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Five-Year Transit System Plan for 2020-2025

Arrowhead Transit
Northeast Region

Prepared for:
Arrowhead Transit

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Table of Contents

Figures

Tables

Acronyms

ACS	American Community Survey
ADA	Americans with Disabilities Act
AEOA	Arrowhead Economic Opportunity Agency
FTA	Federal Transit Administration
FTE	Full-Time Equivalent
GMTIP	Greater Minnesota Transit Investment Plan
GTFS	General Transit Feed Specification
LEHD	Longitudinal Employer-Households Dataset
MnDOT	Minnesota Department of Transportation
MPO	Metropolitan Planning Organization
MPTA	Minnesota Public Transit Association
MVLST	Motor Vehicle Lease Sales Tax
MVST	Motor Vehicle Sales Tax
N/A	Not Applicable
NTD	National Transit Database
RDO	Regional Development Organization
TCRP	Transit Cooperative Research Program
U.S.C.	United States Code
USDOT	United States Department of Transportation

Glossary

Access: The opportunity to reach a given destination within a certain timeframe or without significant physical, social, or economic barriers.

Accessible Vehicle: A public transportation vehicle that does not restrict access, is usable, and provides allocated space and/or priority seating for individuals who use mobility devices.

Americans with Disabilities Act (ADA): The Americans with Disabilities Act, passed in July 1991, gave direction to local transit agencies to ensure full access to transportation for persons with disabilities.

Capital Cost: The cost of equipment and facilities required to support transportation systems, including vehicles, radios, shelters, software, etc.

Central Transfer Point: A central meeting place where routes or zonal demand-responsive buses intersect so that passengers may transfer. Routes are often timed to facilitate transferring and depart once passengers have had time to transfer. When all routes arrive and depart at the same time, the system is called a pulse system. The central transfer point simplifies transfers when there are many routes (particularly radial routes), several different modes, and/or paratransit zones. A downtown retail area is often an appropriate site for a central transfer point, as it is likely to be a popular destination, a place of traffic congestion and limited parking, and a place where riders are likely to feel safe waiting for the next bus. Strategic placement of the transfer point can attract riders to the system and may provide an opportunity for joint marketing promotions with local merchants.

Circulator: A bus that makes frequent trips around a small geographic area with numerous stops around the route. It is typically operated in a downtown area or area attracting tourists, where parking is limited, roads are congested, and trip generators are spread around the area. It may be operated all-day or only at times of peak demand, such as rush hour or lunchtime.

Commuter Bus Service: Transportation designed for daily, round-trip service, which accommodates a typical 8-hour, daytime work shift (e.g., an outbound trip arriving at an employment center by 8 a.m., with the return trip departing after 5 p.m.).

Coordination: Coordination means pooling the transportation resources and activities of several agencies. The owners of transportation assets talk to each other to find ways to mutually benefit their agencies and their customers. Coordination models can range in scope from sharing information, to sharing equipment and facilities, to integrated scheduling and dispatching of services, to the provision of services by only one transportation provider (with other former providers now purchasing services). Coordination may involve human service agencies working with each other or with public transit operations.

Dedicated Funding Source: A funding source that, by law, is available for use only to support a specific purpose and cannot be diverted to other uses (e.g., the federal gasoline tax can only be used for highway investments and, since 1983, for transit capital projects).

Demand-Responsive Service: Service to individuals that is activated based on passenger requests. Usually passengers call the scheduler or dispatcher and request rides for dates and times. A trip is scheduled for that passenger, which may be canceled by the passenger. Usually involves curb-to-curb or door-to-door service. Trips may be scheduled on an advanced reservation basis or in “real-time.” Usually smaller vehicles are used to provide demand responsive service. This type of service usually provides the highest level of service to the passenger but is the most expensive for the transit system to operate in terms of cost per trip. In rural areas with relatively high populations of elderly persons and persons with disabilities,

demand-responsive service is sometimes the most appropriate type of service. Sub-options within this service type are discussed in order of least structured to most structured, in terms of routing and scheduling.

- **Pure Demand-Responsive Service**: Drivers pick up and drop off passengers at any point in the service area, based on instructions from the dispatcher. In pure demand-responsive systems, the dispatcher combines immediate requests, reservations, and subscription service for the most efficient use of each driver's time.
- **Zonal Demand-Responsive Service**: The service area is divided into zones. Buses pick up and drop off passengers only within the assigned zone. When the drop off is in another zone, the dispatcher chooses a meeting point at the zone boundary for passenger transfer or a central transfer is used. This system ensures that a vehicle will always be within each zone when rides are requested.
- **Flexibly Routed and Scheduled Services**: Flexibly routed and scheduled services have some characteristics of both fixed route and demand-responsive services. In areas where demand for travel follows certain patterns routinely, but the demand for these patterns is not high enough to warrant a fixed route, service options such as checkpoint service, point deviation, route deviation, service routes, or subscription service might be the answer. These are all examples of flexible routing and schedules, and each may help the transit system make its demand-responsive services more efficient while still maintaining much of the flexibility of demand responsiveness.

Dial-A-Ride Service: A name that is commonly used for demand-responsive service. It is helpful in marketing the service to the community, as the meaning of "dial-a-ride" may be more self-explanatory than "demand-responsive" to someone unfamiliar with transportation terms.

Express Bus Service: Express bus service characteristics include direct service from a limited number of origins to a limited number of destinations with no intermediate stops. Typically, express bus service is fixed route/fixed schedule and is used for longer distance commuter trips. The term may also refer to a bus that makes a limited number of stops while a local bus makes many stops along the same route but as a result takes much longer.

Farebox Recovery Ratio: The percentage of operating costs covered by revenue from fares and contract revenue (total fare revenue and total contract revenue divided by the total operating cost).

Fares: Revenue from cash, tickets, and pass receipts given by passengers as payment for public transit rides.

Federal Transit Administration (FTA): An operating administration within the United States Department of Transportation that administers federal programs and provides financial assistance to public transit.

Feeder Service: Local transportation service that provides passengers with connections to a longer-distance transportation service. Like connector service, feeder service is service in which a transfer to or from another transit system, such as an intercity bus route, is the focal point or primary destination.

Fixed Route: Transportation service operated over a set route or network of routes on a regular time schedule.

Goal: A community's statement of values for what it wants to achieve.

Headway: The length of time between vehicles moving in the same direction on a route. Headways are called short if the time between vehicles is short and long if the time between them is long. When headways are short, the service is said to be operating at a high frequency; if headways are long, service is operating at a low frequency.

Intercity Bus Service: Regularly scheduled bus service for the public that operates with limited stops over fixed routes connecting two or more urban areas not near, that has the capacity for transporting baggage carried by passengers, and that makes meaningful connections with scheduled intercity bus service to more distant points, if such service is available. Intercity bus service may include local and regional feeder services, if those services are designed expressly to connect to the broader intercity bus network.

MAP-21: Moving Ahead for Progress in the 21st Century Act, signed into law in July 2012. MAP-21 established surface transportation funding programs for federal fiscal years 2013 and 2014.

Measure: A basis for comparison, or a reference point against which other factors can be evaluated.

Motor Vehicle Sales Tax: A source of revenue for Minnesota public transit. The percentages of this revenue source designated for metropolitan area and Greater Minnesota transit are defined in Minn. Stat. 297B.09.

Operating Expenditures: The recurring costs of providing transit service (e.g., wages, salaries, fuel, oil, taxes, maintenance, insurance, marketing, etc.).

Operating Revenue: The total revenue earned by a transit agency through its transit operations. It includes passenger fares, advertising, and other revenues.

Paratransit Service: "Paratransit" means the transportation of passengers by motor vehicle or other means of conveyance by persons operating on a regular and continuing basis and the transportation or delivery of packages in conjunction with an operation having the transportation of passengers as its primary and predominant purpose and activity but excluding regular route transit. "Paratransit" includes transportation by car pool and commuter van, point deviation and route deviation services, shared-ride taxi service, dial-a-ride service, and other similar services.

Passenger Trip (Unlinked): Typically, one passenger trip is recorded any time a passenger boards a transportation vehicle or other conveyance used to provide transportation. “Unlinked” means that one trip is recorded each time a passenger boards a vehicle, no matter how many vehicles that passenger uses to travel from their origin to their destination.

Performance Indicator: An indicator is a metric that provides meaningful information about the condition or performance of the transportation system but is neither managed to nor used to evaluate the effectiveness of policies, strategies, or investments.

Performance Measure: A performance measure is a metric that measures progress toward a goal, outcome, or objective. This definition covers metrics used to make decisions or evaluate the effectiveness or adequacy of a policy, strategy, or investment.

Performance Target: A target is a specific performance level representing the achievement of a goal, outcome, or objective.

Point Deviation Service: A type of flexible route transit service in which fixed scheduled stops (points) are established but the vehicle may follow any route needed to pick up individuals along the way if the vehicle can make it to the fixed points on schedule. This type of service usually

provides access to a broader geographic area than does fixed route service but is not as flexible in scheduling options as demand-responsive service. It is appropriate when riders change from day to day but the same few destinations are consistently in demand. Also sometimes called checkpoint service.

Public Transportation: Transportation service that is available to any person upon payment of the fare either directly, subsidized by public policy, or through some contractual arrangement, and that cannot be reserved for the private or exclusive use of one individual or group. “Public” in this sense refers to the access to the service, not to the ownership of the system that provides the service.

