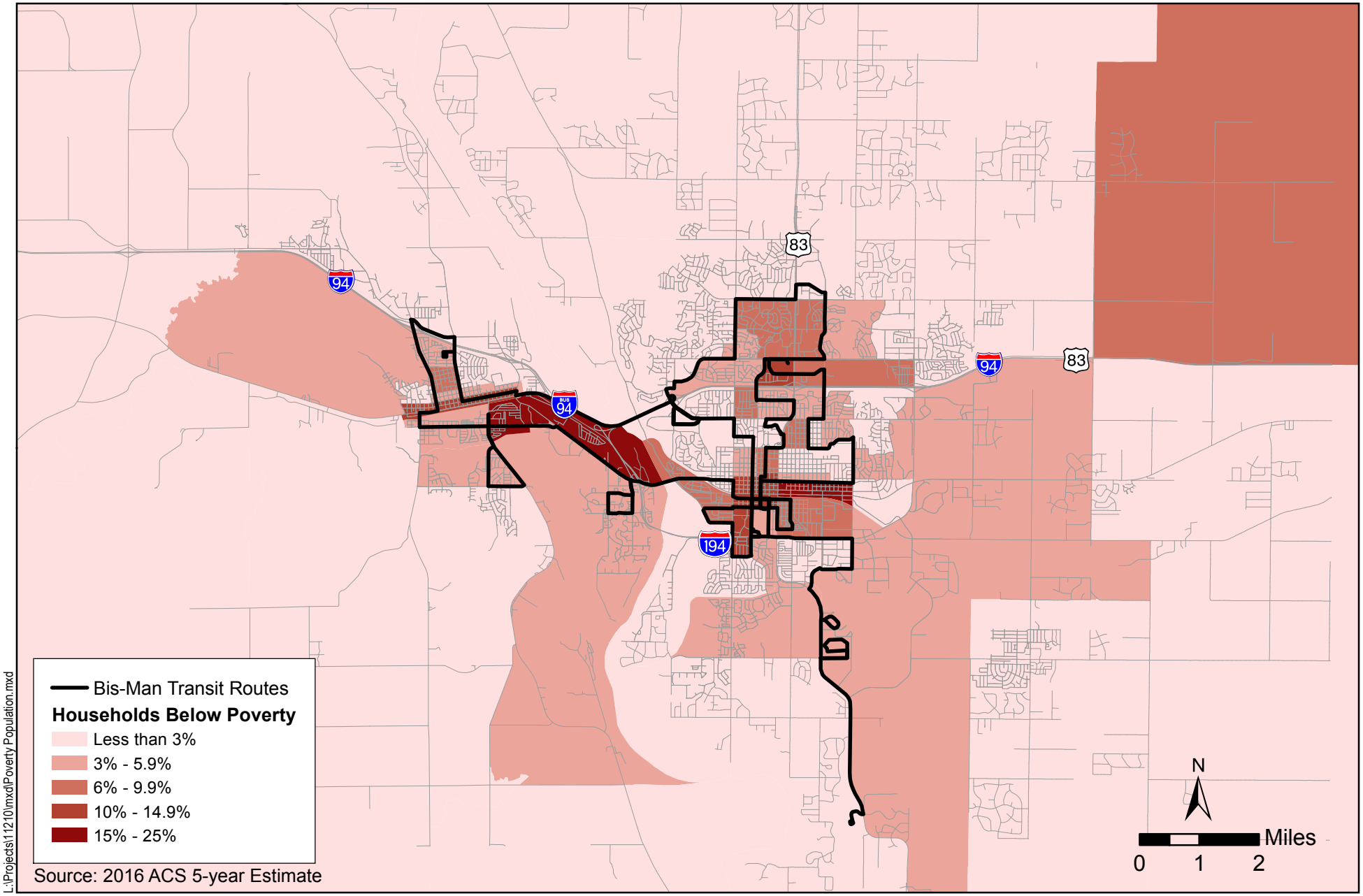
Youth (18 Years and Under) Population Distribution

Bis-Man Transit
Transit Development Plan

Note: Bis-Man Transit Fixed Routes are shown as of June 2018

Figure 4



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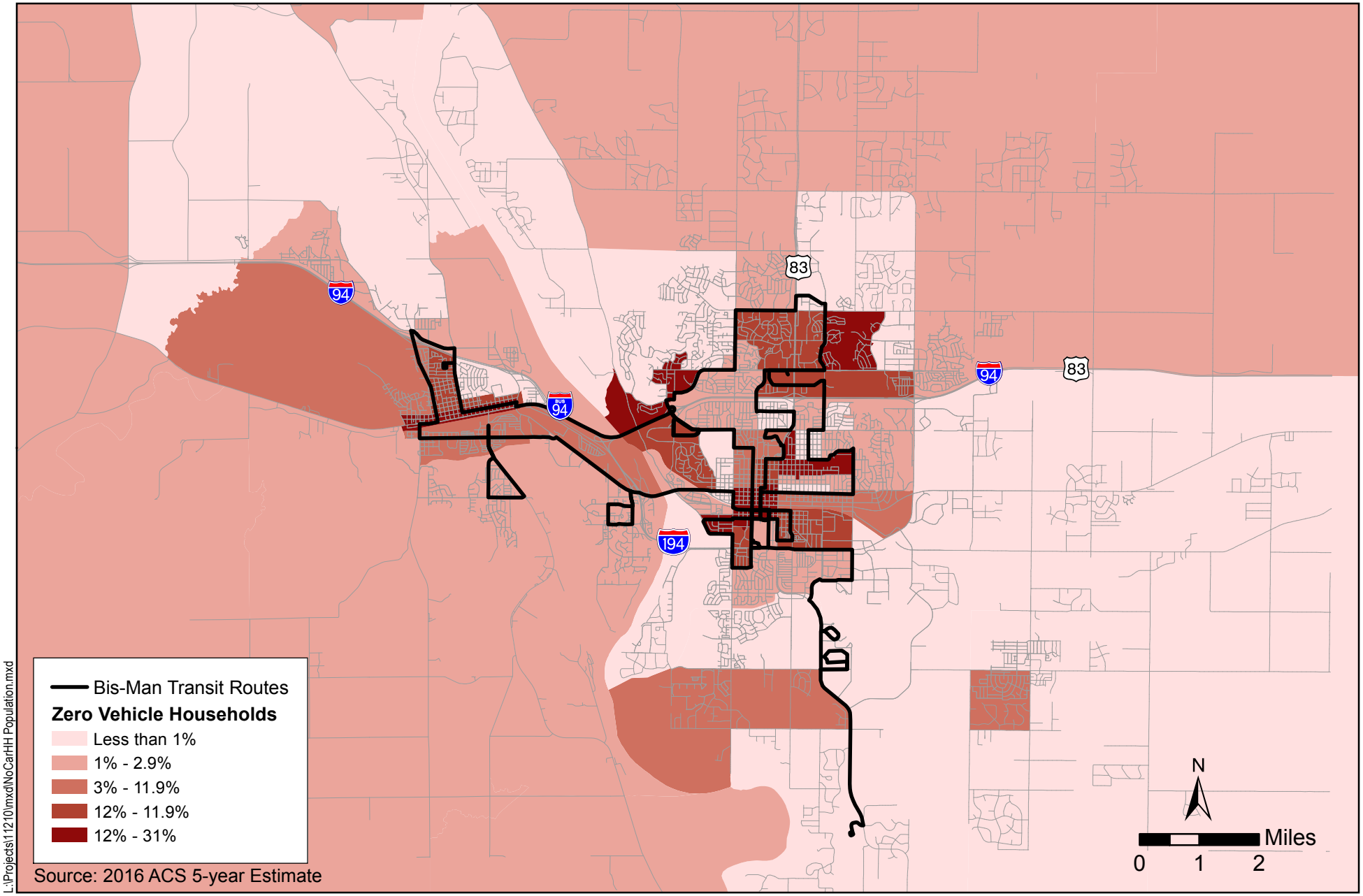
Below Poverty Level Households Distribution

Bis-Man Transit
Transit Development Plan

Note: Bis-Man Transit Fixed Routes are shown as of June 2018

Figure 5



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Zero Vehicle Households Distribution

Bis-Man Transit
Transit Development Plan

Note: Bis-Man Transit Fixed Routes are shown as of June 2018

Figure 6

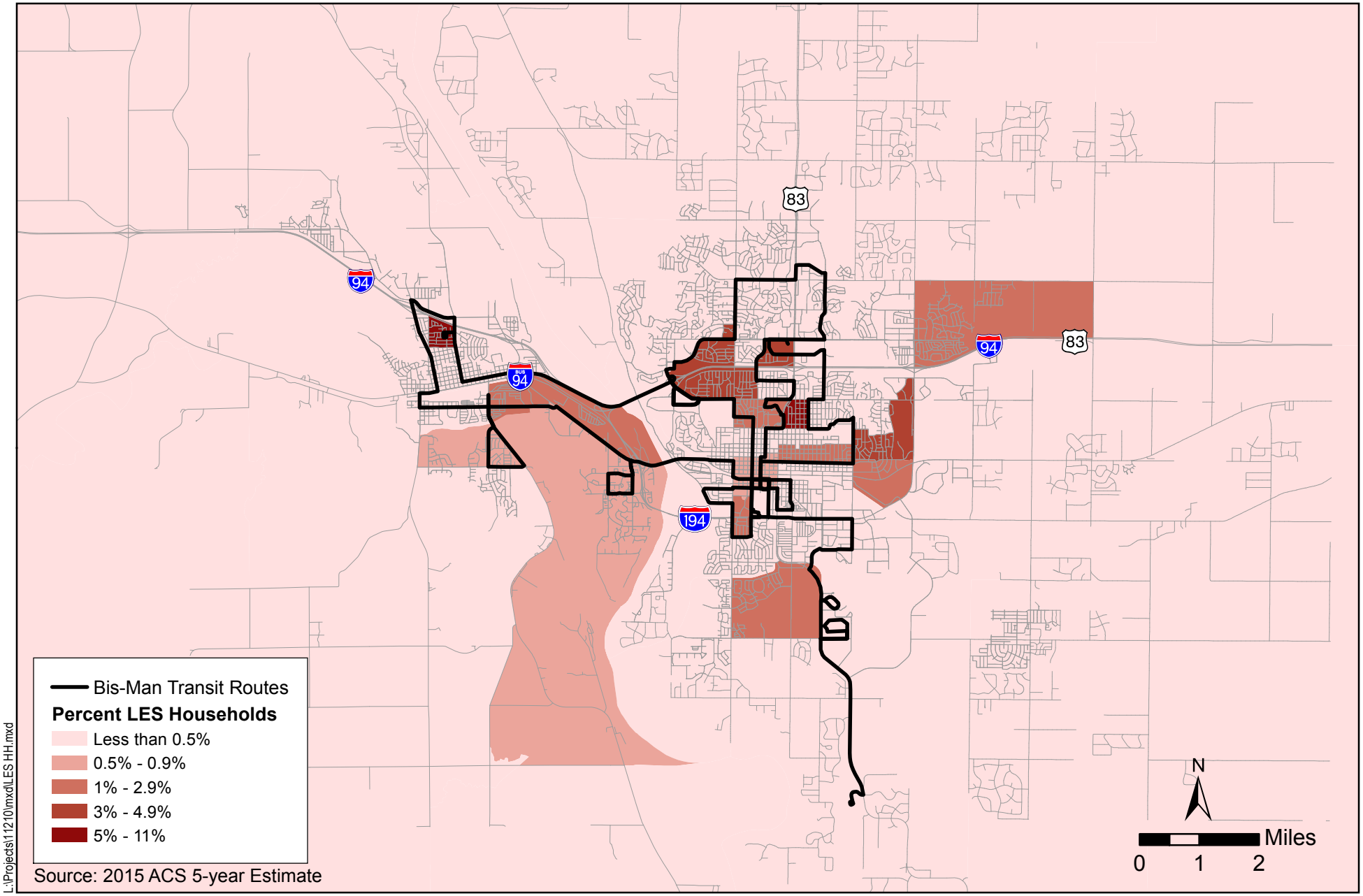
Population with Limited English Proficiency

Individuals with limited ability to read, write, speak, or understand English are considered limited English proficient (LEP). This language barrier may prevent individuals from accessing public services and income opportunities. Hence, this population group needs easy access to public transportation services to be able to open up more opportunities for employment and to encourage the overall mobility of individuals.

As shown in Figure 7, the higher (3 percent or higher) percent of Limited English Speaking households are located within the coverage area of the fixed route network, except for areas east of Centennial Road.

Disabled Population

Figure 8 shows the distribution of population with disability. Although disabled population may be eligible for using transportation through other human service agencies, public transportation is likely to be the cheapest form of transportation. Areas with 20-28 percent of disabled population are located mostly along the existing transit network.



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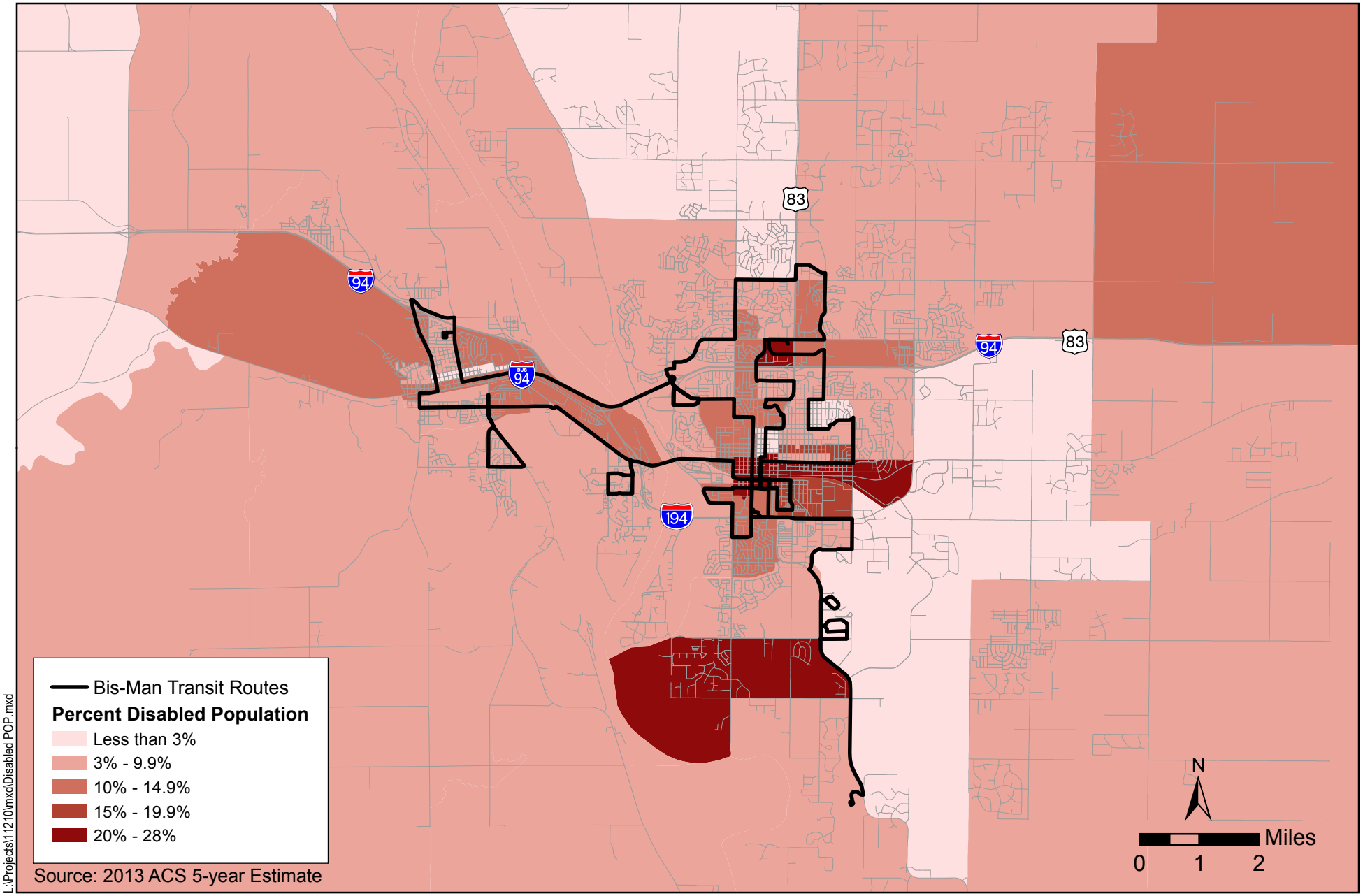
Distribution of Limited English Speaking (LES) Households

Bis-Man Transit
Transit Development Plan

Note: Bis-Man Transit Fixed Routes are shown as of June 2018

Figure 7



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Distribution of Population with Disability

Bis-Man Transit
Transit Development Plan

Note: Bis-Man Transit Fixed Routes are shown as of June 2018

Figure 8

Transit Service Overview

This section provides a summary of the transit services offered by the Bis-Man Transit. It includes organization background and service overview including fleet inventory.

Bis-Man Transit Background

Bis-Man Transit was formed in 1987 as a non-profit organization. Bis-Man Transit started as a door-to-door, 24-hour in advance reservation system, available 24 hours per day, seven days per week. The service was available to qualified riders (either aged 60 years or older or having a certifiable disability).

Bis-Man Transit's fixed route system planning started in the year 2000. The transit proposal was approved by the Bismarck City Commission and the Metropolitan Planning Organization in 2003 and fixed-route service started in Bismarck and Mandan in May of 2004. The fixed route system was branded as Capital Area Transit (CAT) and started with five fixed routes. Currently, Bis-Man Transit runs six fixed routes throughout Bismarck and Mandan area serving transportation needs related to work, school, volunteering, shopping, socializing with family and friends, etc.

Bis-Man Transit Services Overview

The Bis-Man Transit Board oversees two distinct transit services in the Bismarck-Mandan area – a fixed route service for Bismarck and Mandan (CAT), and a paratransit service that serves riders in Bismarck, Mandan, and Lincoln. The FTA requires paratransit[5] to be provided no less than three-quarters of a mile around the fixed route service on the same days and service hours as fixed route service.

Bis-Man Transit Paratransit Service

Paratransit is a required complementary service required to be provided with fixed route operations for people that cannot, due to physical or mental condition, use fixed route service. Unlike fixed route service that has a walk element to the trip, paratransit service is a

[5] Based on U.S. Department of Transportation regulation §37.131, public transit agencies that run fixed route services must also provide the Americans with Disabilities Act (ADA) complementary paratransit services for individuals with disabilities who are unable to use accessible fixed route services. Paratransit services are characterized by vehicle that operate flexible routes or demand response service and provide origin-to-destination service. The ADA regulations require transit providers to conduct an eligibility determination to strictly limit the paratransit service to individuals who ae not able to use accessible fixed route services due to disability.

curb-to-curb service between the rider's origin and destination locations. In general, requirements for paratransit service include:

- Operates the same hours and days as fixed route service.
- Coverage extends ¾ mile from each fixed route path.
- Requires passengers to demonstrate they cannot reasonably navigate fixed route service.

Bis-Man Transit operates a paratransit service throughout Bismarck and Mandan. This service area may have areas that are outside the required distance of not less than ¾ mile (as part of receiving federal funding). Additionally, paratransit service is provided to residents in Lincoln to areas throughout Bismarck and Mandan. Except for service to/from or in Lincoln, travel is not supported outside Bismarck and Mandan as the county does not participate in funding the service.

Listed below are characteristics of paratransit service provided by Bis-Man Transit:

- Service hours of 5:30 a.m. through 12 a.m.
- Service days Sunday through Saturday.
- The service is open year-round except for six major holidays.
- People 70 years and older do not need to demonstrate limited capacity to use fixed route service.
- Riders must schedule a ride at least the day before the ride is needed.

The Bismarck-Mandan-Lincoln service locally referred to as paratransit service exceeds the technical FTA definition of paratransit service by:

- Providing a longer span of service over the day relative to fixed route service.
- Providing service on Sunday, while fixed route service is not provided.
- Allowing seniors over 70 years old to ride, without demonstrating need.

As the level of service exceeds FTA requirement, what is locally characterized as paratransit is technically a combination of paratransit and demand-response service where the demand-response service can only be used by paratransit eligible riders. Table 1 highlights the division of service into the two operating definitions.