Revenue Hours: The number of transit vehicle hours when passengers are being transported. Calculated by taking the total time when a vehicle is available to the public with the expectation of carrying passengers. Excludes deadhead hours, when buses are positioning but not carrying passengers, but includes recovery/layover time.

Ridership: The total of all unlinked passenger trips including transfers.

Ridesharing: A form of transportation, other than public transit, in which more than one person shares the use of a vehicle, such as a van or car, to make a trip. Variations include carpooling or vanpooling.

Route Deviation Service: Transit buses travel along a predetermined alignment or path with scheduled time points at each terminal point and in some instances at key intermediate locations. Route deviation service is different than conventional fixed route bus service in that the vehicle may leave the route upon requests of passengers to be picked up or returned to destinations near the route. Following an off-route deviation, the vehicle typically returns to the point at which it left the route. Passengers may call in advance for route deviation or may access the system at predetermined route stops. The limited geographic area within which the vehicle may travel off the route is known as the route deviation corridor.

Section 5304 (State Transportation and Planning Program): The section of the Federal Transit Act of 1991, as amended, that provides financial assistance to the states for purposes of planning, technical studies and assistance, demonstrations, management training, and cooperative research activities.

Section 5307 (Urbanized Area Formula Program): The section of the Federal Transit Act of 1991, as amended, that authorizes grants to public transit systems in urban areas with populations of more than 50,000 for both capital and operating projects. Based on population and density figures, these funds are distributed directly to the transit agency from the FTA.

Section 5310 (Enhanced Mobility for Seniors and Persons with Disability): The section of the Federal Transit Act of 1991, as amended, that provides grant funds for the purchase of accessible vehicles and related support equipment for private non-profit organizations to serve elderly and/or disabled people, public bodies that coordinate services for elderly and disabled, or any public body that certifies to the state that non-profits in the area are not readily available to carry out the services.

Section 5311 (Non-urbanized Area Formula Program): The section of the Federal Transit Act of 1991, as amended, that authorizes grants to public transit systems in non-urbanized areas (fewer than 50,000 population). The funds initially go to the governor of each state. In Minnesota, MnDOT administers these funds.

Service Area: The geographic area that coincides with a transit system’s legal operating limits (e.g., city limits, county boundary, etc.).

Service Gaps: Service gaps can occur when certain geographic segments cannot be covered by transportation services. This term can also refer to instances where service delivery is not available to a certain group of riders, or at a specific time.

Service Span: The duration of time that service is made available or operated during the service day (e.g., 6 a.m. to 10 p.m.).

Standard: A recommendation that leads or directs a course of action to achieve a certain goal. A standard is the expected outcome for the measure that will allow a service to be evaluated. There are two sets of transit standards.

- **Service design and operating standards**: Guidelines for the design of new and improved services and the operation of the transit system.
- **Service performance standards**: The evaluation of the performance of the existing transit system and of alternative service improvements using performance measures.

Total Operating Cost: The total of all operating costs incurred during the transit system calendar year, excluding expenses associated with capital grants.

Transfer: Passengers arrive on one bus and leave on another (totally separate) bus to continue their trip. The boarding of the second vehicle is counted as an unlinked passenger trip.

Transit Dependent: A description for a population or person who does not have immediate access to a private vehicle, or because of age or health reasons cannot drive and must rely on others for transportation.

Transit Subsidy: The operating costs not covered by revenue from fares or contracts.

Transit: Transportation by bus, rail, or other conveyance, either publicly or privately owned, that provides general or special service on a regular and continuing basis. The term includes fixed route and paratransit services as well as ridesharing. Also known as mass transportation, mass transit, or public transit.

Trip Denial: A trip denial occurs when a trip is requested by a passenger, but the transportation provider cannot provide the service. Trip denial may happen because capacity is not available at the requested time. For ADA paratransit, a capacity denial is specifically defined as occurring if a trip cannot be accommodated within the negotiated pick-up window. Even if a trip is provided, if it is scheduled outside the +60/-60-minute window, it is considered a denial. If the passenger refused to accept a trip offered within the +60/-60-minute pick-up window, it is considered a refusal, not a capacity denial.

Volunteers: Volunteers are persons who offer services to others but do not accept monetary or material compensation for the services that they provide. In some volunteer programs, the volunteers are reimbursed for their out-of-pocket expenses; for example, volunteers who drive their own cars may receive reimbursement based on miles driven for the expenses that they are assumed to have incurred, such as gasoline, repair, and insurance expenses.

1. Executive Summary

Arrowhead Transit is a public transportation service that offers a variety of intercity, deviated route, and demand response (Dial-A-Ride) services. Local routes in Virginia and Grand Rapids make regular scheduled stops multiple times a day. Other deviated route services make weekly, biweekly, or monthly long trips between cities. Dial-A-Ride service is operated in Virginia, Mountain Iron, Chisolm, Grand Rapids, International Falls, Ely, Grand Marais, Two Harbors, Hermantown, Aitkin, Cloquet, Moose Lake, Pine City, and Floodwood. Annually, Arrowhead Transit provides almost 300,000 revenue hours and 6 million revenue miles of service and facilitates over 630,000 trips.

To identify Arrowhead Transit's needs for the 2020 to 2025 period, the project team met with staff from the agency three times to learn about and discuss the agency's operating structure and environment, challenges, and opportunities for improvement. The first two meetings were a chance to gather information and begin considering strategies and opportunities for Arrowhead Transit. At the third meeting, the project team engaged with operations planning staff from each service sub-area to develop a comprehensive list of the agency's needs for the five-year period and to prioritize these needs according to their relative importance to the agency's operations.

The project team identified capital and operational needs and assigned each one a level of priority based on agency employees' understanding of its operations and challenges. The highest priority capital and organizational needs include:

- New maintenance facility in Gilbert
- Comprehensive facilities study and fleet replacement plan
- Farebox system implementation
- Additional mechanics
- Continuation of Rural Rides Program
- Fleet expansion to accommodate high priority operational needs
- Accelerated replacement of high mileage buses
- Upgraded reservation system
- Updated website
- Marketing and advertising
- Driver recruitment
- Maintain free transfer program with DTA
- Upgrade security cameras and maintenance capabilities at Hermantown facility

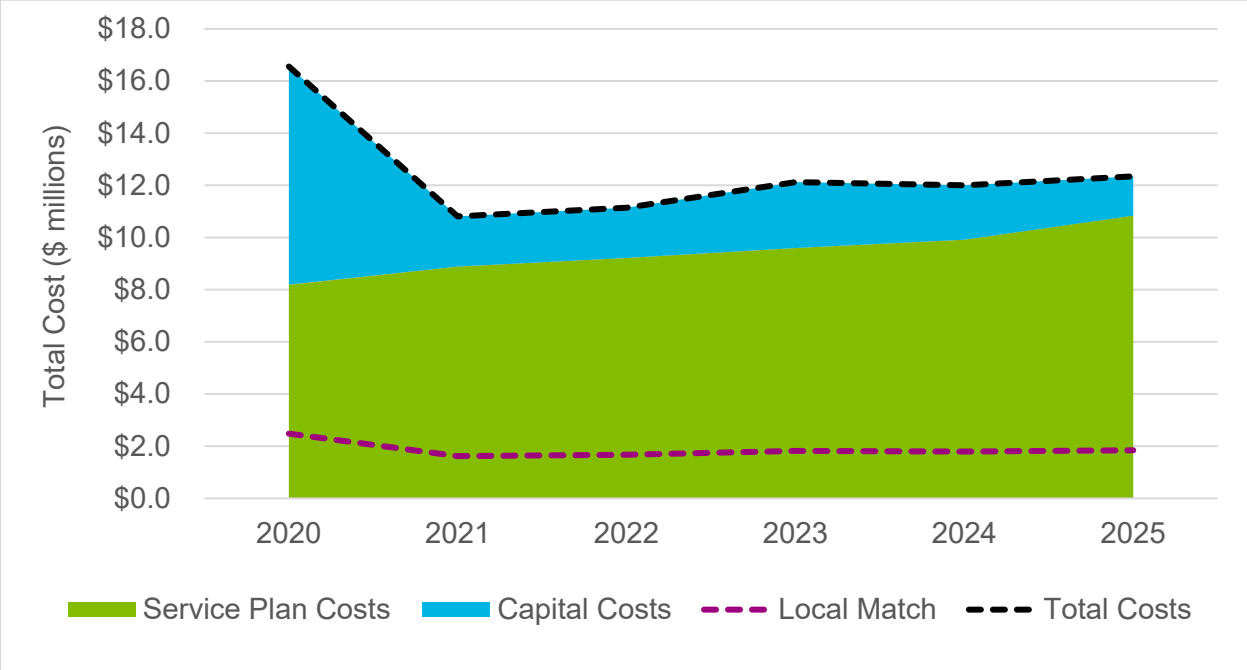
Highest priority operational needs include:

- Expand Dial-A-Ride service in Cloquet, Grand Rapids, Hermantown, Pine City, Virginia/Mountain Iron, and Sandstone
- Discontinue the Hill City-Grand Rapids "shopping run"
- Guarantee service on following runs:
  - Pine City-Duluth
  - McGregor-Palisade-Aitkin-Brainerd

  - Moose Lake-Cloquet
  - Meadowlands-Culver-Duluth
  - Sandstone-Hinckley-Pine City
  - Pine City-North Branch-Cambridge
- Make the Aitkin-McGregor-Cromwell-Duluth service a seasonal, summer only service (three times per year)
- Streamline Duluth services

Other identified needs are documented in Chapter 6. Capital and operating plans for 2020 through 2025 are included in Appendix A. Total costs for the five-year plan are shown on Figure 1. As shown, capital costs are front loaded in 2020 for expansion of the Gilbert maintenance facility and expedited replacement of the oldest fleet vehicles. Service costs increase with cost escalation and expansion throughout the five-year plan period, with many Dial-A-Ride service increases occurring particularly in 2020 and 2021. In 2025, larger increases are associated with expansion of deviated route services in Cook and Lake Counties.