Table 1. Characterization of Bis-Man Transit Paratransit Service

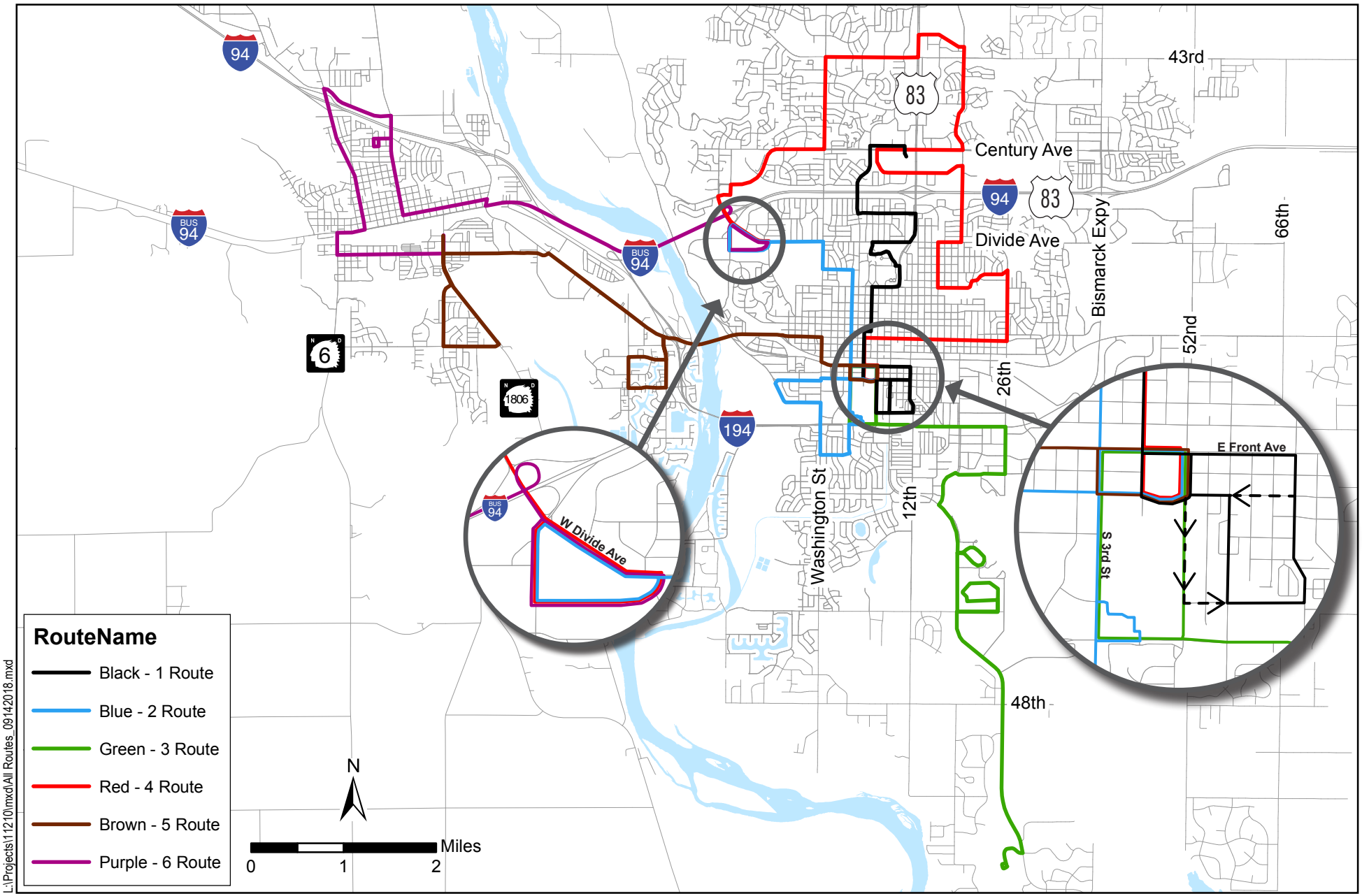
Service Characteristic	Service Definition Division	
	Paratransit	Demand Response*
Daily Hours of Service	6:30 AM to 7:00 PM Weekdays 8:00 AM to 7:00 PM Saturdays	5:30 AM to 6:30 AM Weekdays 7:00 PM to 12:00 AM Weekdays 5:30 AM to 8:00 AM Saturdays 7:00 PM to 12:00 AM Saturdays 7:30 AM to 2:30 PM Sundays
Service Days	Monday through Saturday	Sunday and Holidays (45 Hours for Holidays vary)
Age		70 years old plus

* For paratransit eligible riders only

Capital Area Transit Fixed Route Service

Figure 9 shows the current fixed route network of Bis-Man Transit. An overview of the general routing of the six fixed routes of CAT is provided below:

- **Route 1 (Black):** provides north-south service in Bismarck between the Front Avenue Transit Shelter and Gateway Mall shopping area.
- **Route 2 (Blue):** provides north-south service in Bismarck between the Kirkwood Mall, Front Avenue Transit Shelter and Bismarck State College (BSC).
- **Route 3 (Green):** provides service in southern Bismarck between the Front Avenue Transit Shelter to United Tribes Technical College and University of Mary.
- **Route 4 (Red):** provides service from downtown Bismarck (Front Avenue Transit Shelter) to east Bismarck, Walmart North, and then ending at Bismarck State College.
- **Route 5 (Brown):** provides east-west service between the Front Avenue Transit Shelter in Bismarck and central Mandan.
- **Route 6 (Purple):** provides east-west service between Bismarck and Mandan, while serving BSC and Brave Center Academy/Mandan High School.



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Bis-Man Transit Fixed Routes (2018)

Bis-Man Transit
Transit Development Plan

Note: Bis-Man Transit Fixed Routes are shown as of June 2018

Figure 9

The fixed routes operate six days per week. There is no fixed route Sunday service. The routes generally run between 6:30 am – 7:00 pm on weekdays and 8:00 am to 7:00 pm on Saturdays. Each route operates with one vehicle and provides one-hour frequencies, except Route 4 (Red) which operated with one vehicle at two hour headways. The system operates on a flag-stop system, where the bus can stop along the route to pick up passengers. In addition, there are designated stops at key locations throughout the service area including the Front Avenue Transit Shelter, Gateway Mall, BSC, and Dan's Supermarket in Mandan. A full list of bus shelters is provided in the facilities section.

The passengers are not permitted to board or exit a bus along selected higher speed/higher volume segments of:

- Bismarck Expressway: 12th Street to 26th Street
- University Drive: South of Airport Road
- 9th Street: Bismarck Expressway to Main Avenue
- 7th Street: Main Avenue to Bismarck Expressway
- Divide Avenue/State Street: 7th Street to the North Dakota Heritage Center
- Century Avenue: East of 4th Street to 14th Street
- West Divide Avenue/Tyler Parkway: I-94 to Burnt Boat Drive
- I-94: Tyler Parkway/West Divide Avenue (Bismarck) to Mandan Avenue (Mandan)
- Main Avenue: Fraine Barracks Road to 46th Avenue SE

Route 5 has the most revenue miles on weekdays, while Route 3 has the most on Saturdays – 240 miles and 220, respectively. Revenue hours are longer on weekdays, average between 11.5 and 12. Saturday revenue hours are shorter, averaging between 10 and 11 hours.

Table 2 and Table 3 show weekday and Saturday operating characteristics. In addition, Figure 10 shows the average daily boardings by route.

Table 2. Fixed Route Weekday Operating Characteristics

Route	Span of Service	Frequency Peak (min)	Revenue Miles	Revenue Hours	Passengers Per Mile	Passengers Per Hour
Route 1	7:00am – 7:00pm	60	158	12	0.44	5.75
Route 2	7:00am – 7:00pm	60	160	11.5	0.36	5.04
Route 3	7:00am – 7:00pm	60	240	12	0.17	3.33
Route 4	7:30am – 7:00pm	60	157	11.5	0.42	5.74
Route 5	6:30am – 6:30pm	60	244	12	0.27	5.42
Route 6	7:00am – 7:00pm	60	241	12	0.21	4.17
TOTAL			1,200	71	0.30	5.13

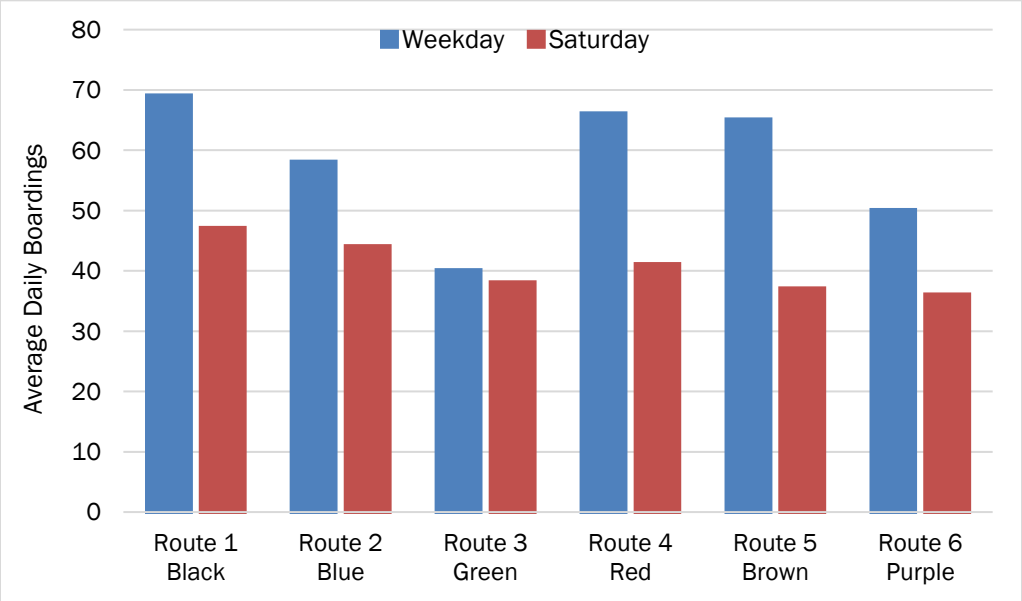
Source: Bis-Man Transit/CAT, 2018

Table 3. Fixed Route Saturday Operating Characteristics

Route	Span of Service	Frequency Peak (min)	Revenue Miles	Revenue Hours	Passengers Per Mile	Passengers Per Hour
Route 1	8:00am – 7:00pm	30	141	11	0.33	4.27
Route 2	8:00am – 7:00pm	60	140	10.5	0.31	4.19
Route 3	8:00am – 7:00pm	60	220	11	0.17	3.45
Route 4	8:30am – 7:00pm	30	94	11	0.44	3.73
Route 5	7:30am – 6:30pm	60	207	10	0.18	3.70
Route 6	8:00am – 7:00pm	30	145	11	0.25	3.27
TOTAL			947	64.5	0.27	3.97

Source: Bis-Man Transit, 2018

Figure 10. Route Level Average Daily Boardings



Source: Bis-Man Transit, 2018

Bis-Man Transit Fleet

CAT has nine buses dedicated to fixed route service. A fleet of 20 vehicles (18 "cutway" vans and two minivans) are dedicated to paratransit service. In general, the fixed route buses are larger and are heavy-duty, while Bis-Man Transit paratransit buses are medium-duty buses or include light-duty vehicles. Table 4 summarizes the characteristics of CAT's fixed route and paratransit fleet.

Bis-Man Transit Facilities

This section lists the facilities maintained by Bis-Man Transit/CAT for both the fixed route and paratransit services. Facilities include administrative offices, bus shelters, and maintenance facilities. The paratransit service does not have shelters, as riders schedule rides for curb-to-curb service. The Bis-Man Transit administrative office is located at 3750 East Rosser Avenue at the Bismarck Transit Center.

The CAT bus shelters are located only in Bismarck and Mandan. Lincoln is served by Bis-Man Transit paratransit services, and does not include CAT fixed route service. As mentioned previously, CAT provides a flag-stop service where riders can board a bus along one of the six fixed routes. Shelters have been added at major pick up points along the routes and are outlined below.

- Bismarck shelters
    - North Walmart
    - Gateway Mall
    - Arrowhead Plaza
    - Bismarck State College
    - West Central Human Service Center
    - McDonalds (Burnt Boat Drive)
    - High-rise Residential Building (S 2nd St @ E Bowen Ave)
    - South Walmart
    - United Tribes Technical College
    - 7th Street (near CHI - St. Alexius Medical Center)
- Mandan shelters
    - Liberty Heights Apartments
    - Mandan Community Center
    - Dan's Supermarket
    - 8th Avenue Southeast (near Ft. Lincoln School)
    - 1st Street Northwest & 6th Avenue Northwest

Table 4. Fleet Inventory

Service Type	Rolling Stock Number	Year	Category	Condition*
Fixed Route	401	2004	Heavy-Duty Small Bus	Adequate
Fixed Route	402	2004	Heavy-Duty Small Bus	Good
Fixed Route	403	2004	Heavy-Duty Small Bus	Decommissioned
Fixed Route	601	2006	Heavy-Duty Small Bus	Good
Fixed Route	602	2006	Heavy-Duty Small Bus	Good
Fixed Route	1001	2010	Heavy-Duty Small Bus	Good
Fixed Route	1002	2010	Heavy-Duty Small Bus	Good
Fixed Route	1003	2010	Heavy-Duty Small Bus	Good
Fixed Route	1501	2015	Heavy-Duty Large Bus	Excellent
Fixed Route	1502	2015	Heavy-Duty Large Bus	Excellent
Fixed Route	1909	2019	Heavy-Duty Large Bus	Excellent
Fixed Route	1910	2019	Heavy-Duty Large Bus	Excellent
Paratransit	53	2012	Medium-Duty Bus	Good
Paratransit	54	2012	Medium-Duty Bus	Good
Paratransit	55	2012	Medium-Duty Bus	Good
Paratransit	1701	2017	Medium-Duty Bus	Excellent
Paratransit	1702	2017	Medium-Duty Bus	Excellent
Paratransit	1703	2017	Medium-Duty Bus	Excellent
Paratransit	1704	2017	Medium-Duty Bus	Excellent
Paratransit	62	2012	Light-Duty Vans, Sedans, or Buses	Excellent
Paratransit	63	2012	Light-Duty Vans, Sedans, or Buses	Excellent
Paratransit	1801	2018	Medium-Duty Bus	Excellent
Paratransit	1802	2018	Medium-Duty Bus	Excellent
Paratransit	1803	2018	Medium-Duty Bus	Excellent
Paratransit	1804	2018	Medium-Duty Bus	Excellent
Paratransit	1901	2018	Medium-Duty Bus	Excellent
Paratransit	1902	2018	Medium-Duty Bus	Excellent
Paratransit	1903	2019	Medium-Duty Bus	Excellent
Paratransit	1904	2019	Medium-Duty Bus	Excellent
Paratransit	1905	2019	Medium-Duty Bus	Excellent
Paratransit	1906	2019	Medium-Duty Bus	Excellent
Paratransit	1907	2019	Medium-Duty Bus	Excellent
Paratransit	1908	2019	Medium-Duty Bus	Excellent

Source: Bis-Man Transit, March 2019

Fixed Route Operations Analysis

This section is intended to provide a clear understanding of how the fixed route system performs today and to lay out a roadmap for the future. The report evaluates current services and defines service standards and performance measures for the fixed-route and demand response.

Route Profiles

Route profiles (included as Appendix 1. Route Profiles) were developed for each fixed route including the route's overview, key destinations, schedule, time stamp locations, and a map of the route layout.

Operating Performance

This section provides a five-year overview of key operating characteristics of the fixed route system, as reported to the National Transit Database (NTD) and agency-reported ridership trends. Table 5 shows the annual operating statistics for CAT's fixed route service. Figure 11 through Figure 18 illustrate the data provided in Table 5.

Most performance measures have been negatively impacted by the general decline in passenger trips since 2012. This is an industry-wide trend impacting agencies across the United States. There may also be some impacts from the recent fare increase for the CAT service. Other key trends and data are summarized below:

- Passenger trips declined from a peak in 2012, although there was slight increase in 2014.
- Operating costs increased since 2012, although there was a decrease in operating costs in 2014 and 2015. A 13 percent increase occurred for 2016.
- Farebox revenue fluctuated from year to year, but 2014 saw the lowest rate between 2012 and 2016.

Key Operating Characteristics

Annual Passenger Trips

As shown in Figure 11, passenger trips have steadily declined since at least 2012. Passenger trips did increase by 2 percent between 2013 and 2014 but have decreased by 9 percent between 2014 and 2016. Overall, a decline of 11 percent has been observed from 2012 to 2016.

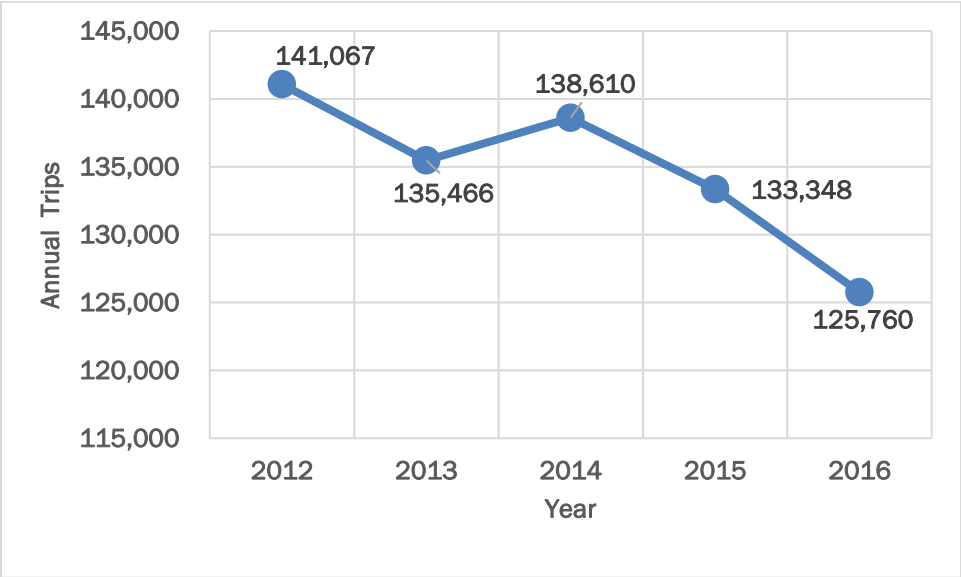
Table 5. Capital Area Transit Fixed Route Service Operating Statistics and Performance Measures

	2012	2013	2014	2015	2016
Passenger Trips	141,067	135,466	138,610	133,348	125,760
Operating Costs	$1,389,282	$1,441,080	$1,307,383	$1,210,912	$1,369,781
Farebox Revenue	$80,849	$80,305	63,352	$70,346	$75,321
Revenue Miles	302,977	300,704	304,200	305,378	306,579
Revenue Hour	19,787	19,944	19,878	19,554	19,605
Passengers per Revenue Hour	7.1	6.8	7	6.8	6.4
Passengers per Revenue Mile	0.5	0.5	0.5	0.4	0.4
Operating Costs per Passenger	$9.85	$10.64	$9.43	$9.08	$10.89
Operating Costs per Revenue Hour	$70.21	$72.26	$65.77	$61.93	$69.87
Farebox Recovery Ratio	5.80%	5.60%	4.80%	5.80%	5.50%

Source: Bis-Man Transit/CAT; National Transit Database (NTD)

Note: Operating expenses/costs reported in the NTD 2016 Profile for Bismarck-Mandan is $200,000 lower than actual expenses reported. NTD has been informed of the Profile error.

Figure 11. Annual Passenger Trips

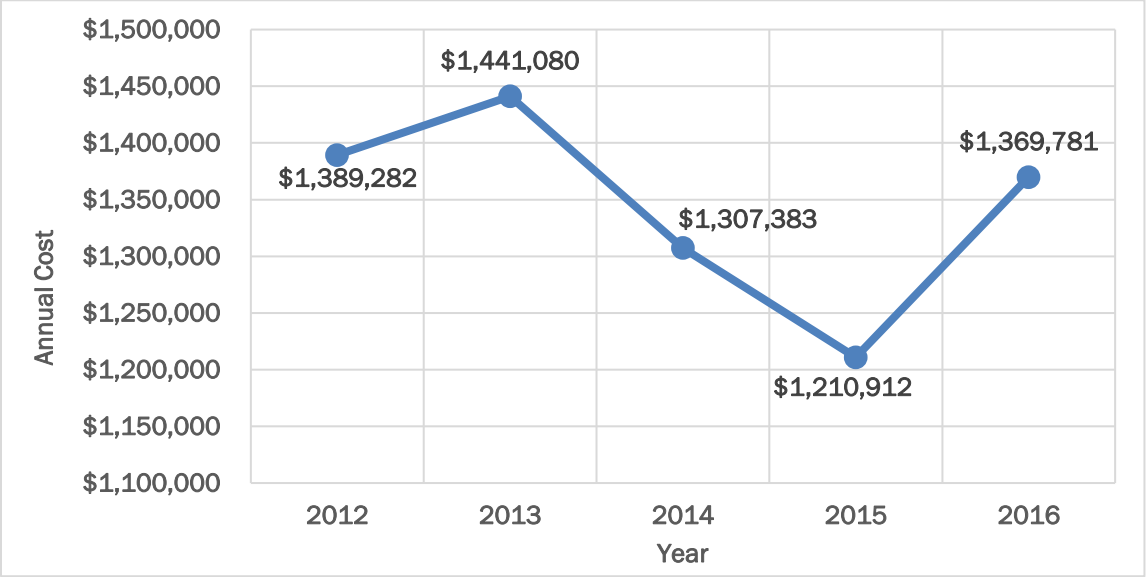


Source: Bis-Man Transit/CAT, NTD (2012)

Annual Operating Costs

As shown in Figure 12, operating costs sharply rose between 2015 and 2016.

Figure 12. Annual Operating Costs



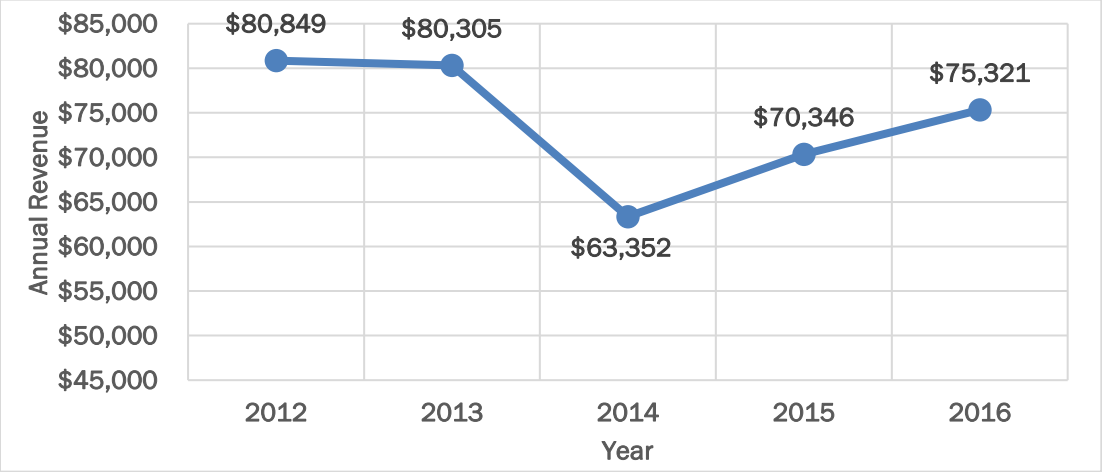
Source: NTD

Note: Operating expenses/costs reported in the NTD 2016 Profile for Bismarck-Mandan is $200,000 lower than actual expenses reported. NTD has been informed of the Profile error.

Annual Farebox Revenue

Figure 13 shows farebox revenue has decreased about $5,500 since 2012. A sharp decline occurred in 2014, but farebox revenue has steadily increased since that time.

Figure 13. Annual Farebox Revenue



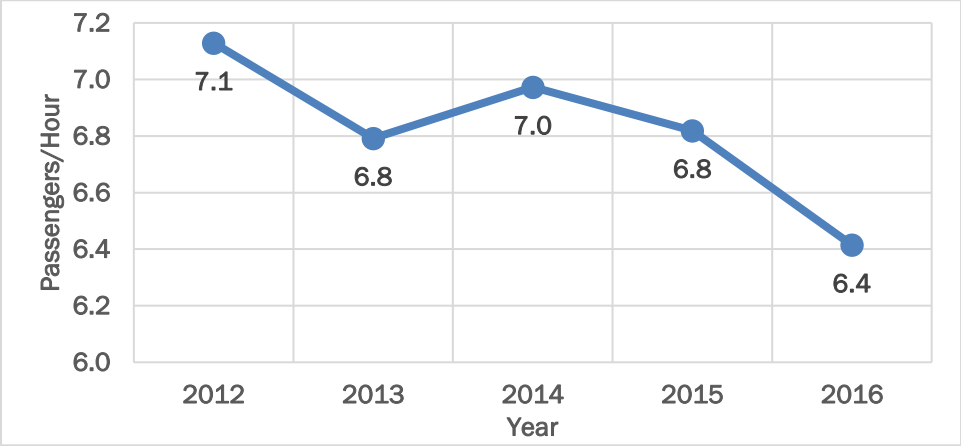
Source: NTD

Performance Indicators

Passengers per Revenue Hour

The number of passengers who are served per hour of revenue service is an indication of productivity of the service. As shown in Figure 14, the number of passengers per revenue hour has decreased since at least 2012. Despite a modest increase from 2013 to 2014, the passengers per revenue hour have decreased approximately 11 percent since 2012.

Figure 14. Passengers per Revenue Hour

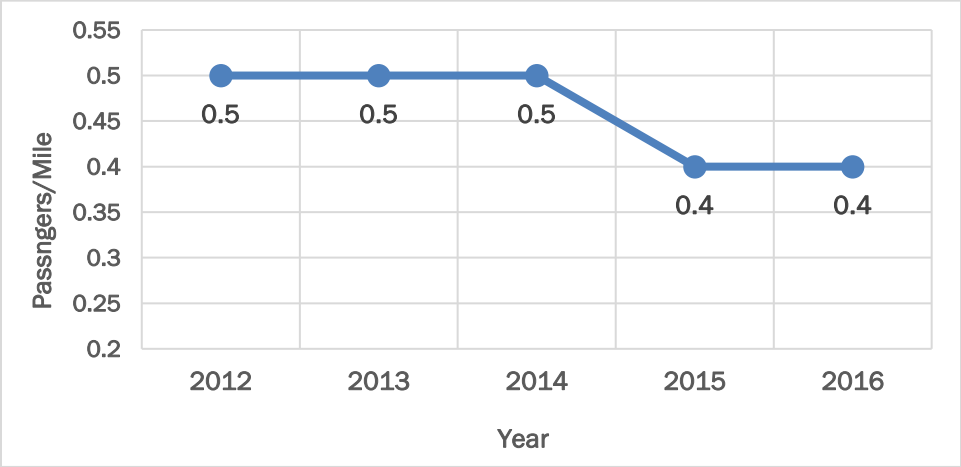


Source: NTD

Passengers per Revenue Mile

The number of passengers who are served per mile of revenue service is also an indication of productivity of the service. As shown in Figure 15, passengers per revenue mile has decreased approximately 25 percent since 2012.

Figure 15. Passengers per Revenue Mile

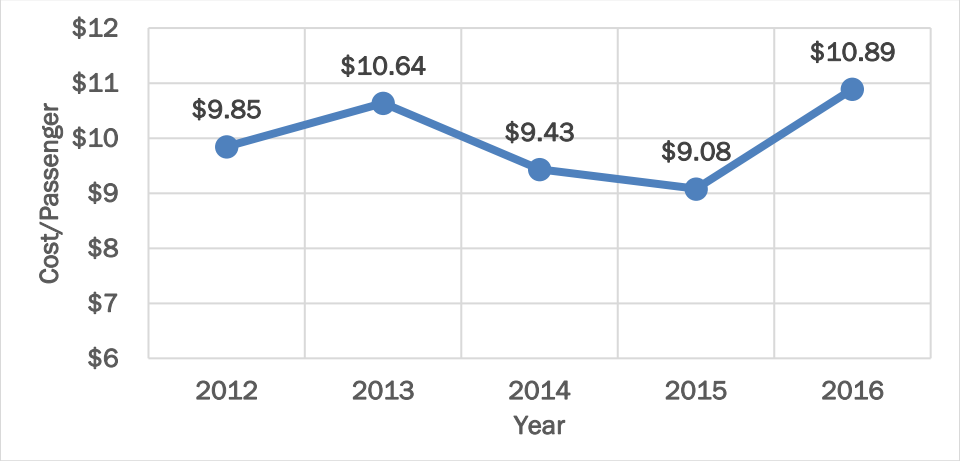


Source: NTD

Cost per Passenger

Operating costs per passenger is an indication of cost-effectiveness of the service operations. A higher operating cost per passenger ratio indicates the service is less cost-effective. As shown in Figure 16, operating costs per passenger have increased approximately $1.00 since 2012. Despite decreases from 2013 to 2015, an increase to a reported high between 2015 and 2016 represents an overall increase in average cost per passenger in the past five years.

Figure 16. Cost per Passenger



Source: NTD

Cost per Revenue Hour

Cost per revenue hour is a measure of the level of efficiency at which an organization can operate. As the cost per revenue hour increases, it would be an indicator of decreasing efficiency. Figure 17, documents the Bis-Man Transit's fixed route service cost per revenue hour. Over the 2012 to 2016 period, costs were relatively stable (2012 and 2016 figures are within about one percent). Intermediate years, however, showed an initial declining cost per revenue hours (a positive) followed by at 13 percent increase between 2015 and 2016.

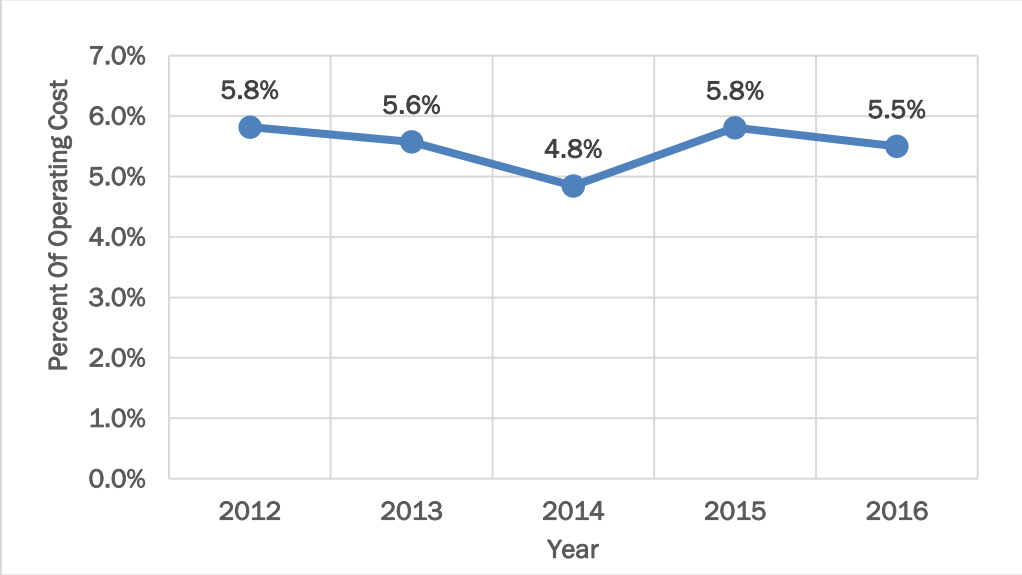
Farebox Recovery Ratio

The farebox recovery ratio indicates the percentage of a service's operating costs that are being covered by the fares paid by passengers. The higher the ratio or percentage, the greater the proportion of operating costs being paid for by passenger fares. As shown in Figure 18, a decrease of 0.3 percent occurred between 2015 and 2016 while there was an increase of 1 percent between 2014 and 2015.

Figure 17. Cost per Revenue Hour

Source: NTD

Figure 18. Farebox Recovery Ratio



Source: NTD

On-time Performance

On-time performance data for CAT fixed routes was collected in July and December of 2017, for route timepoints, as shown in Table 6. Route 1 had the best on-time performance average, with an on-time rate of 68 percent. The system average was slightly lower at 66 percent. In general, buses that were not on-time were early as opposed to late. CAT has recently adjusted scheduled timepoints to address some of the issues with on-time performance. CAT staff has reported improvements to on-time performance with some routes operating at 85% on time or better.

Table 6. Fixed Route Service On-Time Performance

	Jul-17			Dec-17			Average		
Route	On-Time	Early	Late	On-Time	Early	Late	On-Time	Early	Late
Route 1	71.5%	26.8%	1.7%	64.5%	14.6%	20.9%	68.0%	20.7%	11.3%
Route 2	60.5%	34.8%	4.8%	66.6%	25.9%	7.6%	63.5%	30.4%	6.2%
Route 3	57.5%	34.9%	7.7%	69.9%	19.3%	10.8%	63.7%	27.1%	9.3%
Route 4	70.1%	24.4%	5.5%	63.8%	23.9%	12.3%	67.0%	24.2%	8.9%
Route 5	67.5%	30.9%	1.6%	65.3%	26.7%	8.0%	66.4%	28.8%	4.8%
Route 6	61.9%	35.0%	3.1%	71.6%	19.9%	8.5%	66.7%	27.5%	5.8%
System Average	64.7%	31.4%	3.9%	67.3%	21.5%	11.1%	66.0%	26.5%	7.5%

Source: Bis-Man Transit/CAT (July, December 2017)

Paratransit System Operations Analysis

Bis-Man Transit's paratransit service provides door-to-door transportation for riders with disabilities or riders over 70 years of age. The ridership for this service has continually been greater than the CAT fixed route ridership.

Operating Performance

This section provides a five-year overview of key operating characteristics of the paratransit system, as reported to the National Transit Database (NTD).Table 7 shows the annual operating statistics for Bis-Man Transit's paratransit service. Figure 19 - Figure 25 illustrate the data provided in Table 7.

Table 7. Operating Characteristics and Performance Measures for Paratransit

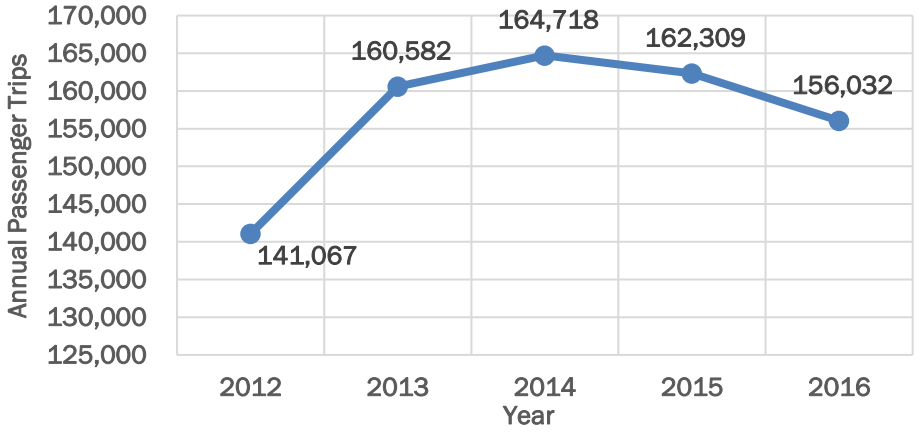
	2012	2013	2014	2015	2016
Passenger Trips	141,067	160,582	164,718	162,309	156,032
Operating Costs	$1,879,491	$1,985,166	$1,970,462	$1,991,994	$1,884,282
Farebox Revenue	$379,869	$371,660	$377,992	$412,473	$422,903
Revenue Miles	623,172	628,858	487,812	639,759	619,449
Revenue Hours	44,507	44,488	36,596	47,025	43,851
Average Fleet Age	5	6	6	7	5
Passengers per Revenue Hour	3.2	3.6	4.5	3.5	3.6
Passengers per Revenue Mile	0.23	0.26	0.34	0.25	0.25
Operating Costs per Passenger	$13.32	$12.36	$11.96	$12.27	$12.08
Operating Costs per Revenue Hour	$42.23	$44.62	$53.84	$42.36	$42.97
Farebox Recovery Ratio	20.2%	18.7%	19.2%	20.7%	22.4%

Key Operating Characteristics

Annual Passenger Trips

Figure 19 shows the trend of annual passenger trips since 2012. The passenger trips increased sharply between 2012 and 2013 by about 14 percent and the ridership in 2014 was the highest in the past five years (6 percent higher than 2016 ridership). The decline in annual ridership observed is consistent with a national trend observed over the period. Nationally, transit ridership in the last three to four years has seen a drop in ridership of approximately 5 percent[6]; which is essentially identical to the condition observed in Bismarck-Mandan.

Figure 19. Annual Passenger Trips for Paratransit



Source: National Transit Database

Since fixed route service was initiated in the mid-1990s, paratransit ridership has exceeded fixed route ridership. Since 2013, the number of paratransit riders has been at the minimum 16 percent greater than the number of fixed route riders. In addition, between 2016 and 2017 there was a dip in paratransit riders. Although the service dipped from 2016 to 2017, the percent paratransit riders comprised of the total was 33 percent higher than the fixed route system. Table 8 highlights historical ridership over the 2013 to 2017 period. To carry the number of passengers requesting trips, Bis-Man Transit puts 15 to 16 buses on the street, while fixed route operates the system with six buses.

[6] 2017 National Transit Summary and Trend – 2017. National Transit Database, Office of Budget and Policy

Table 8. Annual Ridership: Paratransit versus Fixed Route

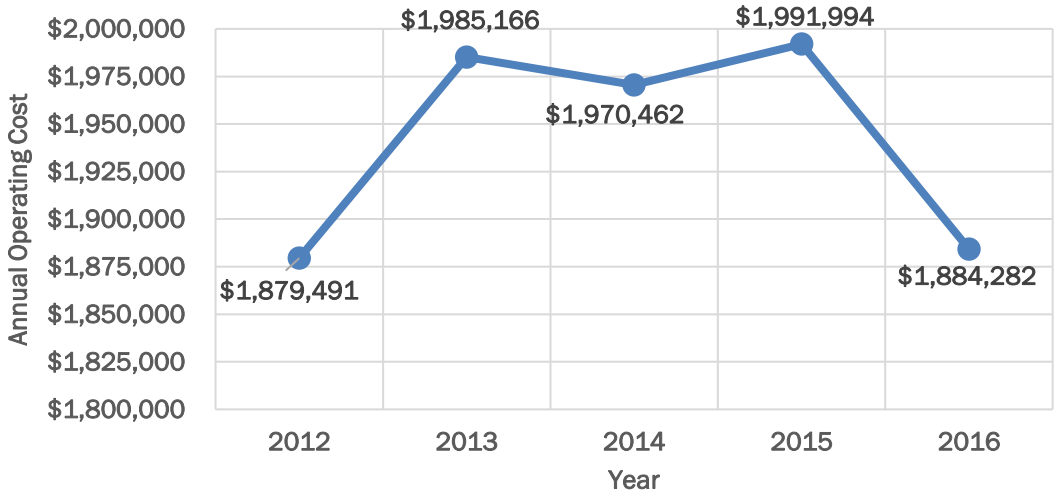
Year	Paratransit Ridership	Fixed Route Ridership	Percent Difference
2013	160,582	135,466	16%
2014	164,718	138,610	16%
2015	162,309	133,348	18%
2016	156,032	125,760	19%
2017	147,332	98,646	33%

Source: Bis-Man Transit/CAT, 2018

Annual Operating Cost

Figure 20 shows the annual operating costs' trend over the period of 2012-2016. A sharp increase of about 6 percent occurred between 2012 and 2013 while costs went down by 5 percent between 2015 and 2016.

Figure 20. Annual Operating Costs for Paratransit

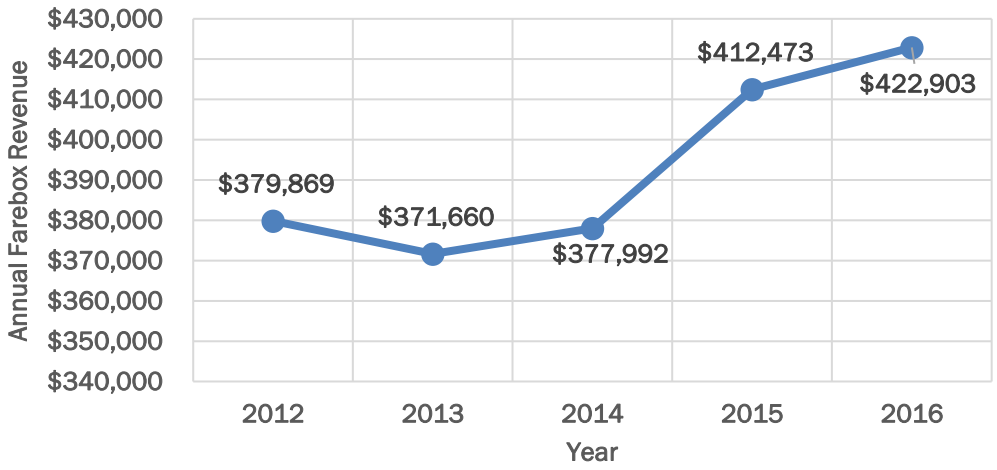


Source: National Transit Database

Annual Farebox Revenue

Figure 21 shows the annual farebox revenue for the period of 2012 to 2016. Since 2012, the farebox revenue has increased by 11 percent. Analysis of the potential reasons for increasing farebox revenue was not completed.