Figure 1. 2020-2025 Plan, Local Revenue Requirements



This five-year transit system plan is intended to inform agency decisions and investments between 2020 and 2025. It is considered a “living document” and providers are encouraged to update the plan as necessary to meet changing agency and community needs.

2. Why a Five-Year System Plan?

Transit systems in Greater Minnesota have been working in a rapidly changing environment with system mergers and increased demand for service along with new policies and funding situations. Despite significant growth in the amount of service available outside of the Twin Cities Metropolitan Area, transit in Greater Minnesota is not always recognized or understood by local officials and residents. To address the growing need for transit service in a way that is integrated and embraced by the community, a vision for the future of each transit system is critical. Without a plan, systems are put in the position of having to react in the moment to new circumstances and operate on a year to year basis without a longer-term vision to guide annual budgets and decision making.

Transit providers and MnDOT agree that individual five-year plans will help identify system-specific priorities based on themes from the Greater Minnesota Transit Investment Plan (GMTIP). Five-year plans will help systems better deliver service and work toward overall goals such as:

- Improving coordination of services to meet transportation needs;
- Increasing ridership/usage across the network;
- Ensuring fiscal responsibility as a transit funding agency;
- Anticipating and planning for future funding levels to achieve service expansion;
- Articulating and communicating a vision for the transit system and the benefits it provides to the community.

Plans are intended to help systems work with local government officials, local planning agencies, transit system board members, and other organizations to prepare for these changes. Transit agencies recognize the importance of involving local officials in planning activities to continue building local support for improving transit systems, including long-term commitment of local funds to leverage state and federal dollars.

The process for developing the five-year plans is guided by a consultant Project Manager, the Office of Transit and Active Transportation at MnDOT, and the Minnesota Public Transit Association (MPTA). A Project Advisory Committee consisting of Transit Directors, staff from MPOs (Metropolitan Planning Organizations) and RDOs (Regional Development Organizations), local government officials, service organization representatives, and staff from MPTA and MnDOT is providing input and identifying key issues to be addressed by the plans.

Larger transit systems routinely develop and update five-year plans as do local governments when it comes to planning for future development. The Greater Minnesota Transit System five-year plans will allow all transit service to be incorporated into the larger transportation vision for communities as they plan for new economic development and a future with an aging population.

Policies established through the Olmstead Plan and Americans With Disabilities Act (ADA) require communities to accommodate the needs of people with disabilities. A statutory goal of meeting 90% of the need for transit service by 2025 in Greater Minnesota is also focusing more attention on exactly how to expand service around the state.

With a well-defined five-year plan, goals and ideas for improving transit service can be put into action with a clear blueprint for which routes to add or expand, specific hours of service to adjust, and how the funding can be identified to cover additional operating and capital expenses. The plans will also facilitate communication with the public and help raise awareness

of how and where transit service is provided in the state, which will help encourage greater ridership.

The five-year plans are designed to be updated annually to meet changing needs and circumstances.

Transit service improves the livability and prosperity of communities across Greater Minnesota. The Five-Year Transit System Plan will bring all stakeholders together to develop a future vision that will guide the decisions that are made today.

3. Agency Overview

Arrowhead Transit is a service arm of the Arrowhead Economic Opportunity Agency (AEOA) and provides deviated route service, Rural Rides, on-demand (Dial-A-Ride), destination (on-demand to specific locations), and regional connections across eight counties in northeastern Minnesota. Arrowhead Transit also operates 11 separate service contracts for numerous entities, including social service agencies. Arrowhead Transit's service area, shown on Figure 2, is 23,578 square miles and covers approximately 27% of the state of Minnesota and includes the counties of Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, St. Louis, and Pine. The service area borders Canada to the north and Wisconsin to the east.

3.1 Transit Agency Background

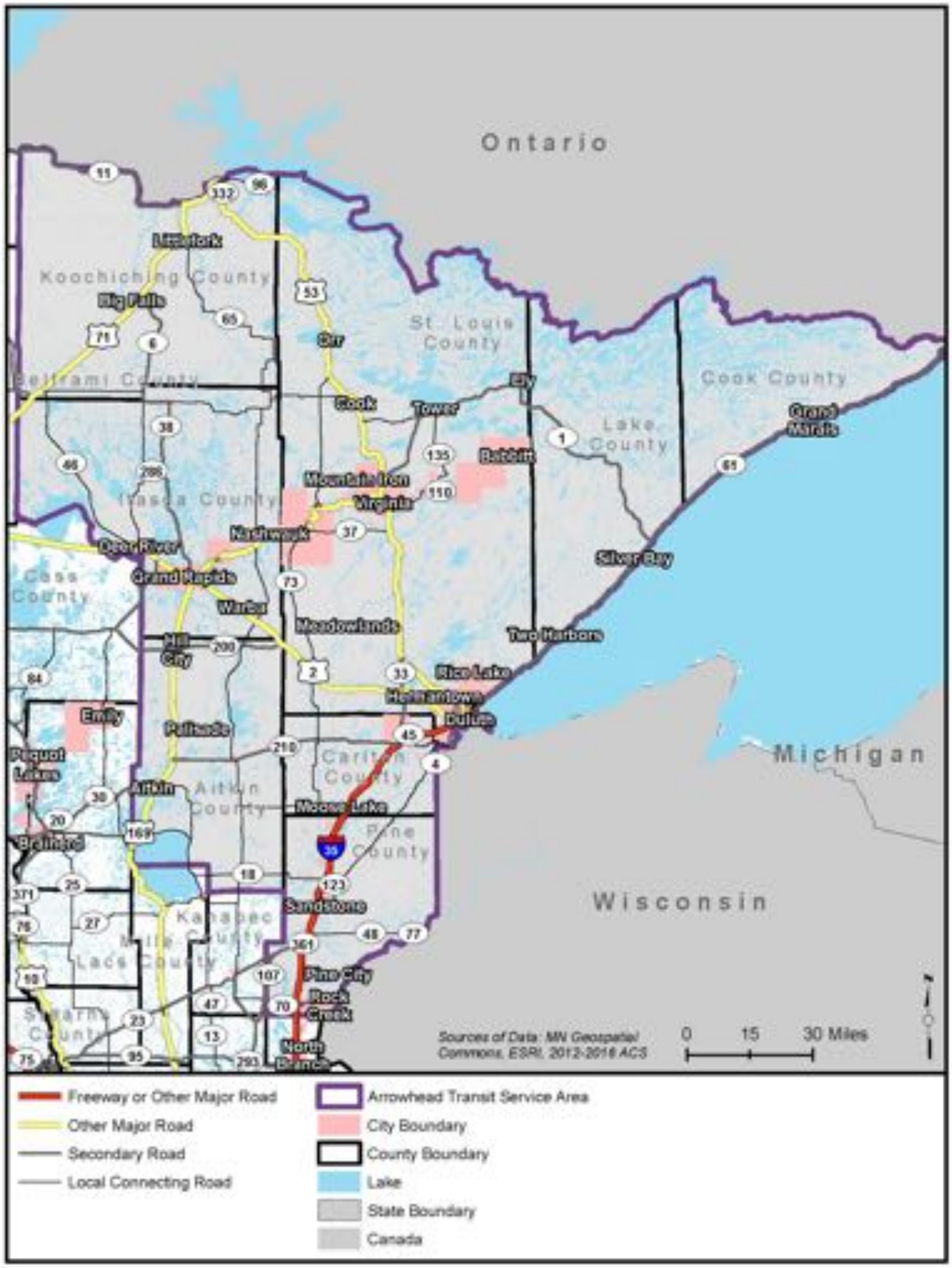
Arrowhead Transit is a public transportation service within the AEOA. The agency started in 1974 as a rural senior transportation service through a partnership between Cook, Itasca, Koochiching, and St. Louis Counties. The initial service was operated with four buses using limited funding from the Older Americans Act. Arrowhead began to broaden their services to include general public transportation with support from the MnDOT. Lake County joined the system in 1975 followed by Aitkin County in 1979 and Carlton County in 1986, creating the largest transit service area in Minnesota and one of the largest in the country. Pine County joined in 2011. Arrowhead Transit's focus is providing transportation connections between rural areas and larger communities for workforce opportunities, social services, medical appointments, and shopping.

3.2 Governance

Arrowhead Transit is part of the AEOA and governed by their Board of Directors. The Board is comprised of 27 members representing the private, community, and public sectors. The Arrowhead Transit Director reports directly to the AEOA Executive Director. In addition, the transit agency has an Advisory Board made up of 55 representatives from the eight member counties. The Advisory Board meets every other month and provides guidance and policy direction.

The overall AEOA Mission Statement is "AEOA strengthens communities by providing opportunities for people experiencing social and economic challenges." In addition, Arrowhead Transit has its own mission statement that states "Our mission is to provide affordable, safe, accessible public transportation and support independent living and self-reliance."

Figure 2. Location Map

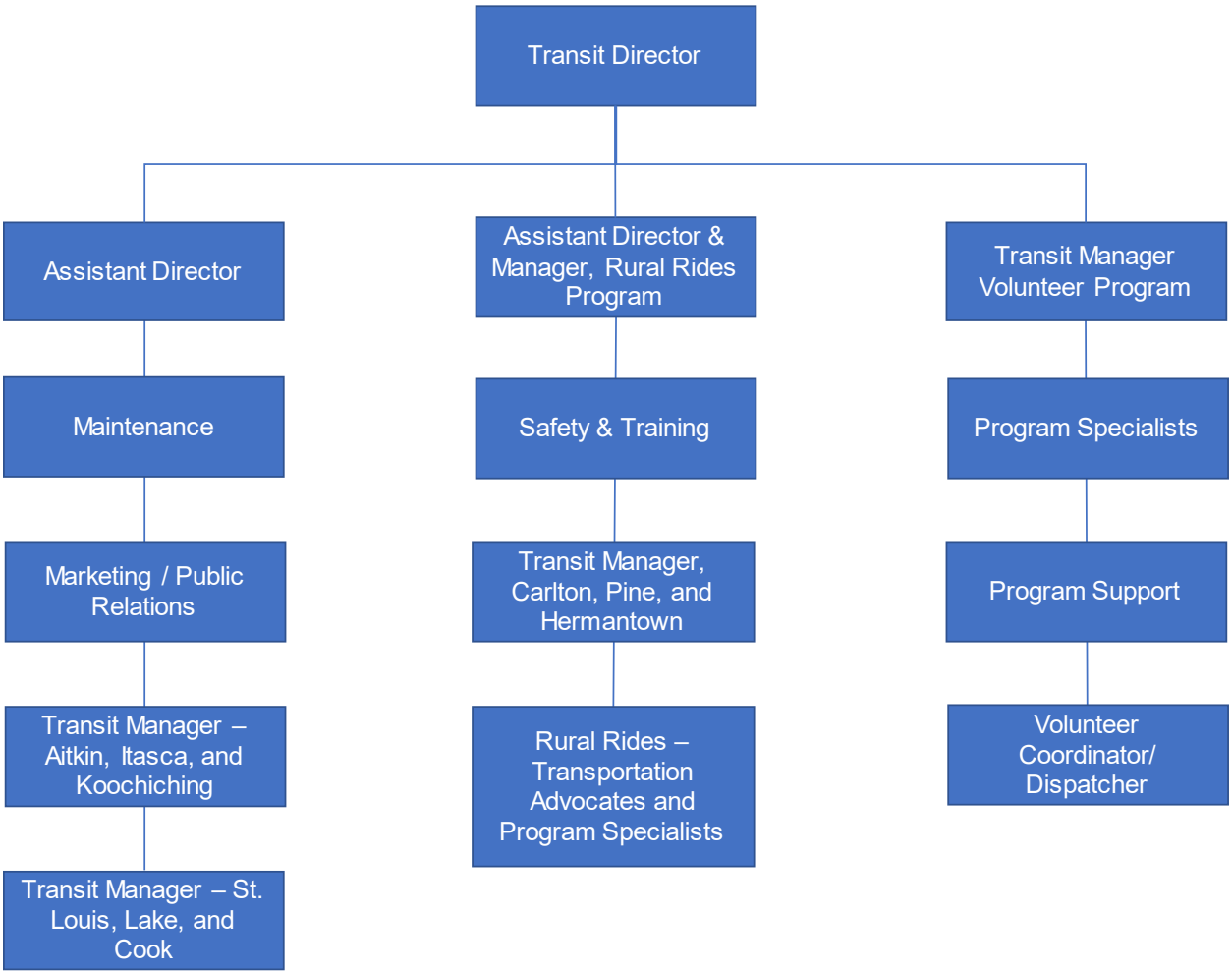


3.3 Decision-Making Process

The Arrowhead Transit Director reports directly to the Executive Director of the AEOA (Figure 3). The Office Manager, two Assistant Directors, Transit Manager – Rural Rides, and Transit Manager – Volunteer Program all report to the Transit Director. Other administrative staff members support the senior management team, including the positions of Maintenance Manager, County-level Transit Managers, Marketing Coordinator, and Safety and Training Coordinator. Arrowhead Transit also employs 81 drivers and dispatchers, and 5 mechanics.

Decisions on changes related to operations and capital purchases are sent to the AEOA Board of Directors for final action.

Figure 3. Organizational Chart



Source: Arrowhead Transit

3.4 Service Area Overview

As shown on Figure 2, Arrowhead Transit includes Cook County, Lake County, St. Louis County (not including services provided by Duluth Transit Authority or Hibbing Area Transit), Koochiching County, Itasca County, Aitkin County, Carlton County, and Pine County. Additionally, some of Arrowhead Transit's regional routes extend beyond this service area to Bemidji in Beltrami County, Brainerd/Baxter in Crow Wing County, Mora in Kanabec County, North Branch in Chisago County, and Cambridge in Isanti County.

Understanding the demographics can help explain changes in transit demand and support recommendations for changes in future transit service. The US Census Bureau is a primary source of demographic data and provides valuable indications of trends and projections. Demographic data from the American Community Survey (ACS) 5-year Estimates (2016) and employment data from the Longitudinal Employer-Households Dataset (LEHD) from 2015 comprise the datasets used to conduct this analysis. An overview of demographic conditions for Arrowhead Transit is provided in Table 1 with more detailed information following. Service area demographics are calculated based on the total of census tracts or block groups that intersect the service area.

Approximately 350,000 residents live in the service area. The highest concentration of population is in St. Louis and Carlton Counties surrounding the City of Duluth, as shown on Figure 4. According to the US Census Bureau's 2017 estimates, service area population has declined by 0.1% since 2010, with the most dramatic declines in Koochiching County (−5.9%) and Lake County (−3.1%). The only counties with positive population growth were Cook County (4.3%), Carlton County (0.3%), and Itasca County (0.2%).[1]

As shown on Figure 5, the highest concentration of poverty is in northern St. Louis County. Additional pockets of higher poverty are located in Hibbing and downtown Duluth in St. Louis County, as well as Grand Rapids in Itasca County.

Figure 6 maps the concentration of households without a vehicle. Block groups with over 30% zero-vehicle households are located in the cities of Hibbing, Virginia, and Duluth in St. Louis County. Rural areas with under 80% vehicle ownership are located along MN 1 in northern Itasca County and central St. Louis County and off MN 210 in central Aitkin County.

MnDOT produces an Economic Health Index and a Transit Dependency Index to help assess a variety of demographic characteristics across a consistent geography. The Economic Health Index, illustrated on Figure 7, is based on the average number of employers, the trend in number of employers, the adult labor participation rate, and the population change from 2010 to 2016. The urban and suburban areas around Duluth, Virginia, and Grand Rapids as well as most of Cook County have higher Economic Health Index scores. "Very Low" scores were more common in Aitkin County, Koochiching County, northern Pine County, and northwestern Itasca County.

The Transit Dependency Index is based on median household income and the percentages of population with a disability, workers without access to a vehicle, and households with limited English proficiency. Transit dependency is the highest along the western half of the service area, as shown on Figure 8. Areas scoring "Very High" for transit dependency include western Cook County, southwestern Koochiching County, western Itasca County, central Aitkin County, southwestern Pine County, and St. Louis County around the City of Virginia and Fairbanks Township.

Approximately 147,000 jobs are located within the study area. Many of these are located in Duluth in southeastern St. Louis County, as shown on Figure 9. Additional employment is clustered along the major trunk highways (removed from figure to increase visibility of employment clusters). Higher job densities exist along the I-35 corridor, from Duluth into Carlton and Pine Counties, and the US 169 corridor between Virginia and Grand Rapids.

[1] US Census Bureau, QuickFacts, https://www.census.gov/quickfacts, accessed September 2018.

Table 1. Demographic and Socioeconomic Profile

County/ Community	Population	Jobs	Median Household Income	People Living Below Poverty	Households without Vehicles	Seniors[a]	Disabled[b]
Service Area	354,846	147,045	$50,834	14.6%	7.7%	18.8%	14.8%
Aitkin County	15,722	3,414	$44,524	12.8%	5.6%	30.0%	18.0%
Carlton County	35,482	13,223	$55,607	13.1%	5.2%	16.3%	11.6%
Cook County	5,215	2,421	$51,793	11.9%	5.6%	24.6%	11.8%
Itasca County	45,356	15,273	$49,507	13.3%	5.5%	21.0%	16.0%
Koochiching County	12,930	4,408	$44,929	16.9%	6.7%	21.7%	16.3%
Lake County	10,721	4,021	$52,320	12.0%	6.2%	24.7%	13.2%
Pine County	29,067	7,336	$45,379	13.7%	5.4%	18.3%	17.6%
St. Louis County	200,353	96,949	$49,395	15.5%	9.3%	17.3%	14.4%
Minnesota	5,450,868	2,557,046	$63,217	10.8%	7.0%	14.3%	10.6%

Source: US Census Bureau ACS 2016, LEHD 2015

[a]Percentage of population that is 65 years or older, US Census Bureau, 2011-2016 ACS 5-year estimates.