Figure 21. Annual Farebox Revenue for Paratransit



Source: NTD

Performance Indicators

Passengers per Revenue Hour

Figure 22 shows that the passengers per revenue hour peaked in 2014 due to the highest ridership in the period of 2012-2016. Moreover, revenue hours for 2014 were also the lowest in that period. The typical metropolitan area goal is to carry at least three passengers per hour when accounting for deadhead.

Passengers per Revenue Mile

As shown in Table 7, the passengers per revenue mile were consistent at 0.25 in the analysis period of 2012 through 2016. The highest passengers per revenue mile were in the year 2014 (with the highest ridership) and lowest revenue miles.

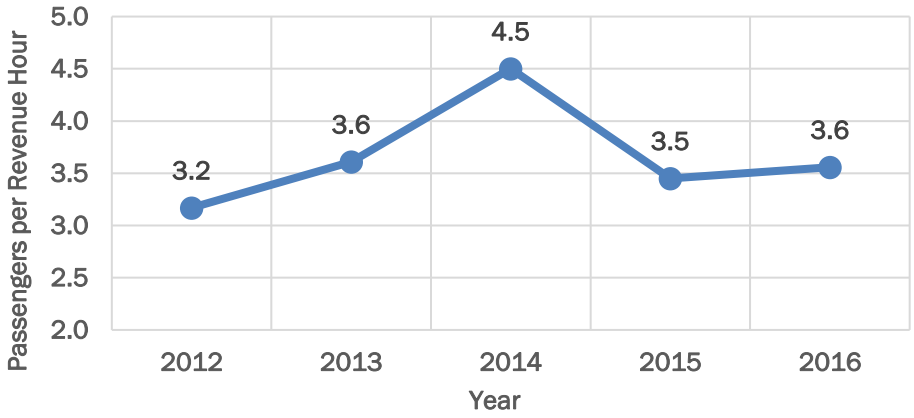
Costs per Passenger

As shown in Figure 23, the operating costs per passenger have declined since 2012. The lowest value was in the year 2014 due to the highest ridership in the period.

Costs per Revenue Hour

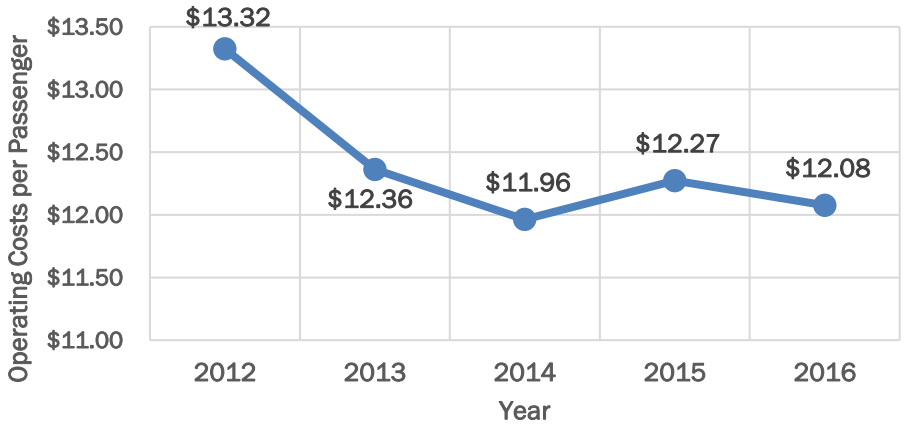
Figure 1 shows the costs per revenue hour over the analysis period of 2012 through 2016. The year 2014 had the highest costs per revenue hour due to the lowest number of revenue hours.

Figure 22. Passengers per Revenue Hour (2012-2016)



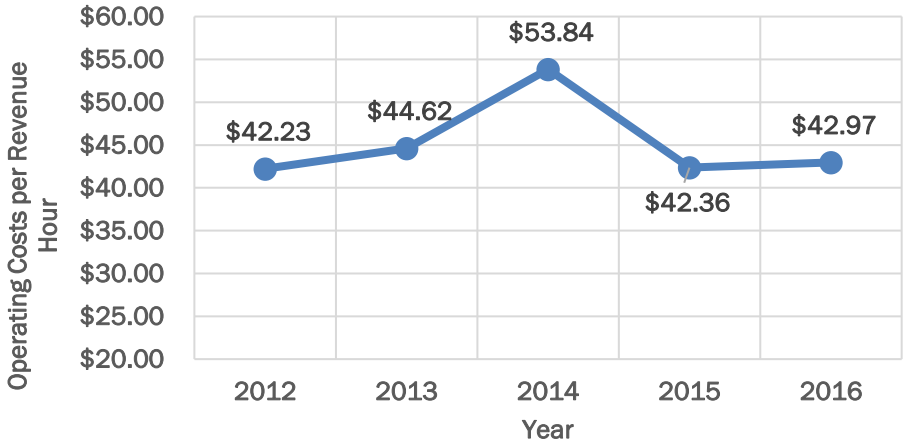
Source: National Transit Database

Figure 23. Costs per Passenger for Paratransit



Source: National Transit Database

Figure 24. Costs per Revenue Hour

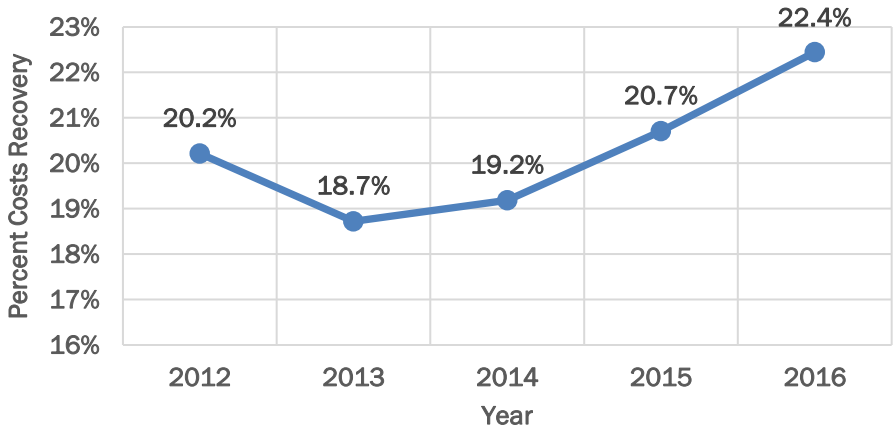


Source: National Transit Database

Farebox Recovery Ratio

The farebox recovery ratio indicates the percentage of a service's operating costs that are being covered by the fares paid by passengers. The higher the ratio or percentage, the greater the proportion of operating costs being paid for by passenger fares. As shown in Figure 25, a decrease of 7 percent occurred between 2012 and 2013, which combined with ridership and cost changes, suggests 2012 to 2013 was a transitional year. Since 2013, there has been a trend of increasing fare box recovery for the system.

Figure 25. Farebox Recovery Ratio for Paratransit



Source: National Transit Database

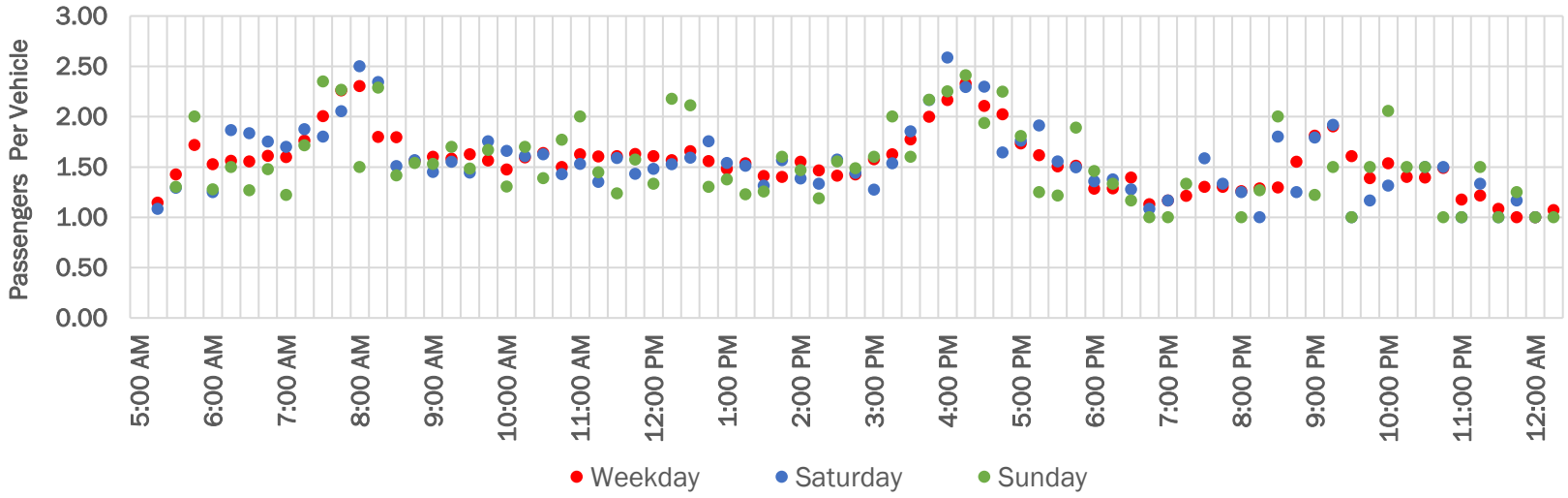
Passenger Load Assessment

The number of passengers on-board a vehicle at any one time (passenger load) is a measure typically used to help define service efficiency. The goal is not to maximize the number of people per trip, but rather to find a logical balance between the number of people being carried and meeting the desired on-time performance and rider comfort for their on-board duration. Figure 26 displays the average passenger load for April 2018 using data obtained from Bis-Man Transit. Displayed is the average passenger load observed across the paratransit fleet for every 15-minute period of the weekday, Saturday, and Sunday service days for the month. The typical metropolitan area goal is to carry at least one passenger in each 15-minute period a vehicle is operating, which equates to three or so passengers per hour when accounting for deadhead.

The following are the findings of the review:

- Most weekday and weekend service hours exceed the desired threshold of more than one passenger in a 15-minute period.
- Early morning hours (7:00 AM to 8:00 AM), late afternoon (4:00 PM to 5:00 PM) and evening (8:30 PM to 10:00 PM) average more than two people per vehicle over a 15-minute period. These loads approach the reasonable capacity for a vehicle when balancing cost of service and passenger comfort.
- While Sunday overall ridership is lower, Bis-Man Transit does a good job of balancing the number of vehicles on the road. This is reflected in average passenger loads on Sunday that are relatively consistent with weekday loads.

Figure 26. Paratransit Average Passenger Per Vehicle by 15-Minute Periods (April 2018)



Source: Bis-Man Transit Paratransit Ride Log (April 2018)

Peer Comparison

Compared to peer communities, based on population and development density, Bis-Man Transit provides a high number of paratransit trips from both an absolute number and a ratio of fixed route trips. Table 9 documents the comparison of Bismarck-Mandan paratransit/Demand Response service to regional communities that have been used in other planning efforts as peer communities. Relative to the peers, the following observations are provided:

- Bis-Man Transit provides more trips annually than any of the other peers. Paratransit ridership in Bismarck-Manda-Lincoln, expressed as the number of trips per capita, reflects a substantially higher level of use compared to Midwestern peers. While Rapid City also has a per capita ridership greater than 1.0 passengers, all the other peer communities had an annual (2016) ridership of substantially less than one per capita
- The annual operating cost of paratransit in Bismarck-Mandan ($1,884,300 in 2016) is exceeded by only Sioux Falls, South Dakota ($3,570,100), a metro area with a population almost 40 percent higher than Bismarck, Mandan, and Lincoln. Relative to the annual cost of fixed route service, Rapid City and Bismarck-Mandan-Lincoln are the only peers where paratransit annual operating expenditures exceed fixed route expenditures.
- Operating cost per trip per passenger for Bismarck is the lowest among the peers. Expressed in terms of cost per capita, expenditures in Bismarck-Mandan-Lincoln are approximately $20, which is closer to the highest expenditure level (Sioux Falls) than it is to the lowest (Fargo-Moorhead).
- Except for Sioux Falls, Bis-Man Transit has the largest in-service fleet among the peer communities.

Table 9. 2016 Paratransit Service Parameters – Bis-Man Transit and Peers

Peer City	Service Area Population	Operating Cost	Ridership	Operating Cost Per Capita	Ridership Per Capita	Operating Cost Per Passenger
Billings, MT	109,100	$1,260,090	49,407	$11.55	0.5	$25.50
Fargo/Moorhead	134,100	$1,326,546	52,373	$9.89	0.4	$25.33
Grand Forks	61,300	$1,229,085	48,363	$20.05	0.8	$25.41
Rapid City	68,000	$1,107,993	87,280	$16.30	1.3	$12.69
Sioux Falls	130,400	$3,570,132	113,377	$27.38	0.9	$31.49
Bis-Man Transit	**94,700**	**$1,884,282**	**156,032**	**$19.89**	**1.6**	**$12.08**

Table 10 outlines key recent observable characteristics of the paratransit service. The service typically runs extended hours each day (starting as early as 5:30 AM and ending as late as

12:00 AM). Moreover, the service is provided seven days a week (unlike fixed route which does not operate on Sundays).

Table 10. Paratransit Service Hours and Miles Performance

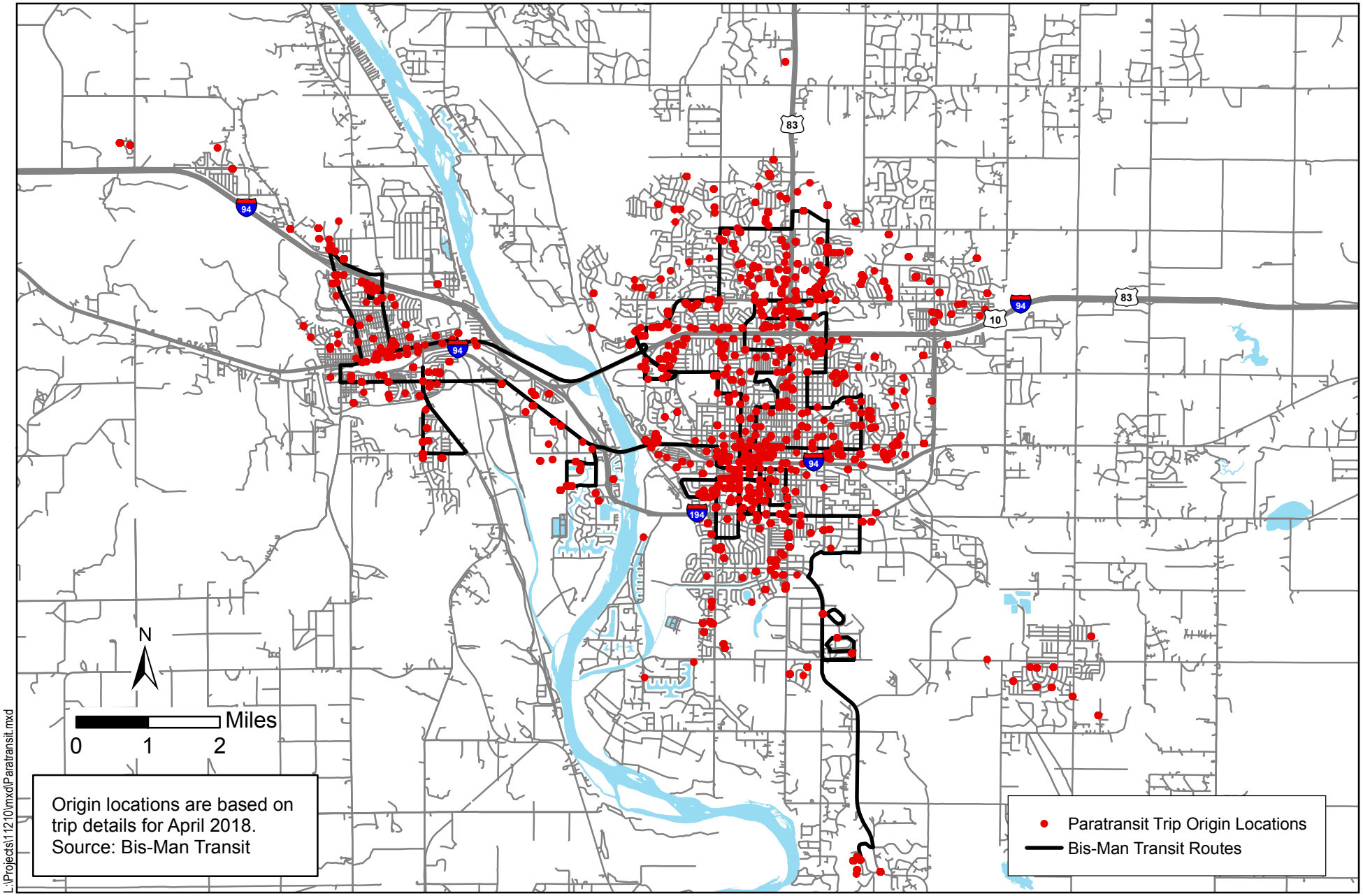
	April 2018			May 2018		
	Weekday (Average)	Saturday (Average)	Sunday (Average)	Weekday (Average)	Saturday (Average)	Sunday (Average)
Vehicles in Operation	15	9	5	14	10	4
Total Service Miles	2,201.34	998.43	481.91	2,059.29	1,017.83	425.27
Total Revenue Miles	1,963.50	879.24	430.10	1,818.89	842.75	384.42
Deadhead Miles	237.84	119.19	51.82	240.40	175.08	40.85
Total Service Hours	152.84	76.63	35.43	146.81	81.32	34.69
Total Revenue Hours	138.16	66.41	32.30	131.58	69.35	31.78
Deadhead Hours	14.68	10.23	3.13	15.22	11.97	2.91

Source: Bis-Man Transit from Ecolane report.

Key Trends in Paratransit Operations Data

The key trends and data about paratransit observed in April and May of 2018 are summarized as follows:

- Total revenue miles were the greatest during the weekdays (averaging between 1,800 and 2,000)
- Deadhead miles (travel time without anyone on board) were the greatest on weekdays and lowest on Sundays. Approximately 240 deadhead miles were observed each week in April and May.
- Deadhead hours were also the greatest during the week and lowest on Sundays. Approximately 15 deadhead hours were observed each week in April and May.
- In April of 2018, a total of 10,467 were taken on paratransit, out of which 1,272 (12 percent) occurred outside the fixed-route hours of 7 a.m. to 7 p.m. In addition, 1,257 (12 percent) trips were taken by senior (70 years or older) riders who were not certified with a disability. Out of the 1,257 non-certified senior trips, 112 trips were made outside the fixed route service hours. Though a portion of senior riders may also qualify for paratransit through a disability a maximum of 11 percent of the paratransit trips can be potentially made on fixed route network.
- As shown in Figure 27 and Figure 28, the trip origins and destinations of April 2018 paratransit trips are mostly near the Bis-Man fixed routes except some locations south of I-194 and in Lincoln.



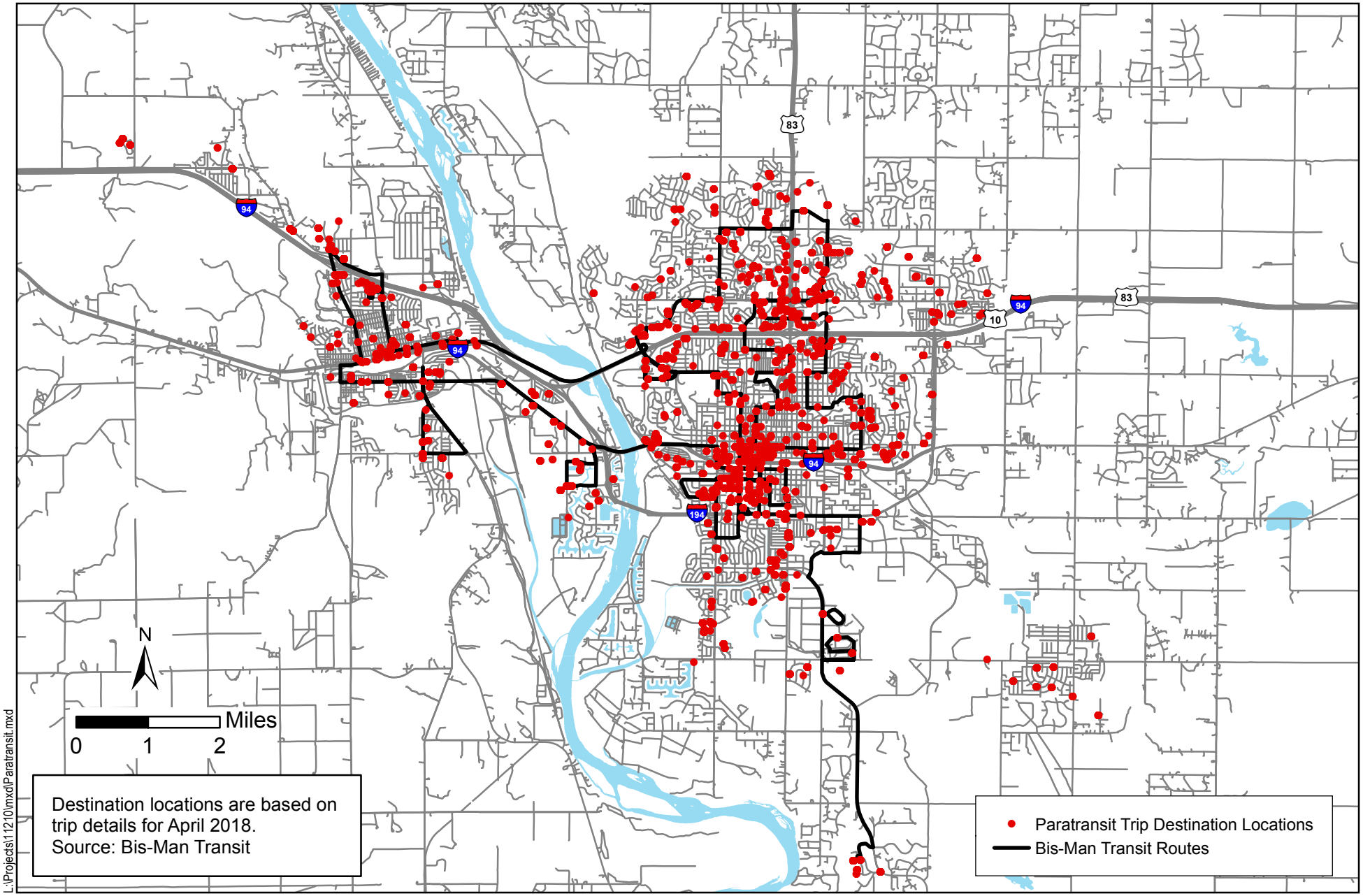
SRF Consulting Group, Inc.

Bis-Man Paratransit Trip Origins

Bis-Man Transit
Transit Development Plan

Note: Bis-Man Transit Fixed Routes are shown as of June 2018

Figure 27



SRF Consulting Group, Inc.

Bis-Man Paratransit Trip Destinations

Bis-Man Transit
Transit Development Plan

Note: Bis-Man Transit Fixed Routes are shown as of June 2018

Figure 28

Community Engagement

There were 3 main engagement efforts conducted as part of the Bis-Man TDP outreach plan: community survey, public meetings and personal interviews with stakeholders. The following sub-sections summarize the information gathered during each engagement effort.

Community Survey

This section includes the summary of the community survey prepared by SRF Consulting Group, Inc. on behalf of Bis-Man Transit. The outreach efforts were conducted by the staff from Bis-Man Transit, Bismarck-Mandan MPO and SRF Consulting on multiple dates and locations in the Bismarck-Mandan metro area.

The community survey consisted of questions about Bis-Man Transit's service and suggestions for improvement. The survey is an important part of the customer engagement efforts for developing a TDP for Bis-Man Transit. The survey was designed in both online and paper format for maximum outreach.

Survey Instrument and Schedule

Two online survey instruments were designed to include 5 common questions and 2 outreach specific questions.

The first outreach effort was conducted at the North Dakota Transportation Expo held at the Bismarck Exhibition Center on May 12th, 2018 where Bis-Man region residents were handed out cards with online survey link and QR code (Appendix 2. Community Survey Summary Report includes the survey instrument). Additionally, responses were also collected using a paper survey instrument (including 5 questions, as included in Appendix 2. Community Survey Summary Report). The first outreach generated 108 responses. The second outreach effort on May 19th at the Touch-a Truck event in Mandan used an online survey and generated 26 survey responses (Appendix 2. Community Survey Summary Report includes the survey instrument). Table 11 summarizes the survey outreach schedule.

Table 11. Outreach Schedule and Response Rate for Community Survey

Dates	Venue	Format	Responses
May 12	ND Transportation Expo, Bismarck	Online and Paper	108
May 19	Touch-a-Truck Event, Mandan	Online	26

Survey Findings

Transit User

The first question of the survey asked the respondents if they were a transit user. Based on both online and paper surveys out of 129 responses to the question, 25 percent were transit users.

Riding Frequency

When survey respondents marked themselves as transit users, the online survey instrument asked them a follow-up question about their frequency of use. Most respondents skipped this question and only 7 answered. Hence, answers to this question were not deemed appropriate to draw inferences for the population.

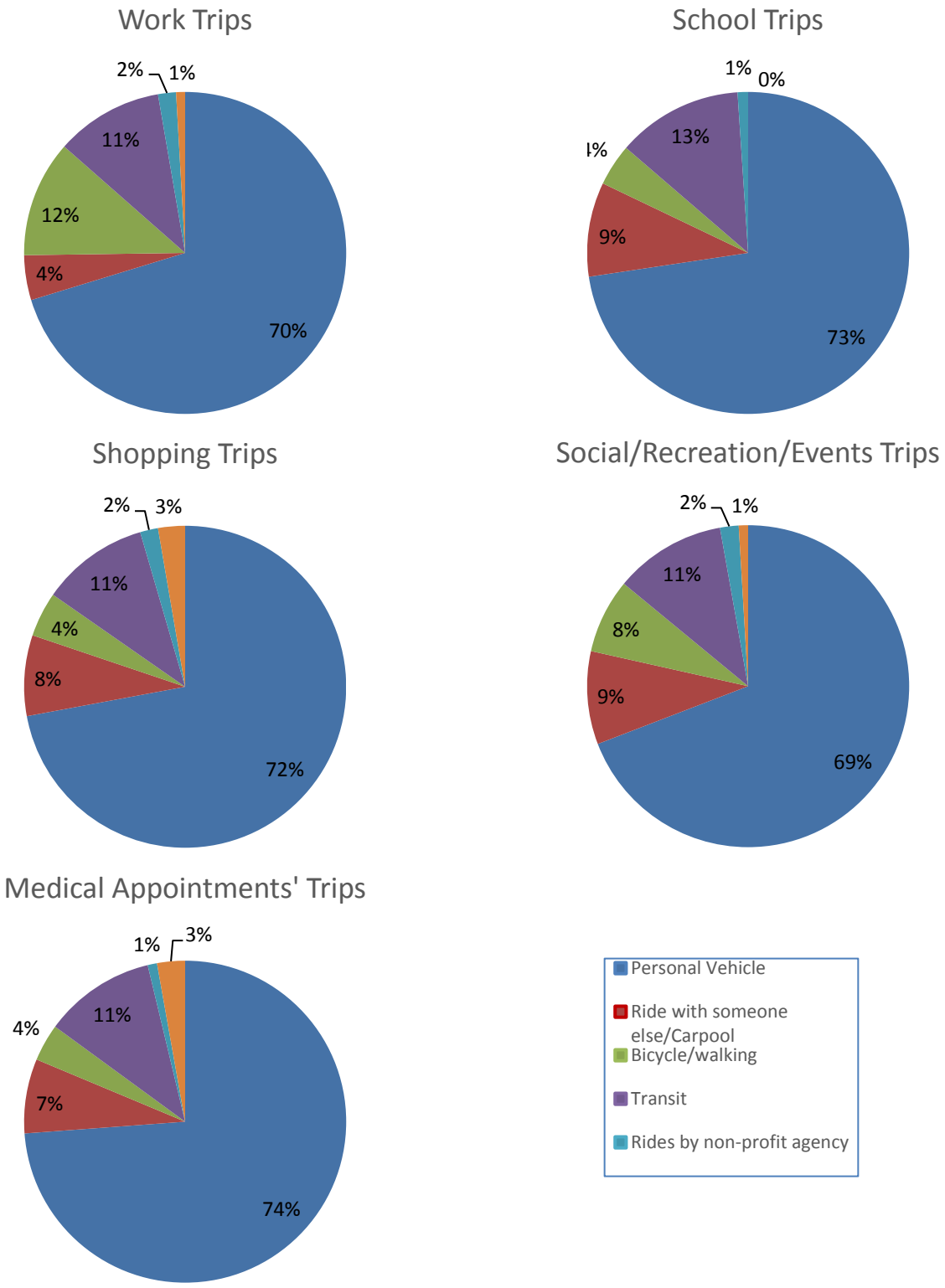
Bis-Man Transit and Capital Area Transit (CAT) Relationship

During the first outreach effort, it was generally observed that some community members were confused about the relationship between Bis-Man Transit and CAT. Hence, the survey instrument was revised before second outreach to include a question about the relationship between CAT and Bis-Man Transit. About 92 percent respondents (out of 24) of the question indicated that 'Bis-Man Transit and CAT are two parts of one public transportation system' while only 8 percent said, 'they are not related and operate separately'.

Primary Mode of Transportation

As shown in Figure 29, the primary mode of transportation is "personal vehicle" for about 70 percent of the trips. The share of "riding with others" mode is more for non-work trips while "transit" mode share is maximum for school or training trips.

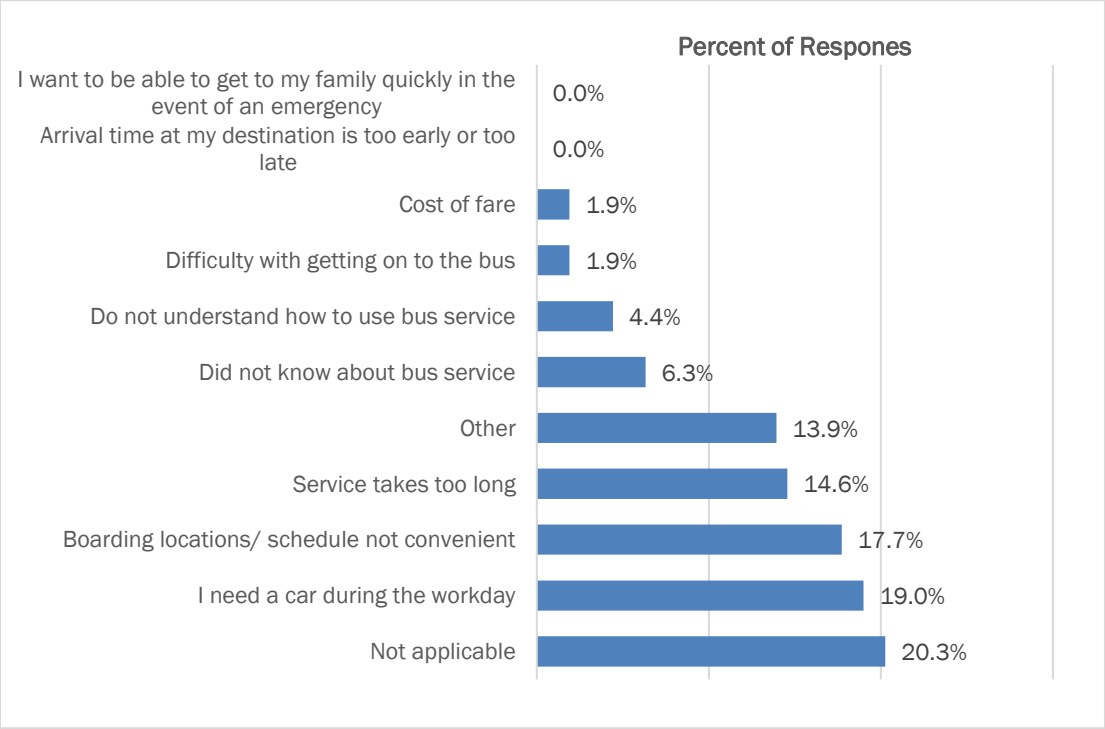
Figure 29. Primary Mode of Transportation by Trip Purpose



Barriers to Taking Transit

Two main barriers that were indicated by respondents were 'I need a car during the workday' and 'Boarding locations/schedule not convenient'. As shown in Figure 30, about 20 percent respondents indicated 'not applicable' as the barrier, with most of these respondents being non-riders. The question also included open-ended response section (list of open-ended responses is included as Appendix 2. Community Survey Summary Report).

Figure 30. Barriers to Taking Transit



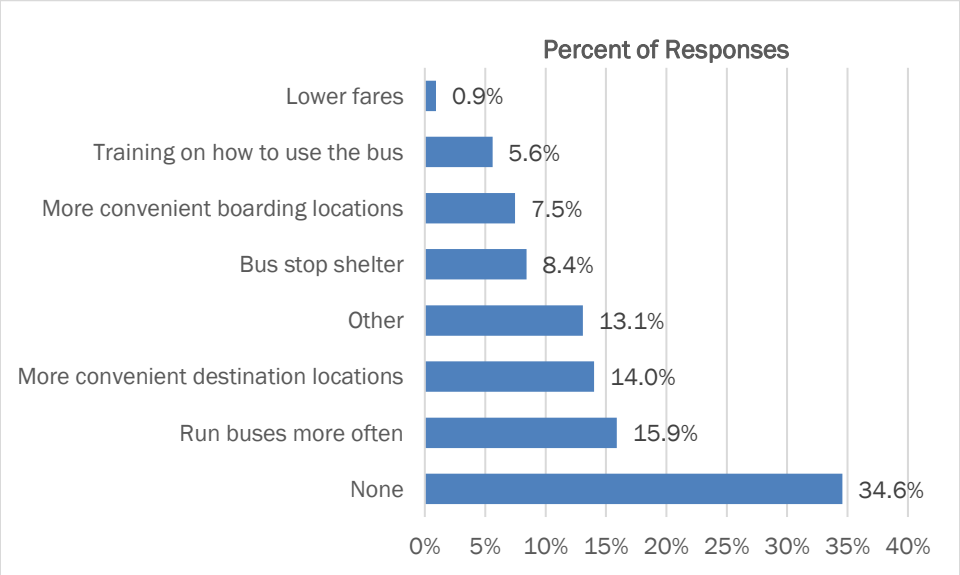
Transit Improvements

As shown in Figure 31, most respondents did not suggest any improvement to the existing service. Close to 15 percent of the respondents, indicated improvements were needed to 'more convenient destination locations' and 'buses running more often'. The question also included an open-ended response section (included as Appendix 2. Community Survey Summary Report).

Vehicle Availability

About 25 percent of the respondents lived in households with no vehicles, however, only a marginal share of these respondents were current transit users.

Figure 31. Transit Improvement Suggestions



Public Meetings

Three series of public meetings were held between July 2018 and February 2019. The public meetings were held on July 10-12, 2018, November 7-8, 2018 and January 29-30, 2019. These three series of public meetings provided an opportunity for the public to learn about the study and provide input regarding transit service and needs.

Information about meeting formats is outlined below:

- Meeting 1 – Transit Development Plan Overview and Current System Input. As this was the first real face-to-face discussion with the public, a presentation of the purpose and format for conducting the transit plan was provided. The presentation was followed with gathering input regarding what attendees believe transit service does well and where improvement is needed. Attendees were also give the opportunity to identify locations in the regional they would like to travel on transit but cannot.

- Meeting 2 – Alternatives. The second round of meetings were conducted as open houses, providing attendees opportunity to talk with staff at length about the range of ideas being reviewed to address issues with current service or opportunities for enhancement. Displays of each alternative being reviewed were provided for discussion. Attendees were also asked to "vote their preference" as to which of the alternatives were most important to them. Everyone was given a "bank" of coins reflecting a potential budget that would not allow all alternatives to be implemented. Results in the voting were incorporated into the selection of alternatives.

- Meeting 3 – Preliminary Recommendations. The meetings started with a presentation of how the preliminary recommendations were developed and concluded with a review of the proposed actions for a future scenario of continuing the current funding and a

scenario of enhanced funding. Displays of the alternatives were provided for discussion following the presentation.

Three public meetings were held during each series of public meetings, two in Bismarck and one in Mandan. All meeting times were setup during Bis-Man fixed route service hours. At all meetings, the accommodation for disabilities and/or language assistance was provided, when requested in advance. In addition, due to cold weather forecast during the third series of public meetings, a pre-recorded presentation video was made available on the plan website.

Summary of public meetings is included as Appendix 3. Summary of Public Meetings' Feedback.

Stakeholder Interviews

Several stakeholder interviews were held as part of the engagement plan. Synthesis of the interviews is included as Appendix 4. Summary of Stakeholder Interviews.

Mission, Goals and Objectives

Bis-Man Transit held Strategic planning meeting on November 14, 2015 to identify priorities and strategic goals for Bis-Man Transit. This chapter includes a summary of the identified goals and objectives.

Mission

"To provide high quality, reliable, convenient and safe public transit services in an efficient manner."

Goals and Objectives

Goal 1. Develop and implement comprehensive marketing plan.

Strategic Priority – Marketing
Objective 1: Evaluate use of technology to reach target markets.
Objective 2: Explore additional advertisement revenue streams.
Objective 3: Evaluate and recommend changes to brand identity.
Objective 4: Provide marketing activities to reach transit dependent communities, including non-technology users[7].

Goal 2. Design and implement a plan to improve operational efficiency of Paratransit.

Strategic Priority – Paratransit
Objective 1: Develop an action plan with timelines to achieve a balanced operating budget relative to revenue.
Objective 2: Implement the action plan.

Goal 3. Demonstrate effective and efficient use of staffing resources.

Strategic Priority – Human Resources
Objective 1: Evaluate staffing needs.
Objective 2: Develop organizational structure based on needs.
Objective 3: Develop policies and procedures.
Objective 4: Develop a succession plan.

[7] Non-technology users include riders with no or limited access to the online marketing portals, social media and websites.

Goal 4. BMT shall operate safe, ethical and compliant transportation system, fostering a culture of transparency and accountability, while adhering to federal/state/local regulations.

Strategic Priority – Compliance
Objective: Update policies and procedures
Objective: Adhere to federal/state/local regulations
Objective: Develop training for staff
Objective: Enhance safety training

Goal 5. Position BMT to be financially sound, to grow the system and to provide a valuable service to the community.

Strategic Priority – Fiscal Oversight
Objective 1: Develop and operate within budget.
Objective 2: Long-term Bus Replacement Plan
Objective 3: Cash reserves
Objective 4: Maximize advertising
Objective 5: Investment policy
Objective 6: Contract Management policy
Objective 7: Leverage industry and professional association memberships

Goal 6. Review and recommend fixed route system changes to achieve simplicity and efficiency.

Strategic Priority – Fixed Routes
Objective 1: Initiate task force to establish a hub.
Objective 2: Design and implement a plan to increase fixed rides.

Transit Service Plans – Immediate and Future

Recommendations for revisions to the current transit operating plan (defined based on the days, hours, routes, etc.) have been organized into the following:

- Immediate/Near Term Changes: These represent minor changes to the current route paths to address input received from riders, persons attending public meetings, and discussions with drivers. Change included in the list would represent a "revenue neutral" plan, which would not result in a measurable increase/decrease in the current operating parameters. The changes represent minor adjustments to address spot locations where access is poor or limited, where drivers have difficulty making turns, where service redundancies are present or where it is possible to get a route closer to a trip generator.
- One to Six Years Out: Recommendations for the system through the bulk of the six-year planning period have been organized into two alternate paths that are based on funding conditions. The alternate paths address conditions likely to exist if the current revenue and expenditures programs are followed or if additional revenue for transit operations is identified.