[b]Percentage of population with serious difficulty in any of four functional areas identified by the ACS (hearing, vision, cognition, ambulation), US Census Bureau, 2011-2016 ACS 5-year estimates.

Figure 4. Population Density

Figure 5. Persons Living Below the Poverty Level

Figure 6. Zero-Vehicle Households

Figure 7. Economic Health Index

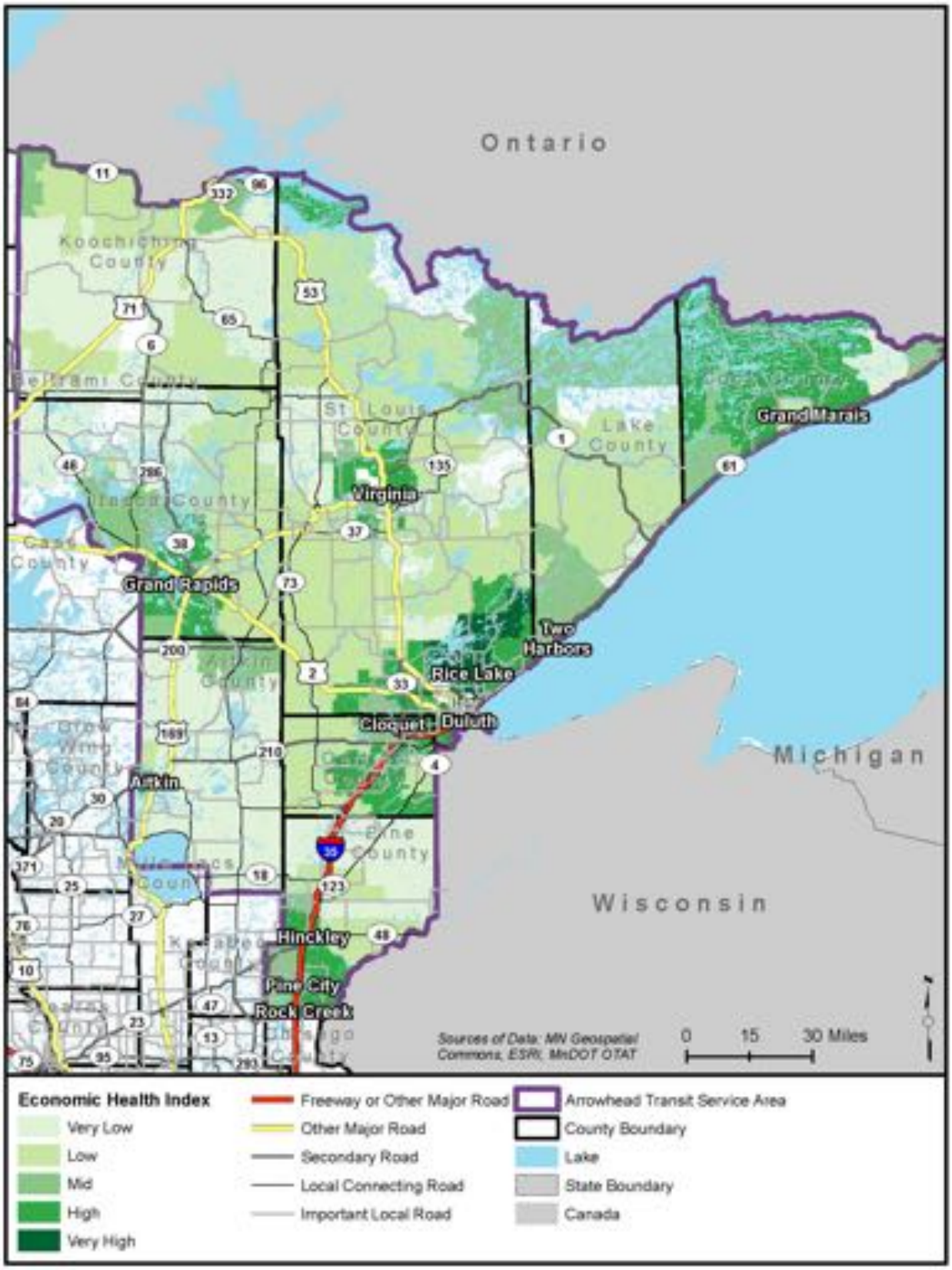


Figure 8. Transit Dependency Index

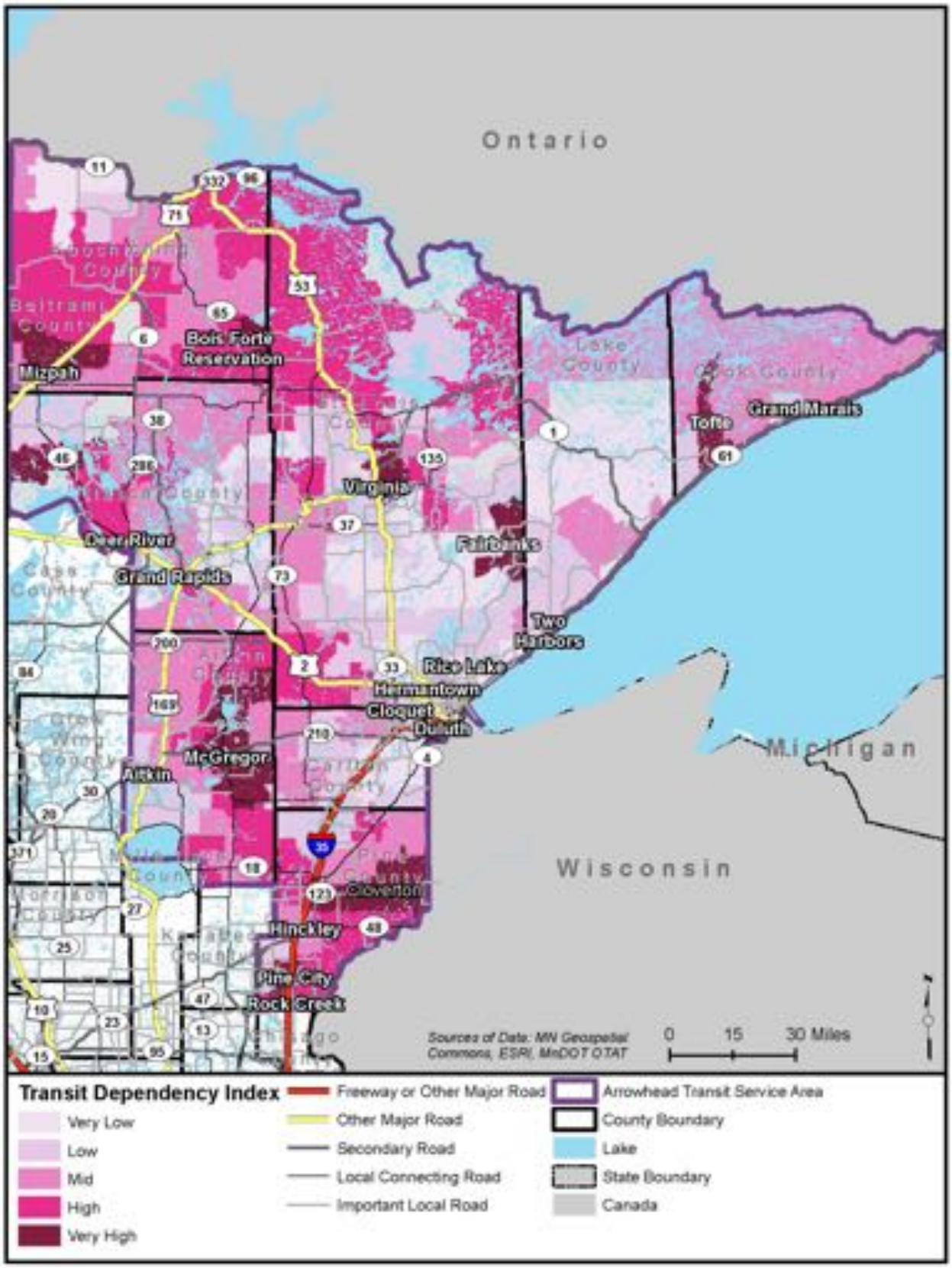


Figure 9. Job Density

Figure 10 shows the primary work locations for those living within the study area. Over half (51%) commute to or within St. Louis County. The next most popular work destinations are in Itasca County and Carlton County, with 9.3% and 7.9%, respectively. Commuters traveling outside the service area are most likely to work in Hennepin County (not shown, 4.1%) or Douglas County, Wisconsin (2.6%).

3.5 Regional Connections

Arrowhead Transit provides regional transit service outside its service area to destinations in neighboring counties, including Bemidji in Beltrami County, Brainerd/Baxter in Crow Wing County, Mora in Kanabec County, North Branch in Chisago County, and Cambridge in Isanti County. See Chapter 4 for additional information about these services. Additionally, Jefferson Lines provides service to many cities within the Arrowhead Transit service area. Hibbing Area Transit is a small urban public transit agency providing connecting transit service located in the City of Hibbing in St. Louis County. Additional public transit connections can be made in St. Louis County within the Duluth Transit Authority service area.