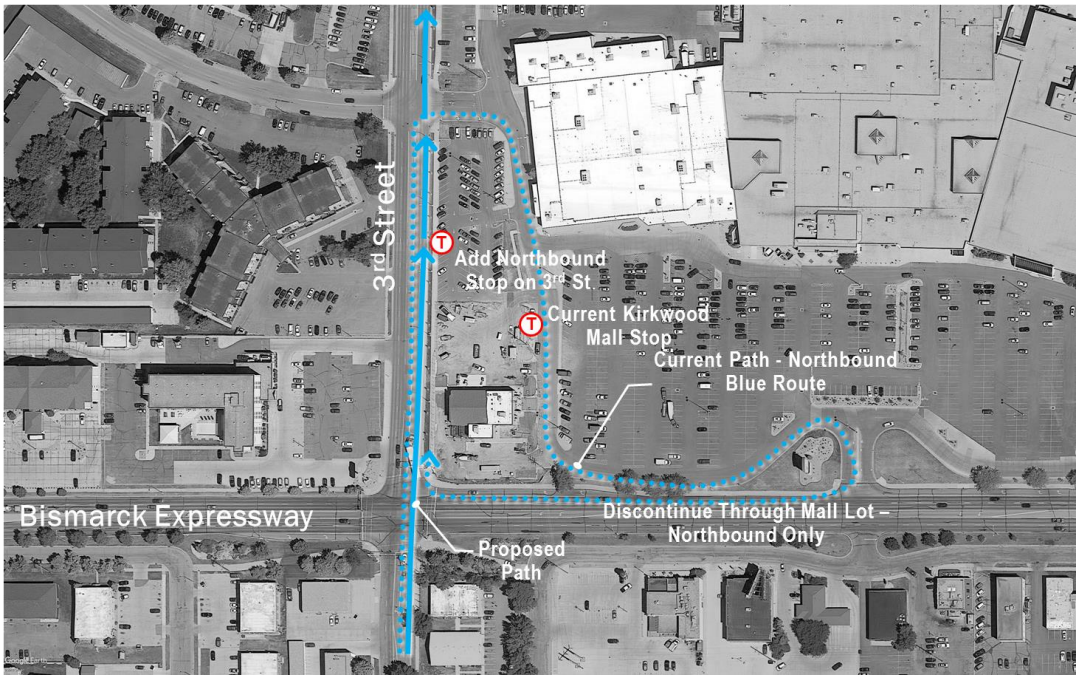
Immediate/Near Term

Minor changes to the current six route fixed route network were developed based on input received at public meetings, a community survey and discussions with drivers. This concept focuses on incorporating changes into the current operating plan without making significant revisions to the schedule, driver blocks and only minor changes to any route. Figure 32 and Figure 33 display the recommended immediate/near term recommended changes to the current fixed route network. Changes are outlined below:

- Brown Route (ND 1806-19th Street SE-8th Avenue SE Double Loop): Currently, the Brown Route covers the ND 1806-19th Street SE-8th Avenue SE loop twice per run. The time between trips through the loop is approximately 13 minutes. The proposed change is to travel through the loop only in the eastbound direction, which would connect people shopping at Dan's Supermarket with more direct access to their home with groceries.
- Brown Route 46th Avenue SE-McKenzie Drive-40th Avenue SE-21st Street SE loop. Run time along the route can be reduced, without substantially changing access to key stops by eliminating the 21st Street SE segment and running the route on 40th Avenue SE from 21st Street SE to Memorial Highway. Apartment buildings and employment stops along the route would have consistent walk access with the change, while run time would be slightly reduced.

- Blue Route: Proposed change eliminates several difficult movements required to get in and out of Kirkwood Mall. The change, displayed in Figure 32, affects only northbound travel, by eliminating the pull into the mall property. Buses would stop on 3rd Street adjacent to the current Kirkwood Mall stop, letting people off or boarding them at the curb. By eliminating the pull into and circulate through the mall parking lot maneuver, several minutes of travel time covering a very limited area could be avoided. Passengers would have less than 100 feet of additional walk distance and would not need to cross additional drive isles relative to the onsite stop.

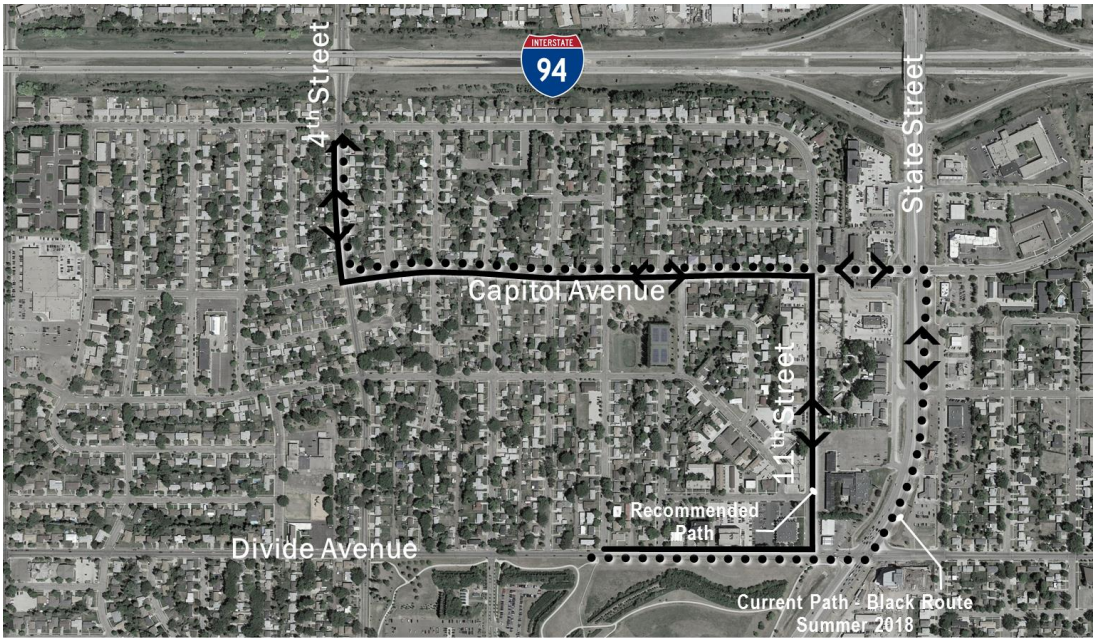
Figure 32. Northbound Blue Route Modification at Kirkwood Mall



- Black Route: The segment of the route on State Street from Divide Avenue to Capitol Avenue is designated as a No Stop area. As part of the transit plan update, a set of No Stop segment guidelines were developed, which would include this segment. As the State Street running segment is unproductive relative to boarding activity, the recommendation is to move the north-south segment of the Black Route to 11th Street between Divide Avenue and Capitol Avenue. Eleventh Street provides more direct access to several apartment buildings and office space that would likely improve the productivity of the segment.

  There may be concern about eastbound queues at Divide Avenue/State Street impacting the ability for a transit vehicle to make the left on to 11th Street. If the left turn becomes an issue, it is suggested the route be moved to 8th Street. Figure 33 displays recommended changes to the Black Route.

Figure 33. Recommended Immediate Term Black Route Modification



One to Six Year Recommendations

Through review of the historical annual revenue and combined annual operating cost and cyclical capital costs, it has been concluded the current condition of costs outpacing revenue is not a viable scenario moving forward. Over the last three years capital reserves have been used, in part, to fund service. Capital reserve funds have been used to offset declining revenue from key sources. Since 2017, approximately $500,000 per year were required from the capital reserves to fund service and capital improvements. The need to use funds from the capital reserve is due to:

- Variability in Federal Funding: Operating grants, determined by formula or competition, received for fixed route and paratransit service has fluctuates year-to-year. A significant element of the variation is whether system performance meets the thresholds of the Small Transit Intensive Cities (STIC) program. This program awards metropolitan areas of less than 200,000 population when service levels and/or performance meets or surpasses levels observed in the year for metropolitan areas of 200,000 to one million in population. Bismarck-Mandan typically competes for funding in two of the six categories, with revenue miles and revenue hours per capita being very close to the program threshold. Slight declines in either relative to the averages for larger metros can result in large swings in federal funding.

- Reduced State Funding: Since 2016 operating funding from the State of North Dakota has declined by approximately $150,000. State transit funds are allocated from the Highway Tax Distribution Fund and account for 1.5 percent of the entire fund. The tax fund is variable each biennium and in the last several years has been lower than the

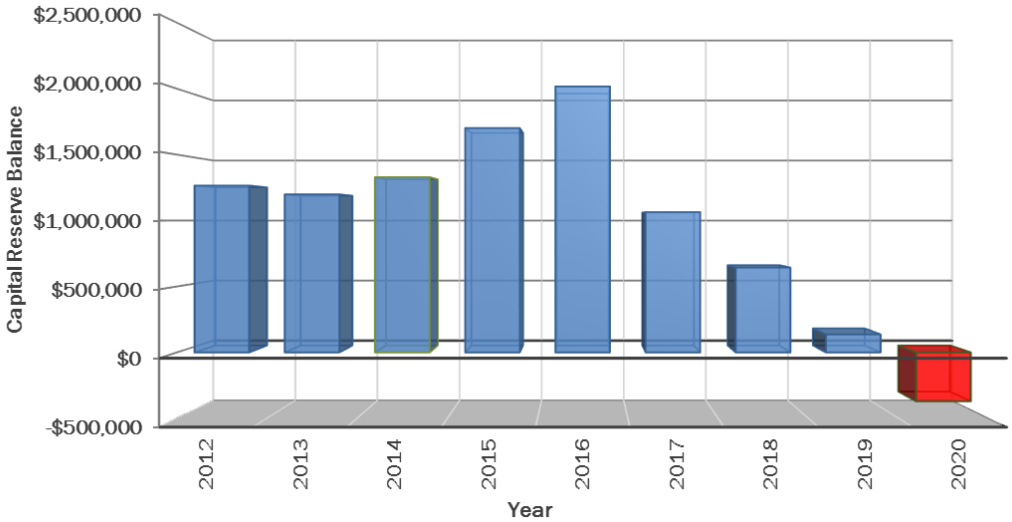
2012 to 2015 period tax fund. The reduction in the Highway Tax Distribution Fund results in a reduction in the funds allocated to communities for transit service.

The cumulative impact of these substantial differneces in funding is approximately 11 percent of the annual operating budget from 2016 through 2018, which is more than the amount that can be absorbed by any organization without considering or making service changes. In 2017, Bis-Man Transit made changes to fixed route miles and paratransit eligibility directed at reducing operating costs. The changes resulted in narrowing the revenue-to-expenditure gap from where it would have been, however, an annual negative balance of approximately $500,000 remains. This negative revenue condition directly influences the need to consider two paths for the future.

Two Possible Paths

Alternate future transit conditions in Bismarck-Mandan reflect whether the $500,000 operating deficit can be closed and whether additional operating funding can be located. If added funding cannot be found, by the end of 2020 the capital reserve fund will be depleted, which will require almost immediate action to reduce costs. Understanding the immediate negative revenue condition and the impacts on the capital reserve fund, Bis-Man Transit can take more deliberate steps to eliminate the revenue-to-expenditure gap. Figure 34 displays the reserve fund balance since 2012 and a projected deficit in 2020.

Figure 34. Historical and 2020 Projected Capital Reserve Balance



Alternatives for the future funding discussed throughout the TDP update are:

- No change in operations and funding: Continuing along the current path where annual operating costs exceed cumulative revenue and use of capital reserve funds to make up the deficit will exhaust the reserve fund sometime in 2020. As the reserve fund is intended to be the repository for funding significant purchases such as new vehicles or

other facility maintenance/repairs, depleting it not only removes a short-term source of funding to address an operating deficit, but it substantially impacts Bis-Man Transit's ability to maintain an acceptable state of good repair in the fleet and facilities.

This path will likely lead to the need to reduce costs by reducing service for fixed route, paratransit or a combination of both services to address the operating cost deficit. A path that results in the need to reduce fixed route and/or paratransit service is not the preferred path, however, identifying a series of options in the event added funding cannot be identified is the responsible action.

- Increase operating revenue: Relative to identified peers, Bis-Man Transit's cost of providing service measured using cost per revenue hour or cost per revenue mile is competitive. Comparing the dollars allocated to service on a per capita basis to the peers, it can be concluded that Bismarck and Mandan are investing less in service than most of the peers. Additionally, separating fixed route investment from paratransit investment it is observed that operating funds allocated to fixed route service are lower than most of the peers and operating funding for paratransit is higher than any of the peers. There is no formula or performance measure of how much a community should be allocating to each service. Once a community understands the level of investment, however, it can then make service decisions based on community values and perception of the benefits derived.

  Increasing operating revenue to a point beyond where the current annual operations deficit is eliminated, will allow the community to consider improvements to service for residents and workers who cannot or chose not to drive. This is the preferred path of proposed through this update of the transit development plan.

Service Concepts by Funding Path

Alternate fixed route and paratransit service changes, reflective of the two funding paths, were developed through the following:

- Analysis of the current conditions to focus changes to either lower producing elements of the system and/or to the most productive portions. If service reductions need to be implemented, it is important to try to minimize the overall system impacts by focusing on lower productivity areas. It is emphasized that decisions will not be made based solely on productivity but will also consider the population being served and alternatives available to them.

- Population being impacted in a positive or negative manner due to the change concept.

- Input provided by system users and non-users through public information meetings, discussion with staff and community leaders, and recommendations from the Transit Board.

- Review of the location of known travel activity generators (current and anticipated).

- Expectations of potential funding availability into the future.

This section describes service change options considered to support either of the future funding paths. With the information from this section, decision-makers will have critical inputs for decisions whether they are:

1. To reduce service as no funding increase is feasible, or
2. To increase funding and allow service expansion.

Service Reductions to Address Operating Deficit

Working with staff, options for service reductions that would reduce annual operating costs were identified and reviewed. Throughout discussions all participants viewed the identified options as having negative impacts on current users and the utility of the system to attract new patrons and support development within the community. Service reduction options are documented in Table 12.

Reducing service on either the fixed route network or for paratransit reduces the hours and/or miles of service provided, which can jeopardize the ability to compete for approximately $520,000 in federal funding awarded through the Small Transit Intensive Cities (STIC) program. While Bismarck-Mandan have been able to meet the award criteria in two categories for 2019, the margin over the threshold is small. A reduction in service substantial enough to close the operating deficit gap will jeopardize meeting the added funding qualification threshold in one or both categories, which impacts federal funding.

Due to the possibility of losing substantial federal funding, the service reduction recommendations should be considered as part of a more comprehensive funding plan. Small changes to service, such as reducing late night paratransit by one or two hours-which is a low-productivity period, could be a cost reduction element that complements a plan that focuses on increasing revenue and does not jeopardize competitive federal funding.

Service Enhancements If Added Operating Funding is Available

The need for transit service in Bismarck and Mandan has been identified by community leaders, residents, business owners, employers, human service agencies, and a list of other groups. While the need and desire for service has been universally expressed, there is still the need to provide the financial support to provide service that meets the community's needs.

Current service provides a baseline level of mobility for persons who cannot or chose not to drive. However, the one-hour to two-hour frequency and ending the service day by 7:00 PM does not provide travel options for persons working retail or second shift jobs or travel on Sundays.

Table 12. Fixed Route and Paratransit Service Reduction Options

Option	Description	Annual Operating Cost Reduction	Impacts
Convert Purple and Brown Routes to 120-Minute Frequency	• System changes implemented in 2017 added frequency (from 120-minutes to 60-minutes) to service in Mandan and Mandan-Bismarck connections. • Routes maintained as currently laid out. • Change schedule to 120-minute headway • Same bus provides service on each route – Supports interlining.	$235,000	Ridership on the combined routes will will likely decline approximately 40%. Estimated annual revenue miles decrease – 72,400 Estimated annual revenue hour decrease – 3,580 Decrease in revenue miles impacts one of two STIC categories ($260,000 in 2019) Fare Income Reduction Estimate - $6,000
Eliminate >70 Years Age Qualifier for Paratransit	• Persons 70 year or older do not need to complete the full paratransit certification process to be able to use the service. • Age is not an FTA qualifier for paratransit use. • The option is to eliminate the qualifier.	$196,000 The estimate reflects the current estimate of all trips by persons using the >70 years old qualifier and not completing the certification process. The amount reflects the maximum but it is anticipated that some riders would certify. Likely estimate is closer to $100,000.	Approximately 14 percent of paratransit riders use the >70 years qualifier option. Approximately 17,000 trips per year. It is likely a percentage of this population would certify for paratransit. Estimated annul revenue miles decrease – 36,465 Estimated annual revenue hour decrease – 2,600 Decrease in revenue miles impacts one of two STIC categories ($260,000 in 2019) Fare Income Reduction Estimate - $25,500
Reduce Paratransit Hours	• Eliminate paratransit service from 7:00 PM to Midnight on weekdays and Saturdays. • Brings paratransit hours more in line with fixed route hours. • Retain early morning (5:30 AM to 7:00 AM) paratransit service.	Weekday period: $88,500 Saturday: $13,900	Approximately 6% of paratransit ridership occurs from 7:00 PM to midnight. Approximately 8,700 trips per year. Estimated annul revenue miles decrease – 37,325 Estimated annual revenue hour decrease – 2,660 Decrease in revenue miles impacts one of two STIC categories ($260,000 in 2019) Fare Income Reduction Estimate - $26,100

The following pages outline service enhancements that would provide a system that better supports travel needs in the region. Each of the ideas are presented separately and include an estimate of annual operating cost and capital cost, as appropriate. They are presented individually as they can be mixed together in separate ways to create a range of benefits to the community. The likelihood of identifying funding to implement all options is small. (Appendix 5. Additional Service Concepts includes four additional concepts reviewed, but not included in the list of higher priority concepts/ideas for implementation if added funding can be found).

Each page describing an option provides the following critical information:

- Description of the option.
- Maps of the coverage, as appropriate.
- List of key benefits and challenges.
- Estimate of annual operating cost and initial capital cost.

The options are not presented in any order of preference or priority.

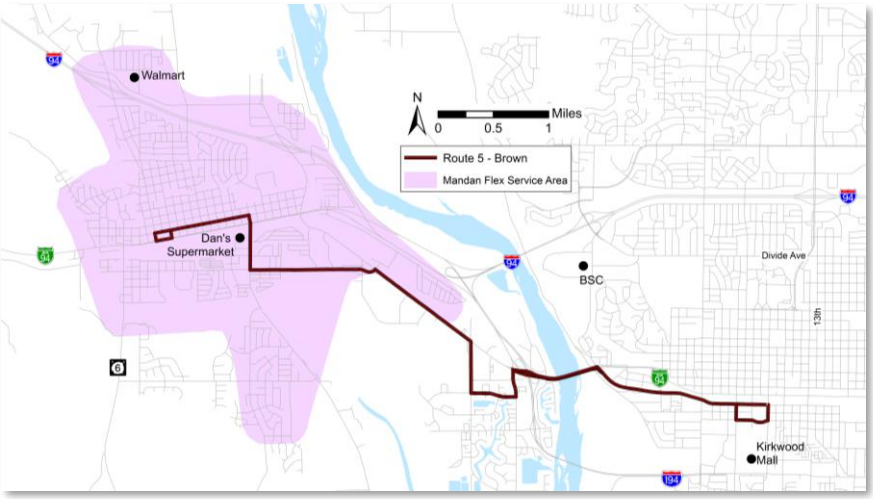
Mandan Flex Route

Annual Operating Cost Increment	
Revenue Neutral to Current	
Flex Route Alone	$212,900

Description

- Discontinue the Purple Route.
- Add a flexible (flex) route transit service within Mandan. The flex service is a call ahead/curb-to-curb transit service which provides transit service to the general public:
- Within a defined service area,
- Has a schedule (designated check-points at Mandan Walmart and Mandan Dan's Supermarket),
- Vehicle Needs: 1 paratransit-type vehicle
- Without a fixed transit route trajectory.
- Riders in flex zone can connect to Bismarck Downtown Transit Hub using Brown Route with a one-hour frequency (proposed transfer point at Dan's supermarket).
- No change in paratransit service to Bismarck.
- Consolidation of Mandan Flex Service and the Mandan-Mandan Paratransit trips

Mandan Flex Service and Brown Route



Potential Benefits and Challenges

Benefits	Challenges
• Provides service to higher density, lower income area (3.7 square miles of service area) • Curb-to-curb service • Connects directly to Blue Route • Mixed use of public transit and paratransit within the flex service area	• Cost

Northwest Bismarck Flex Route

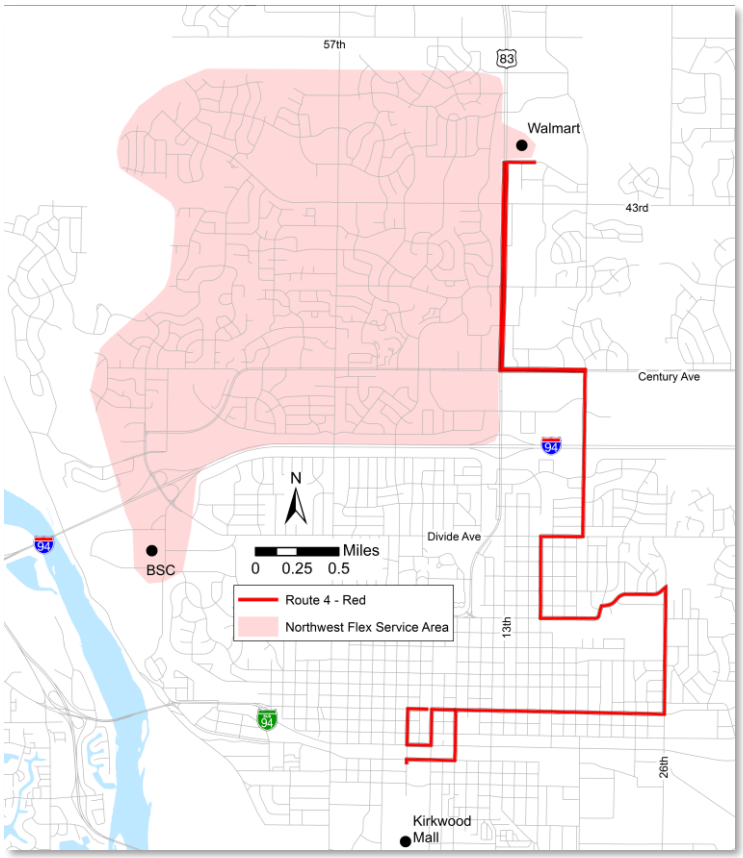
Annual Operating Cost Increment

$212,900

Description

- Discontinue west portion of Red Route (west of US Hwy 83).
- Add a flexible (flex) route transit service in northwest Bismarck. The flex service is a call ahead/curb-to-curb transit service which provides transit service to general public:
  - Within a defined service area,
  - Has a schedule (designated check-points at Walmart North and BSC),
  - Without a fixed transit route trajectory.
- Riders in flex zone can connect to Front Ave Transfer Center using Red Route with a one-hour frequency (proposed transfer point at Walmart North).
- No change in paratransit service in the area.
- Consolidation of Northwest Flex Service and Paratransit within the northwest flex service area.
- Vehicle needs: 1 paratransit-type vehicle

Northwest Flex Service and Red Route



Potential Benefits and Challenges

Benefits	Challenges
• Provides service to higher density, lower income area (3.7 square miles of service area) • Curb-to-curb service • Connects directly to Blue Route • Mixed use of public transit and paratransit within the flex service area	• Cost

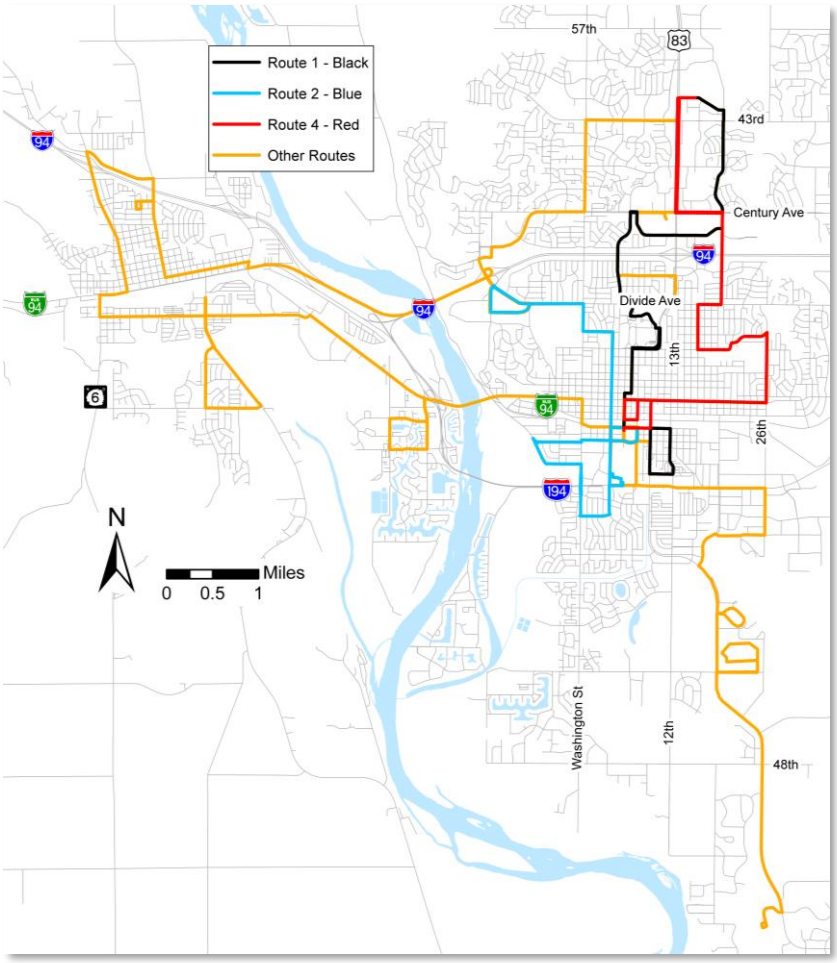
Strengthen the Core - Enhance Service Frequency

Annual Operating Cost Increment	
Upgrade 1 Route All Day	$170,300
Upgrade 2 Routes All Day	$340,600
Upgrade 3 Routes All Day	$510,900
Upgrade All 3 in AM/PM Peaks Only	$170,300

Description

- Core routes, Blue and Black, upgrade to 30-minute frequency on weekdays.
- Red Route upgrades to 60-minute frequency on weekdays.
- New vehicle requirement: 3 fixed-route buses (one for each route)
- Vehicle needs: Each Route Improvement – Add 1 bus to fleet
- AM Peak – 7 AM to 9 AM
- PM Peak – 4 PM to 7 PM

Service Frequency Improvements



Potential Benefits and Challenges

Benefits	Challenges
• Frequency improvement results in more utility and mobility for the riders. • Improves transit experience for riders by reducing the implicit fear of missing the preferred bus (since the next bus available in 30-60 minutes).	• Cost • The system may need additional capacity to accommodate increase in ridership to improved frequency.

Transit Center

Convenience and comfort are two of the most critical determinants of successful transit. Both characteristics extend beyond the on-board travel portion of a trip. Waiting areas and well-designed transfer locations are also critical to improving convenience and comfort. The current transfer hub along Front Avenue, does not support either of these characteristics.

Current Transfer Hub Location – Front Avenue

The transit development plan published in 2012 and the Downtown Bismarck Subarea Plan (2013) document the benefits of a downtown transit center and possible locations. The downtown plan location on Front Avenue between 5th Street and 6th Street provided opportunity to bring together fixed route transit service, taxis and ride hailing services, and multi-use trails into an integrated center.

Based on the current route network, a multimodal center at the transit hub location identified in the downtown plan provides a substantial benefit to transit riders. The downtown plan concept included a parking structure to replace the building on the western portion of the identified site. The inclusion of the structure is an important part of a financial plan for a transit center.

Bismarck Downtown Plan Transit Hub Concept (2013)

A 12 Bus Bays (40')
B Center Platform & Building
C CAT/Bis-Man Parking
D Taxi
E Rail Trail
F Rail Trail Ramp
G Stair to Underpass

Source: 2013 Downtown Bismarck Subarea Plan, City of Bismarck and Bismarck-Mandan MPO

It is unlikely that Bis-Man Transit would have the capital funding to construct a platform on the parcel within the early part of the six-year planning horizon. Thus, the concept for a center consistent with the downtown plan concept is included in the longer-term period, giving Bis-Man Transit and the city an opportunity to determine other uses on the site and locate capital funding.

Designated Fixed Route Stops

Properly spaced designated stops help improve overall reliability of the fixed route service as passenger are in defined location and stops are not bunched together as can occur with flag stops. Fixed bus stops allow a transit agency to better provide riders with information about the system, including:

- Schedules
- Route maps
- Information on all route serving the stops

This information is particularly helpful for attracting new riders to the system by making the network more user friendly.

In the near term, a study is recommended to develop design guidelines for helping staff to determine locations of stops, the level of stop amenities for each location, and the bus stop geometry. Developing stop geometrics is critical to ensure adequate room for buses to maneuver in and out of traffic is provided. The design guidelines should fully integrate ADA guidelines.

Capital Improvement Item Cost Estimate

As part of the TDP, estimates of the costs associated with replacing the fleet to maintain an acceptable state of good repair and other non-budgeted items. The capital projects list does not include vehicles required to support system expansion or enhancement included in the plan. Those costs are summarized with the alternatives discussion. Table 13 summarizes general capital investments.

Table 13. Six Year Annual Capital Investment Plan

Item	Period						Total
	2020	2021	2022	2023	2024	2025	
Vehicle Replacement							
Fixed Route Buses							
Total		$365,000	$365,000	$365,000	$365,000	$365,000	$1,825,000
Local Match Needed		$73,000	$73,000	$73,000	$73,000	$73,000	$365,000
Paratransit							
Total	$78,000	$156,000	$156,000	$156,000	$156,000	$156,000	$858,000
Local Match Needed	$15,600	$31,200	$31,200	$31,200	$31,200	$31,200	$171,600
Bus Stop Signage							
Total			$7,500	$7,500	$7,500	$7,500	$30,000
Local Match Needed			$1,500	$1,500	$1,500	$1,500	$6,000
Front Avenue Transit Center							
Total				$300,000	$1,225,000	$1,225,000	$2,750,000
Local Match Needed				$60,000	$245,000	$245,000	$550,000
Total Capital Need for Year	**$78,000**	**$521,000**	**$528,500**	**$828,500**	**$1,753,500**	**$1,753,500**	**$5,463,000**
Local Match Needed for Year	**$15,600**	**$104,200**	**$105,700**	**$165,700**	**$350,700**	**$350,700**	**$1,092,600**

Note: Figures in the table represent estimates of total capital costs. Federal grants would be requested for these improvements, which would typically fund 80 percent of the cost, with 20 percent being local responsibility.

Input on Service Change (Reduction/Enhancement) Options

The range of options for both future paths were presented at the third round of public information meetings in January 2019 and were the focus of a community input survey available from January 30 through February 22, 2019. Table 14 highlights responses/input received through the outreach efforts.

Table 14. Public - Community Leader – Staff Input on Service Options

Group	Service Reduction Option Comments	Service Enhancement Option Comments
Public Input Meeting Attendees	Do not reduce the level of paratransit service provided. Riders rely on the service for a majority of their trips.	Do not mix paratransit riders and proposed flex route general public riders.
Online Survey Input		Online survey had limited responses and each respondent was asked to rank the seven (prioritized and additional) service enhancement options. The average rank for 'Strengthening the core – Enhance Service Frequency' was highest. Average rank for 'South Bismarck Flex Route' was the lowest. Open-ended comments included improvements to fixed route without reducing paratransit and reducing walk/bike distance to bus-stops.
Bis-Man Transit Board	Revise the text referring to paratransit. Revise references to declines in federal funding. Adjust hours in references to paratransit relative to demand response. Revise potential cost savings from service reduction concepts.	
Bismarck City Commission	Do not reduce hours of paratransit service. Do not change 70+ year old paratransit use guideline.	
Mandan City Commission		Provide documentation of the likely operating funding request to close the gap to be requested from Mandan.
MPO Policy Board	Wil not support changing paratransit hours. Need to support employment What are benchmarks for useful life? Was bus capacity/size reviewed?	
MPO Technical Advisory Committee	No specific comments received.	

Additionally, the options and input received through the engagement process were reviewed with Transit Board members, City Commissioners from Bismarck and Mandan and the MPO Policy Board and Technical Advisory Committee. Input received from county commissioners from Burleigh and Morton Counties is also provided in the table.

Funding the Transit Plan

Avoiding a future that has reduced fixed route and/or paratransit services requires locating and accessing additional funds. Earlier chapters of the transit plan demonstrate that Bis-Man Transit's operating costs per revenue mile or hour are very competitive with peer systems. Thus, finding and eliminating expenditure inefficiencies will not yield large enough financial benefit to avoid service reductions or the need for increased funding. Additionally, recent experience in Bismarck and Mandan is that federal and state transit funding levels are stagnant at best; leaving local sources as the best option for addressing funding shortfalls.

During the transit planning process, several options for generating operations revenue were identified and discussed. Acceptable sources are those generating consistent funding each year, which reduces reliance on competitive federal and/or state grants. Bis-Man Transit continuously looks for grant opportunities. However, grants are much more logical and viable sources for capital improvements than for day-to-day operations.

Table 15 documents the range of alternative funding and enhanced funding sources reviewed as part of the transit plan. The table highlights the following for each:

- Potential Annual Yield: Yield equates to how well a funding opportunity can pay for an improvement alternative, as previously discussed. For example, adding a route or adding frequency to a route costs about $220,000 per year in operating costs. The low level of yield reflects an amount less than $220,000. Moderate yield reflects an amount approximately equal to the cost of implementing one of the improvements. High yield represents a level where two of the alternatives could be funded.
- Equity: Equity is a measure of the balance between who benefits from and who pays for the improvement. A high measure of equity assumes people benefitting are responsible for most of the cost burden. A low measure of equity would reflect an alternative where most of the burden is shouldered by people not directly benefitting.
- Ease of Implementation: This category is a measure of how easy or difficult it could be to implement a funding change. Alternatives that require referenda votes or changes in legislation are generally very difficult to implement. Those requiring support from the Commission are generally easier as long as there is a logical argument for the change

While there are secondary factors to discuss as a community reviews concepts to enhance revenue, the key points of the discussion are:

- How much revenue will the concept generate relative to the need.
- Are those benefiting from the service/improvement paying a fair share of the cost?
- Can the concept get enough support from residents and decision-makers to be implemented?

Table 15. Alternate Local Operating Revenue Concepts

Funding Enhancement Option	Evaluation Criteria		
	Yield	Equity	Ease of Implementation
Property Tax – Add to the current mill levy	Bismarck – Moderate Mandan - Low	Moderate	Low – Little/No support for increasing property taxes
Local Option Sales Tax	High	Moderate	Moderate
Utility Fees – Electricity/Gas/Water/ Communications	Low	Low	Moderate
Community Group/ Private Partnerships	Low	High	Moderate
Concepts Below: Not Supported for Transit in Century Code			
Transit Service Area Fee	Low-Moderate	High	Low – State action required
Parking Fees – Apply to public structures and/or a fee per space for new development	Low	Low-Moderate	Moderate – Fees might be dedicated to structure maintenance.
Uber/Lyft/Taxi Fees	Low	Low	High
Local Option Gas Tax	Moderate – Only one commodity; tempers yield	Low-Moderate	Moderate
Special Assessments on Property	Low	Low	Low – Perceived similar to property tax. Little/No support.
Wheel Tax – Fee on vehicle registrations in Bismarck or Mandan	Moderate-High	Moderate	Low – State action required.

Of the alternatives described in Table 15, a preferred alternative summary comparison relative to these three points is provided:

- Local Option Sales Tax: This option generally provides the greatest yield opportunity and more communities are seeing it as a politically palatable option. This has been especially true in regional centers like Bismarck and Mandan, as it can be argued that a portion of the burden is placed on people coming from outside the region, which

lowers the overall burden on full time residents. The concept has, however, been identified as a moderately regressive tax as lower income groups generally spend a greater portion of their income on good and services that collect sales tax.

- Wheel Tax: Of the options in the list, a wheel tax has the potential to generate enough revenue to allow implementation of many of the alternatives. While not used in North Dakota, many of the states in the region employ the concept to generate funds for transportation improvements, including South Dakota and Nebraska. While the alternative would need action by the state legislature, it could be a very favorable option to generate funding without placing a substantial burden on any group. With average vehicle ownership at approximately two per household for the region, a tax of $5 to $10 per vehicle could generate between $500,000 to $750,000 per year.
- Ride Hailing Service (Uber/Lyft) Fee: More and more communities are looking to ride hailing services as partners in providing service and sources of added revenue. From an ease of implementation perspective, this alternative is generally well-supported by local governments as a source of income. However, for communities the size of Bismarck and Mandan, the amount of funding that can be generated needs to be weighed against benefits provided. An estimate of the potential yield is likely less than $50,000.

Technology and Marketing

Bis-Man Transit recently upgraded their transit system technology. Updates include an automatic vehicle location (AVL) and computer aided dispatch (CAD) system, a traveler information system (RouteShout 2.0), and a scheduling and dispatching software (Ecolane) for their paratransit and demand-response service.

Real Time Transit Information

A CAD/AVL system provides real-time bus arrival information to passengers at specific stops along a route. Real-time information can help increase ridership by reducing customer anxiety, enhancing perceived service reliability, and presenting a more "modern" image of public transit, particularly among discretionary riders that could choose other means of transportation.

Traveler Information System

Bis-Man Transit uses Routematch as their traveler information system, which includes a mobile device application (RouteShout 2.0) and transit vehicle hardware for visual and audio travel information while on-board the vehicle. Android and Apple users can use RouteShout 2.0 to get a prompt heads-up about the real-time bus schedule, minimizing idle wait times. The mobile app can also be used to locate bus routes near the user.

Scheduling and Dispatching Software

Bis-Man Transit uses Ecolane, an automated real-time scheduling and dispatching software, for their demand-response and paratransit service. The software provides a logic-based schedule optimization for demand-response scheduling and dispatch. In addition, the software is capable of flex and fixed-route schedule lookup (with GTFS integration) which is likely to be helpful if flex services are added to Bis-Man Transit. The proposed flex service is expected to be consolidated with paratransit and demand-response service within the service area. Hence, Ecolane's capability to work with flexible route schedules makes it easier to accommodate additional dispatching and scheduling needs.

Fareboxes

An easily understood, convenient and hassle-free fare collection system is important for transit customers. Currently, Bis-Man Transit riders have a range of ways to pay their fare and ticketing options. Bis-Man Transit accepts cash fares for both fixed route and paratransit trips. In late 2018, the mobile pay option (using the Token Transit application) was added as an option, giving riders the opportunity to buy a one-way fare, a round trip fare or a multi-day pass. A key marketing tool for mobile pay is the ability of an individual

or an agency to send a single or multiple ride pass to another person. In many communities, this option is marketed to human services agencies and parents as a convenient way of buying a trip, or series of trips, for a rider without access to a bank account.

Riders show their mobile device to the driver who records the trip. While farebox add-ons are available to automate the mobile pay option, at this time the option is not cost-effective.

Bis-Man Transit Mobile Pay Posters and Mobile Device Ad

In addition to paying cash and mobile pay, riders have the option of purchasing a one-day or 30-day pass.

Autonomous Vehicles in Public Transit[8]

With recent research on Autonomous Vehicles (AV) and advances in technology, the following sub-section intends to explain the current state of the AV technology and how it is likely to affect the public transportation industry in the future. The information provided better informs the transit agency about the possible technology changes that can occur in infrastructure and transportation planning.

Technology Overview

"Autonomous vehicles are vehicles that are capable of intelligent motion and action without requiring either a guide to follow or teleporter control."[9] Although AVs can be used for undersea, space, air, water and land transportation, this section[7] is focused on land-based autonomous vehicles specifically used for public transportation purposes.

In recent times, autonomous vehicles (AVs) are considered one of the major technological advancement in the transportation sector. Advanced safety features in automobiles

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[8] Majority of the content of this section is created using various online sources and the detailed literature review included in the Autonomous Vehicle Policy Guide for Public Transportation in Florida MPO's, Fall 2017 Studio Team, Florida State University. Available through APA, Florida Chapter.