The Bois Forte Tribal Nation, located in northern St. Louis and Koochiching Counties Operates Big Woods Transit. Big Woods provides two demand response routes between Nett Lake and Virginia and two daily commuter routes between Nett Lake and Dam or Cook. The Fond Du Lac Band of Lake Superior Chippewa operates a deviated fixed route to locations on tribal lands, Cloquet, Scanlon, and Duluth. The service operates three times a day on weekdays.

Amtrak service through Minnesota does not extend northeast into the service area. However, MnDOT's 2010 *Comprehensive Statewide Freight and Passenger Rail Plan* includes an intercity passenger rail link between Minneapolis and Duluth as part of its Phase 1 projects.

Several commercial airports are located in the service area, including the Duluth International Airport, Range Regional Airport in Hibbing, and Falls International Airport in International Falls.

4. Agency Transit Services

Arrowhead Transit offers a variety of intercity, deviated route, and demand response (Dial-A-Ride) services, as shown on Figure 11. Local routes in Virginia and Grand Rapids make regular scheduled stops multiple times a day. Other deviated route services make weekly, biweekly or monthly long trips between cities. Some of these routes utilize a "five to go" rule, which requires a minimum of five scheduled passenger trips for the route to operate. Dial-A-Ride service is operated in Virginia, Mountain Iron, Chisolm, Grand Rapids, International Falls, Ely, Grand Marais, Two Harbors, Hermantown, Aitkin, Cloquet, Moose Lake, Pine City, and Floodwood.

As shown on Figure 11, Arrowhead Transit uses a patchwork of different services to meet the transportation needs of customers across a wide service area, with strong regional connections between Grand Rapids and Virginia, along MN 210 in Aitkin County, and along I-35 and MN 61 in Duluth. Local community-based demand response is offered in 14 locations, as summarized in Table 2. Additional local scheduled stop service is also provided in Virginia and Grand Rapids.