[9] Lozano-Perez, T. (2012). *Autonomous robot vehicles*. Springer Science & Business Media.

significantly evolved between 2000 and 2010. These safety features include electronic stability control, blind spot detection, forward collision warning and lane departure warning. Since 2010, auto manufacturers have added several advanced driver assistance features to automobiles like rearview video systems, automatic emergency braking, rear cross traffic alert and lane centering assist.

Driverless vehicle technology awareness and public interest has increased since 2016 but there are some shifts in consumer sentiments based on crashes involving autonomous vehicles[10]. However, the partial automation safety features like lane keeping assist, adaptive cruise control, traffic jam assist and self-park, have been popular among the consumers with the consideration that such features help create better drivers. By a combination of software and hardware (sensors, cameras and radar) support, auto manufacturers are able to help drivers identify safety risks and provide warnings to avoid potential crashes. Hence, these smart technologies are helping to save lives and prevent injuries[11].

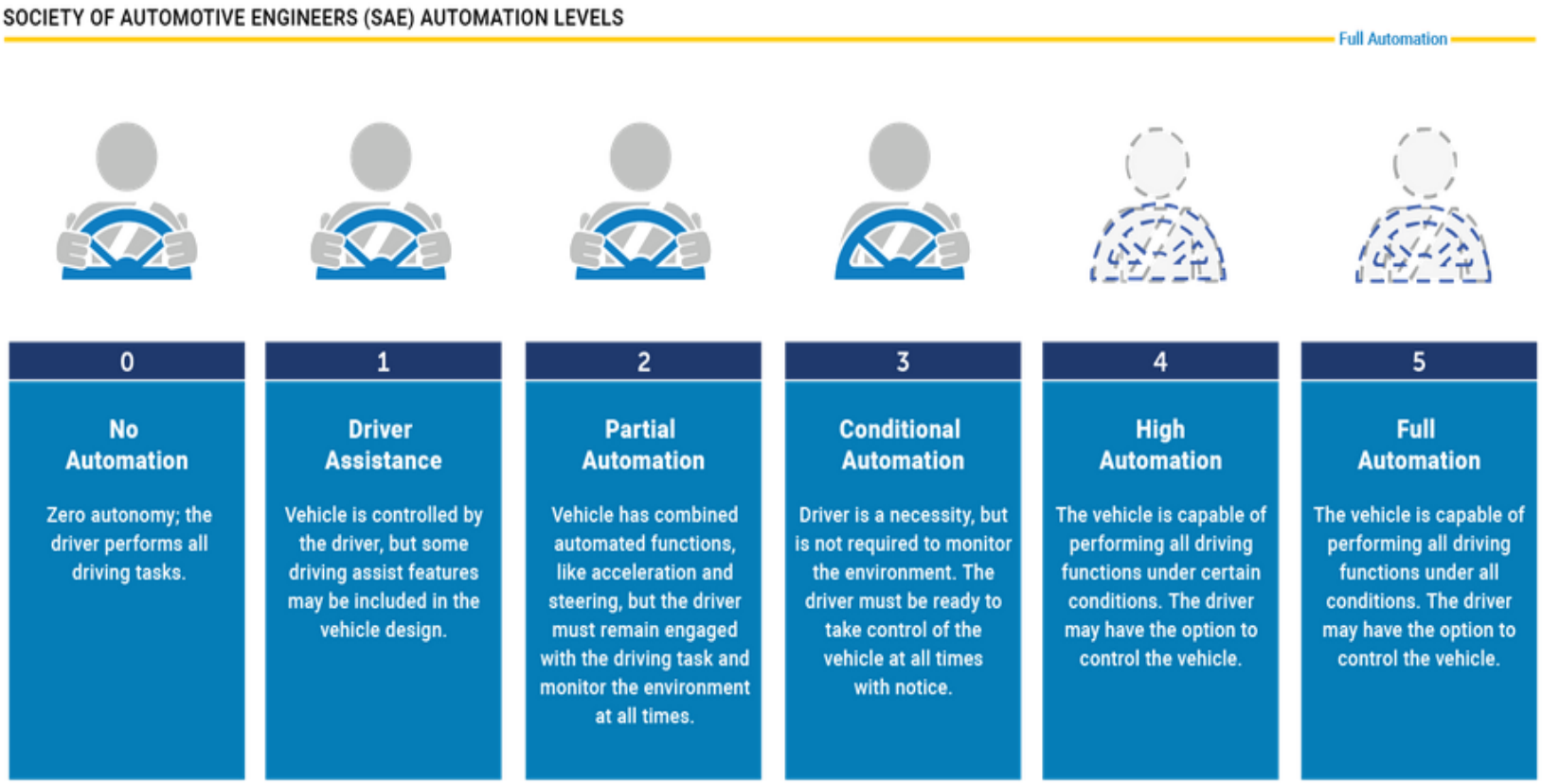
There are six levels of autonomous driving[12] as defined by the Society of Automotive Engineers (as shown in Figure 35).

Benefits[13]

- Safety: Since 94 percent of all crashes are due to human error, the safety benefits of AVs are paramount.
- Economic and Societal Benefits: Eliminating human-error crashes will get rid of the lost workplace productivity, loss of life and decreased quality of life due to injury.
- Efficiency and Convenience: Smooth traffic flow and reduced traffic congestion
- Mobility: For people who cannot drive due to disability or age-related factors, AVs can significantly improve their mobility allowing people to age-in-place and improve livability of communities.

[10] https://www.researchgate.net/publication/299745930_Societal_and_Individual_Acceptance_of_Autonomous_Driving & https://electronics360.globalspec.com/article/12572/consumer-acceptance-of-self-driving-cars-declining-report
[11] https://www.ucsusa.org/clean-vehicles/how-self-driving-cars-work#.XCos6TBKipo
[12] https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety#issue-road-self-driving
[13] https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety#issue-road-self-driving

Figure 35. AV Automation Levels



Challenges[12]

Other than the most common challenge of societal acceptance and perception associated with any new technology, challenges associated with AVs include costs, safety (AV and human driver), system failures, ethics, liability and legal considerations, security, data privacy and travel and infrastructure issues. Additionally, as implementation of the concept will require years, if not decades for a substantial integration, regulatory and policy documents need to account for mixing autonomous and human driven vehicles in urban and rural environments. Since the AVs use machine learning and artificial intelligence as their learning methods while functioning, they are continuously collecting data from their surroundings, which presents challenges associated with algorithm robustness, data privacy and security.

The North Dakota legislature has been debating the AV concept for the last two sessions, with the primary outcome being direction to conduct a study regarding potential autonomous vehicle regulations. The study will form the basis for anticipated future legislation regarding introduction of automated vehicles.

AVs in Public Transit

The previous section covered the general benefits and challenges of AVs, however it is also important to assess the benefits and challenges associated with AVs in public transit. Wilmot and Greenword (2016)[14] state that public transit, dedicated freeway lanes and parking are ways to introduce the AV technology in a fixed setting. The following sub-sections explain the various factors associated with AVs in public transit.

Mobility

AVs in public transportation is likely to significantly improve the mobility of people by gradually improving the accessibility for riders. Starting with short, closed-loop applications, expanding to on-demand branched-routing applications, then robo-vehicle go-anywhere networks (taxis, vans, mini-buses), AVs allow better access than traditional public transportation systems.

Workforce Considerations and Labor Agreements

The adoption of AVs in public transportation vehicles at partial, conditional or high automation levels is likely to require the drivers to possess a wider-ranging skill-set than traditional drivers. The driver duties could include supervising passenger transfer; operating the vehicle to and from storage locations or maintenance depot; and the detection and management of emergency situations. However, to make transition to AVs, labor unions

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[14] Wilmot, C. Greensword, M. (2016) Louisiana Transportation Research Center – Investigation into legislative action needed to accommodate the future safe operation of autonomous vehicles in the state of Louisiana. Louisiana Transportation Research Center. Url: https://www.ltrc.lsu.edu/pdf/2016/FR%20571.pdf

will need to be involved to account for changes in job duties for staff using autonomous technology. To some extent, the public transit employee federal protection laws provide for the preservation of jobs and will be critically important to review before AV technology adoption (Gettman et al., 2017)[15].

Land-use

Heinrichs (2016)[16] states that autonomous transit systems may change the urban fabric differently than autonomous private cars. Anderson et al (2016)[17] suggests that the adoption of autonomous vehicles for public transit could lead to urban centers being denser, thus decreasing the amount of space used to park vehicles. Fully autonomous vehicles could potentially drop off passengers into urban cores and then drive to satellite parking areas.

ADA Compliance

ADA compliance is usually taken care of by bus operators. The current design for AVs is accommodating to ADA individuals but cannot guarantee smooth operations if the rider is unable to understand the instructions. However, other than fully autonomous vehicles with no likely presence of human, human drivers on-board the vehicle can assist with ADA compliance.

Funding Constraints and Liability

Major challenges include funding constraints, liability of transit agencies, and the general acceptance of the new technology by industry professionals, system operators and the public.

Planning and Partnerships

Long range transit planning and regional planning/coordination must consider future AV technology deployment and favorable infrastructure and land-use decisions for the same. Moreover, due to the many challenges facing local transit authorities within their respective MPOs - from decreasing ridership to funding - it will be imperative to have P3s, or public-private partnerships, for adopting the AV technology. Partnerships can start with addressing first mile – last mile connectivity and fixed route gap coverage issues. The

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[15] Gettman, D. Lott, J.S. Goodwin, G. Harrington, T. (2017) Impacts of Laws and Regulations on CV and AV Technology Introduction in Transit Operations. National Cooperative Highway Research Program; Transportation Research Board; National Academies of Sciences, Engineering, and Medicine

[16] Heinrichs, Dirk (2015). Autonomous Driving: Technical, Legal and Social Aspects. Ladenburg, Germany: SpringerOpen. 213-231. Available from https://link.springer.com/book/10.1007/978-3-662-48847-8

[17] Anderson, J. Karla, N. Stanley, K.D. Sorenson, P. Samaras, C. Oluwatola, O. (2016) Autonomous Vehicle Technology: A Guide for Policymakers. Rand Corporation. Available from: https://www.rand.org/pubs/research_reports/RR443-2.html

NCHRP report created the following suggestions for transit agencies (Gettman et al., 2017)[18].

- Develop or revise long-range plans to consider changes in definitions and language
- Identify opportunities and threats posed by AV
- Identify potential strategies for managing the changes
- High frequency BRT
- First/last mile applications
- Conventional fixed route system
- Public Input
- Explore partnership options

Safety and Compliance

The National Highway Traffic Safety Administration (NHSTA) has been given the responsibility to address the following concerns regarding the safe and agreeable adoption of AVs[19].

- Setting Federal Motor Vehicle Safety Standards (FMVSSs) for new motor vehicles and motor vehicle equipment (with which manufacturers must certify compliance before they sell their vehicles)
- Enforcing compliance with FMVSSs
- Investigating and managing the recall and remedy of noncompliance and safety- related motor vehicle defects nationwide
- Communicating with and educating the public about motor vehicle safety issues

State governments are responsible for addressing the following concerns:

- Licensing human drivers and registering motor vehicles in their jurisdictions
- Enacting and enforcing traffic laws and regulations
- Conducting safety inspections, where States choose to do so

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[18] Gettman, D. Lott, J.S. Goodwin, G. Harrington, T. (2017) Impacts of Laws and Regulations on CV and AV Technology Introduction in Transit Operations. National Cooperative Highway Research Program; Transportation Research Board; National Academies ofSciences, Engineering, and Medicine

[19] NHSTA, Automated Driving Systems 2.0: A Vision for Safety

- Regulating motor vehicle insurance and liability

Funding and Acquiring AVs

Funding Options through NHSTA include

- Emerging technology and autonomous vehicle testing and pilot programs
- Advanced Transportation Congestion Management Technologies development (ATCMTD)
- Fixing America's Surface Transportation (FAST) Act

Here are some key findings for transit agencies looking to add AVs to their fleet:

- Retrofitting is a financially viable option compared to buying a new autonomous bus or shuttle.
- An electric bus will be necessary for compatibility and economic efficiency to transition to an autonomous bus.
- Retrofitting is done mainly for freight semi-trucks, but bus manufacturing companies are applying this to buses.
- Fully automated buses are nearing the end of real world testing and will be on the market soon.
- Autonomous buses will be very expensive to buy or lease.
- Shuttles have about a 12-person capacity with an average max speed of 25 MPH and have undergone more extensive testing than buses.
- Shuttles are currently estimated at $250,000 to lease.

Short term and Long-term Strategies for Adopting AVs

Most leading car manufacturers plan on releasing self-driving car models by 2021[20] and Transportation Network Companies (TNCs) like Uber, Lyft, Via, Chariot and Waymo are already using driverless taxis in their fleet (just with drivers in them). Table 16 shows the short-term and long-term strategies.

Table 16. Short-term and Long-Term Strategies for Adoption of AV Technology

Short-term Strategies	Long-term Strategies
• Establish an AV testing bed within jurisdiction(s) • Choose the type of transit to be deployed • Decide the level of automation that should be tested • Select a vendor • Decide whether to buy or lease vehicles • Secure funding • Conduct public participation initiative to establish buy-in and educate the public • Set up a system of payment • Ensure that state and federal safety regulations are met • Designate an agency to license vehicles and establish this procedure	• Update infrastructure • Make sure that all vehicles/ stations/ operators/ etc. are ADA compliant • Have a workforce development plan for loss of bus driver jobs • Designate a lead agency/ stakeholder group to handle questions and decisions that arise • Develop an emergency action plan for potential cyber security breach • Incentivize development around AV service area

Marketing Strategies

Short and long-term marketing strategies have been identified not only to increase community awareness for transit service, but to increase use. These initiatives are aimed to promote transit service by engaging the community in ways to encourage use of the system. Since limited budget is available for marketing efforts, a menu of strategies is provided to allow choices to take advantage of partnership opportunities or additional funding that may become available.

Short-Term Marketing Strategies

Immediate, focused short-term marketing efforts can re-energize any brand. In coordination with recommended service changes, some short-term marketing strategies are presented below. These strategies are recommended to be implemented to support service changes to Bis-Man Transit as well as improve the visibility of the service within the community as a way to increase potential ridership.

[20] https://www.just-auto.com/analysis/all-those-in-favour-of-avs-say-ai_id182611.aspx

Tagline Marketing Campaign

Within the service area there is a divided perception that paratransit and fixed route service are operated by entirely different organizations. When fixed route service was implemented in 2004, it was branded as Capitol Area Transit (CAT) as a means of building a brand. That brand building has worked, but in the process the connectivity between fixed route and paratransit has been somewhat lost. Bis-Man Transit should engage in developing a new or modified tagline line that retains the identify of both services, however, ensures that users and non-users understand both are operated by one agency and in a coordinated manner. Essentially, you cannot have one without the other.

Bus Stop Information and Amenities

An opportunity for Bis-Man Transit for expanding information is to distribute the Rider Guide and Route Map brochure to more locations, including shelters. It is suggested that a six-month campaign of distribution and monitoring, noting how many brochures are actually taken at each location, be completed. Tracking should be done to note percentage completion of this effort so that this can be communicated to stakeholders.

Flag stops are the most prolific type of bus stop in the system; however, flag stops often do not contain information on which routes or served by the service. Updating key flag stops to include easy to access information on routes served, sources for obtaining real time bus information via mobile phones, and customer service numbers will enhance the visibility and ease of use of the service for both existing and potential riders.

Website and Mobile Application Improvement

Internet and technology focused marketing are essential to the growth of any business. A website is the face of a company or agency and is the first place many people look for information on services offered. Bis-Man Transit has an active website and social media

Sample Smartphone Transit Applications

Source: Dallas Area Regional Transit

accounts, as well as a mobile application to track bus locations. Table 17 highlights key statistics for activity on www.bismantransit.com.

One capability recommended to add to each is the ability to purchase tickets and/or passes for using the system (both fixed route and paratransit). This feature will allow Bis-Man Transit to offer alternative payment options, but may require farebox upgrades. Mobile fare payment has the advantage of speeding up the fare collection on the buses to allow for faster travel times and improved reliability. The smart phone payment is designed to complement the cash fare system and offer options to riders.

Table 17. Bis-Man Transit Website Activity Statistics (October 2018-January 2019)

Descriptor	Activity Level
Monthly Visitors	1,400
Average Page Views	2.7 Per Visit
Average Session Time	2:30 Minutes
10 Most Viewed Pages (Percent of total viewed pages)	Home Page – 21.2% Routes/Schedules – 20.9% Black Route – 4.99% Red Route – 4.81% Procurement – 3.48% Purple Route – 3.10% Schedules – 3.05%

Long-Term Marketing Strategies

Long-term marketing strategies are meant to consistently remind the customer about a brand and entice them to continue purchase those services. The following long-term marketing strategies are recommended for Bis-Man Transit to maintain and expand their ridership base into the future.

Partnerships with Local Businesses

Partnerships with local businesses have been commonly used by transit systems to promote transit ridership. For example, businesses could partner with Bis-Man Transit to advertise and provide discounts for customers that use transit to get to the store. Businesses can provide their employees with bus passes to commute to and from work as a benefit of employment. Local businesses can also purchase advertising space on the Bis-Man Transit website, on vehicles (which is done today through wraps), at bus stops, or at a future transit center. Developing strong relationships with the local business community can not only help to maintain current ridership, but attract new riders by offering incentives to use the transit system. It is recommended to approach and discuss developing partnerships with the local business community on an ongoing basis.

Community Outreach Activities

Community outreach is a good way to increase the visibility of a business. For a transit agency, it is a way to increase awareness of the services provided and potentially attract new ridership. The relationships that drivers have built with their riders is a vital component of community outreach. In addition to continued excellent customer service, it is recommended that Bis-Man Transit continues to participate in and organize community outreach events to promote the brand. The following ideas have been used for potential community outreach activities:

- Providing maps and schedules at community gatherings is an inexpensive way to advertise.
- Organize 'Free Ride Days' where all rides are fare free for one day. This type of outreach program will encourage new riders to try the system at no cost and may result in return customers. Developing partnerships with local businesses could result in a sponsorship of a 'Free Ride Day' that could benefit Bis-Man Transit as well as the local economy.
- Organize a 'Stuff the Bus' event. 'Stuff the Bus' is an event where the community is encouraged to deliver donated, non-perishable items to a bus in a specific location on a specific day. The items collected will then be delivered to a local charity of choice and is a good way to engage the community with the local transit system. Bis-Mn Transit could opt to give a free ride pass to people who make donations as a way to encourage participation and attract new riders. Community outreach events should be scheduled in conjunction with other community activities or celebrations. Engaging in community activities will improve the awareness of services provided by Bis-Man Transit.

Educational Campaigns

One of the findings in reaching out to stakeholders that may not currently ride the bus service is that often their exposure to the service was established early on by parents or through other means of being exposed as young children to the public transit system. An idea for exposing children to service could include holding a contest for designing a bus wrap. Small education-related awards or incentives could be provided to the winning group.

Campaigns used in other communities include educational outreach campaigns by working with city, county, and state agency partners on "Take Your Child to Work Day", "Mobility Week" and/or "design your bus shelter contest" types of campaigns.

Steps to Implementation

Some primary next steps are provided and summarized below.

Establishing a Budget and Schedule

This task can be conducted in the near-term and should be updated annually as budgets are established for the year ahead. Tasks to include/consider are:

- Pricing out proposed strategies identified above and identify a prioritized list that best suits local needs.
- Establishing a proposed marketing budget (typically at least 1 percent of operating budget) over the next five years.
- Review Transit Development Plan strategies and identify additional marketing needed to coordinate with planned improvements.
- Develop a schedule for implementation of strategies and identify key steps and milestones for implementation.
- Develop a set of performance measures for the marketing campaign, such as the number of pieces of information distributed, website visits, outreach presentations made, etc.

Identify Marketing Staff

This step includes internal identification of internal staff as well as external partners for marketing. Key steps include:

- Identify the main point of contact internally for different tasks that will be performed in carrying out the marketing plan for the year.
- Allocating time dedication needed for performing tasks to understand staff resource hours needed on a month to month, quarterly and annual basis.
- Identify gaps in resources to understand what skills and staff time dedication is needed.
- Coordinate with Bismarck State College, United Tribes Technical College and University of Mary to establish internship programs that could bring cost-effective labor and creativity to marketing tasks.

Appendices

Appendix 1. Route Profiles

Appendix 2. Community Survey Summary Report

Appendix 3. Summary of Public Meetings' Feedback

Appendix 4. Summary of Stakeholder Interviews

Appendix 5. Additional Service Concepts