Figure 10. Primary Work Destinations for Commuters Living in the Service Area

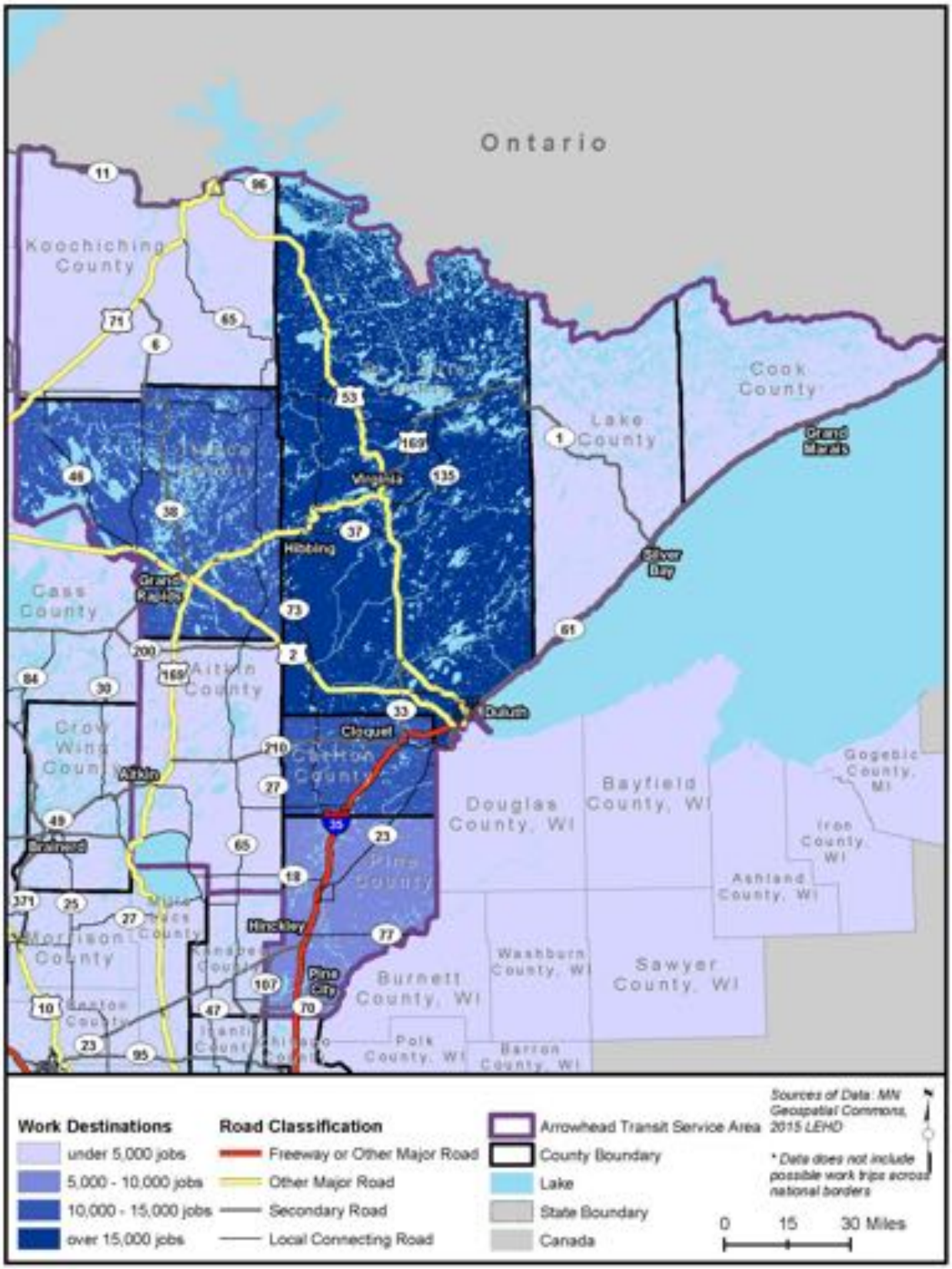


Figure 11. Arrowhead Transit Services

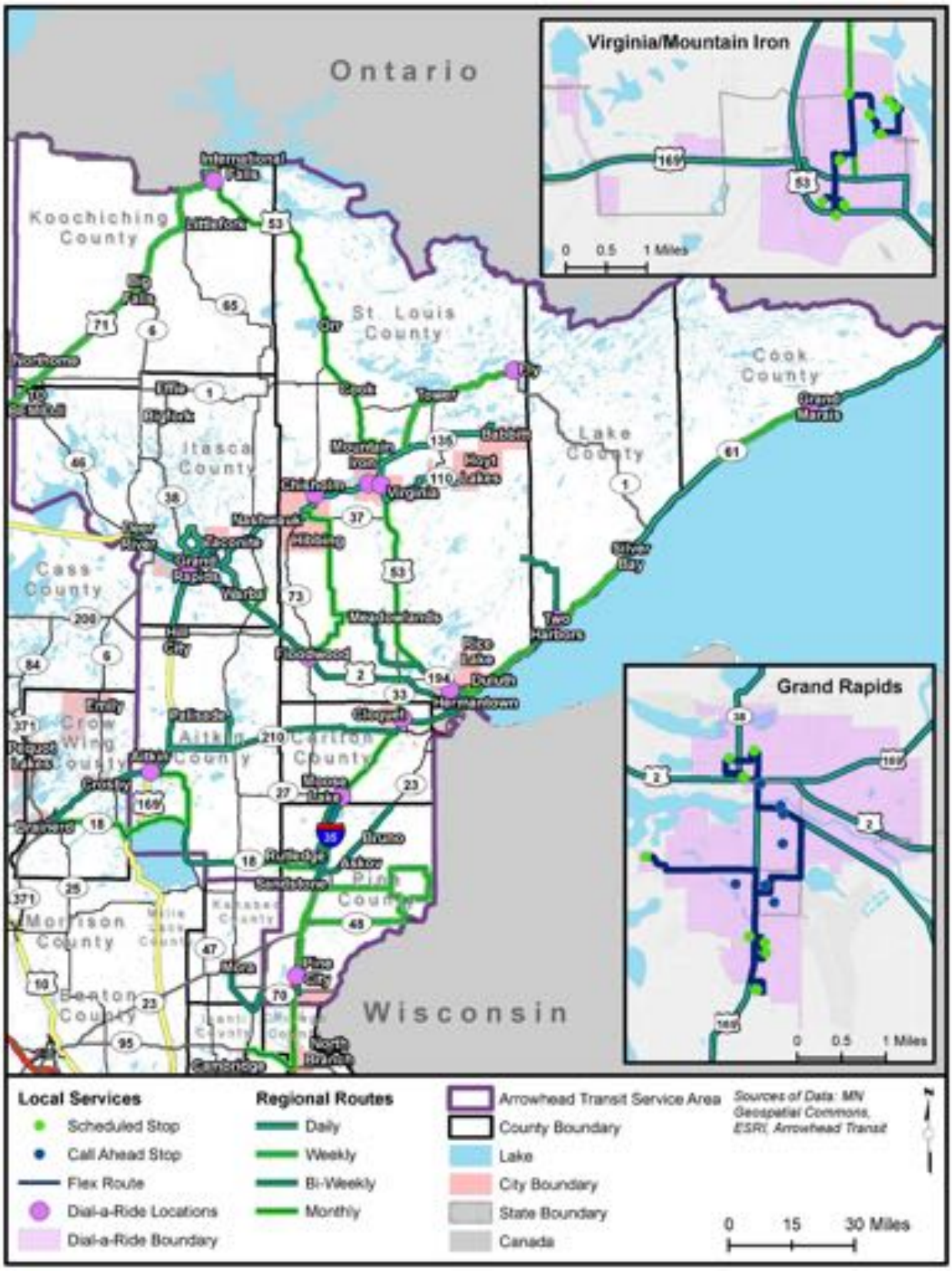


Table 2. Level of Service

County	Location	Service Type	Service Levels
Aitkin County	McGregor to Aitkin	Deviated Route	Two trips daily, Monday through Friday
Aitkin County	Other County Destinations	Deviated Route	Eight trips per month to various locations
Aitkin County	City of Aitkin	Dial-A-Ride	Monday, Wednesday, and Friday, 10 a.m. to 2 p.m.
Carlton County	Cloquet-Esko-Black Bear	Deviated Route	Three trips daily, Monday through Friday
Carlton County	Other County Destinations	Deviated Route	Three trips per month to various locations
Carlton County	Cloquet	Dial-A-Ride	Monday through Friday, 7 a.m. to 8 p.m. Saturday, 9 a.m. to 5 p.m. Sunday, 8 a.m. to 2 p.m.
Carlton County	Moose Lake	Dial-A-Ride	Tuesday and Thursday, 10 a.m. to 1 p.m.
Cook County	Grand Marais to Grand Portage	Deviated Route	One trip daily, Monday through Friday
Cook County	Other County Destinations	Deviated Route	Four trips per month to Duluth
Cook County	Grand Marais	Dial-A-Ride	Monday through Friday, 9 a.m. to 4 p.m. Sunday, 8:30 a.m. to 12:30 p.m.
Itasca County	East Itasca	Deviated Route	Two trips daily, Monday through Friday
Itasca County	West Itasca	Deviated Route	One trip daily, Monday through Friday
Itasca County	North Itasca	Deviated Route	One trip daily, Monday through Friday
Itasca County	South Itasca	Deviated Route	One trip daily, Monday through Friday
Itasca County	Grand Rapids Local	Deviated Route	Six trips daily
Itasca County	Other County Destinations	Deviated Route	Six trips per month to various locations

County	Location	Service Type	Service Levels
Itasca County	Grand Rapids	Dial-A-Ride	Monday through Friday, 7 a.m. to 8 p.m. Saturday, 9 a.m. to 5 p.m. Sunday, 8 a.m. to 2 p.m.
Koochiching County	County Destinations	Deviated Route	Five trips per month to various locations
Koochiching County	International Falls	Dial-A-Ride	Monday through Friday, 7 a.m. to 7 p.m. Saturday, 9 a.m. to 3 p.m.
Lake County	Beaver Bay-Silver Bay-Tofte	Deviated Route	One trip daily, Monday through Friday
Lake County	Other County Destinations	Deviated Route	Ten trips per month to various locations
Lake County	Two Harbors	Dial-A-Ride	Monday through Friday, 9 a.m. to 6 p.m.
Pine County	County Destinations	Deviated Route	Fourteen trips per month to various locations
Pine County	Pine City	Dial-A-Ride	Monday through Friday, 7 a.m. to 6 p.m. Saturday, 9 a.m. to 5 p.m. Sunday, 8 a.m. to 2 p.m.
St. Louis County	Virginia-Eveleth-Gilbert	Deviated Route	Five trips daily, Monday through Friday
St. Louis County	Eveleth to Hibbing	Deviated Route	Two trips daily, Monday through Friday
St. Louis County	Virginia to Hoyt Lakes	Deviated Route	Two trips daily, Monday through Friday
St. Louis County	Virginia to Babbitt	Deviated Route	Two trips daily, Monday through Friday
St. Louis County	Virginia Local	Deviated Route	Seven trips daily, Monday through Friday
St. Louis County	Other County Destinations	Deviated Route	Twenty-one trips per month to various locations
St. Louis County	Ely	Dial-A-Ride	Monday through Friday, 8 a.m. to 3:00 p.m.
St. Louis County	Chisolm	Dial-A-Ride	Wednesday, 9 a.m. to 11 p.m.

County	Location	Service Type	Service Levels
St. Louis County	Virginia	Dial-A-Ride	Monday through Friday, 7 a.m. to 8 p.m. Saturday, 9 a.m. to 5 p.m. Sunday, 9 a.m. to 2 p.m.
St. Louis County	Mountain Iron	Dial-A-Ride	Monday through Friday, 9 a.m. to 6 p.m.
St. Louis County	Hermantown	Dial-A-Ride	Monday through Friday, 8 a.m. to 5 p.m. Saturday, 9 a.m. to 5 p.m. Sunday, 8 a.m. to 2 p.m.
St. Louis County	Floodwood	Dial-A-Ride	Monday through Friday, 9:45 a.m. to 1:30 p.m.

Source: June 2019 Schedules by Location, Arrowhead Transit

Annually, Arrowhead Transit provides almost 300,000 revenue hours and 6 million revenue miles of service. Annual operating statistics for 2018 are summarized in Table 3.

Table 3. 2018 Operating Statistics

Route/Service	2018 Annual Hours of Service	2018 Annual Miles of Service
Demand Response	56,669	657438
Route Deviation	67,370	1,661,266
Total [a]	123,725	2,293,897

Source: Arrowhead Transit

[a] Total adjusted hours and miles may include some unclassified or misclassified trips with a discrepancy of 1% or less when compared to the sum of service types.

4.1 Ridership

As shown in Table 4, Ridership increased by over 56,700 unlinked passenger trips between 2015 and 2018. This corresponded with the addition of approximately 27,500 revenue hours, such that service productivity has fallen slightly from 5.6 to 5.0 riders per hour.

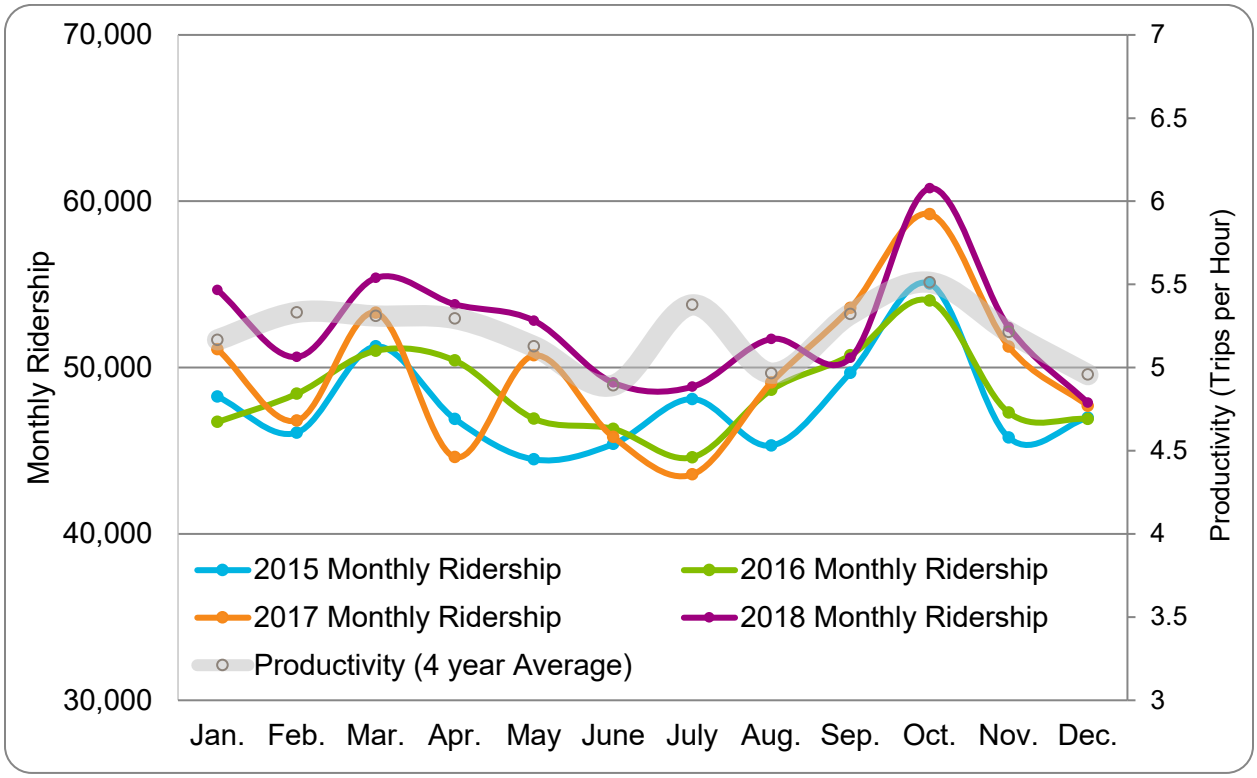
Table 4. System Ridership Trends (2015-2018)

Year	Annual Ridership	Riders/Month	Riders/Hour
2015	573,327	47,777	5.6
2016	582,067	48,506	5.2
2017	596,823	49,735	5.0
2018	630,030	52,503	5.1

Source: Arrowhead Transit

Each year, ridership peaks in October and drops off in December, June, and July. Productivity is highest in October and is also high in July, when fewer riders are offset by a reduction in service hours. Figure 12 summarizes ridership performance by month.

Figure 12. Ridership by Month (2015-2018)



Source: Arrowhead Transit

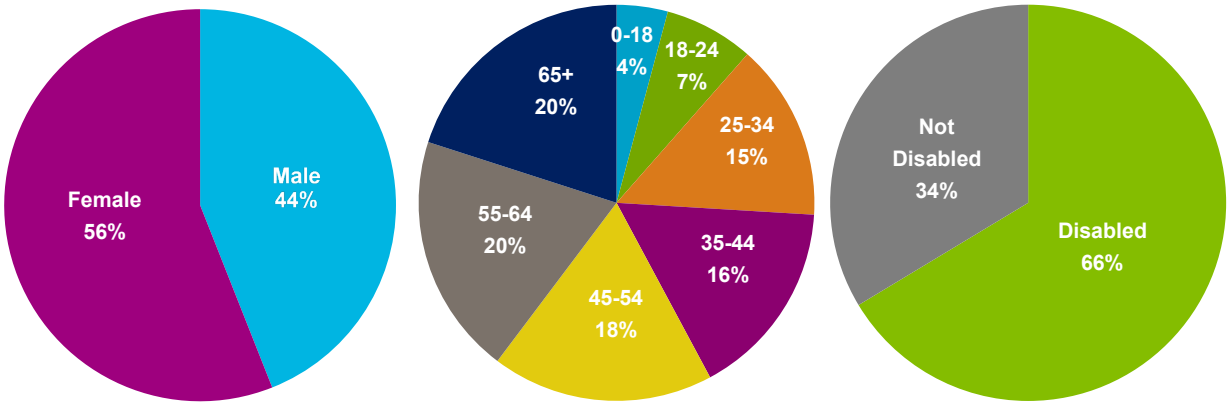
4.2 Service Delivery

Arrowhead Transit is the provider of public transit operations and maintenance for the AEOA and is the designated Federal Transit Administration (FTA) grant recipient responsible for planning and managing the services. Arrowhead Transit also operates 11 separate service contracts for private transportation service. Arrowhead Transit uses a combination of paid staff and volunteer drivers.

4.3 Users

The description of Arrowhead Transit users presented in this section is based on its 2016 on-board survey of 618 passengers. Two hundred and ninety-seven (48%) were demand response (Dial-A-Ride) customers, and two hundred and one (38%) were riding deviated routes. The rest (14%) gave an indeterminable answer or did not respond. Selected demographic characteristics of riders who completed the survey are shown on Figure 13. The majority of respondents (56%) were female. Respondents tended to be older, with 58% over age 45. A majority (66%) identified as having a disability.

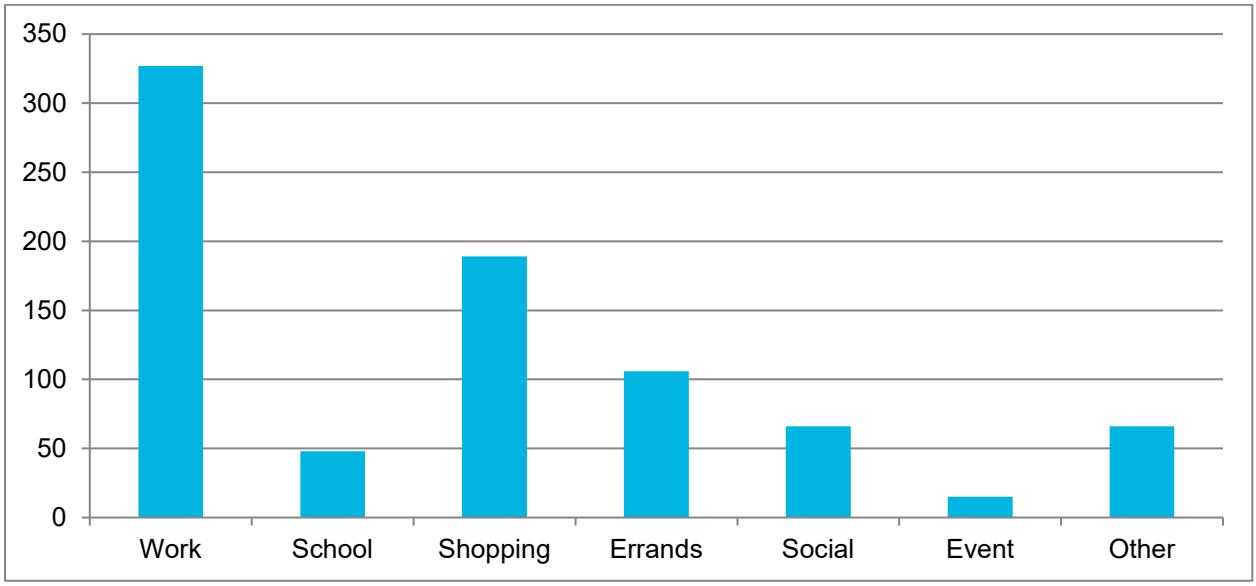
Figure 13. 2016 On-Board Survey Selected Demographic Characteristics



Source: Arrowhead Transit 2016 On Board Survey

The most common trip purpose was work, as show on Figure 14. Over half of all respondents (53%) listed work as the purpose for their trip. Shopping (30%) and errands (18%) were the next most common trip purposes. Other trip purposes include primarily medical or other appointments, as well as some trips for church, volunteer activities, day activity center, social services, and job searching.

Figure 14. 2016 Trip Purposes



Source: Arrowhead Transit 2016 On-Board Survey

5. Capital

Arrowhead Transit uses a fleet of 102 vehicles, including 32 400-series and 70 500-series buses. Arrowhead Transit owns five facilities that cost a total of $2.3 million to construct (current capital value unknown) and leases space at six garages. The leased space costs approximately $78,000 (2018$) per year. Arrowhead Transit does not own or maintain any benches or bus shelters but does have signage at 17 stop locations.

Arrowhead Transit's Capital Plan through 2025 includes replacement of approximately 10 buses per year plus an average of approximately 4 buses per year for service expansion. Replacement vehicle types reflect the needs of the route. All expansion buses are assumed to be smaller, 400-series vehicles.

The Capital Plan for Fleet in this five-year plan (Table 5) supplements Arrowhead Transit's Capital Plan to accelerate vehicle replacements based on the anticipated increased miles that will be added to vehicles each year as a result of providing additional service, per the recommendations in Table 5. The numbers of expansion vehicles estimated to be needed are based on the changes in Table 5 regarding new services that will be implemented or service expansions that require additional vehicles. The Capital Plan for Arrowhead Transit's Fleet (Table 5) between 2020 and 2025 assumes an average vehicle cost of $123,600 in 2018 dollars, given Arrowhead Transit's anticipated mix of vehicle types under the Arrowhead Transit Capital Plan. Vehicle purchases to accommodate service expansions will need to be ordered in the year previous to the implementation of the expanded service, due to the amount of time needed for the vehicle procurement process. The numbers in Table 5 represent the year of service implementation.

In addition to this preliminary capital plan for Arrowhead Transit's fleet, this five-year plan recommends development of a comprehensive vehicle replacement plan that accounts for not only year-by-year vehicle replacements and expansions by type of vehicle based on projected levels of service for each year, but also covers the agency's vehicle disposal processes and procedures.

5.1 Background

Table 6 summarizes Arrowhead Transit's revenue vehicle fleet. All vehicles are equipped with cameras and AVL. Arrowhead Transit uses RouteMatch software to manage scheduling and dispatch and Micro Information Products (MIP) software for accounting. In addition to its revenue fleet, Arrowhead Transit also owns three non-revenue vehicles, two 2016 Dodge Chargers and one 2016 Dodge Caravan. Fleet maintenance is provided in house at a single three-bay maintenance facility in Gilbert, Minnesota. In addition, Arrowhead Transit's parent organization, the AEOA, owns four facilities and leases garage space in six other locations throughout the service area, as shown in Table 7.

5.2 History

Arrowhead Transit expanded from 77 revenue vehicles in 2014 to 102 in 2019, a growth of approximately 6% per year. During that time, Arrowhead Transit added 25500-series vehicles and 15 400-series vehicles, as shown on Figure 15. In 2013, Arrowhead increased the office space at its Gilbert facility.

Agencies that receive federal financial assistance and own, operate, or manage capital assets used in the provision of public transportation are required under 49 U.S.C. 625 to create a Transit Asset Management Plan. This plan facilitates decision-making that balances needs and demands for rolling stock, facilities, and equipment. MnDOT Office of Transit and Active Transportation personnel make annual visits to each federal- or state-funded facility to inspect facility and fleet conditions and understand how assets have been maintained.

Table 5. Capital Plan for Fleet (2019-2025)

	2019	2020	2021	2022	2023	2024	2025
Replacement Vehicles	6	14	11	13	17	13	9
Replacement Cost	$741,600	$1,730,400	$1,359,600	$1,606,800	$2,101,200	$1,606,800	$1,112,400
Expansion Vehicles	3	3	2	0	1	1	1
Expansion Cost	$370,800	$370,800	$247,200	$0	$123,600	$123,600	$123,600
Total Capital Cost for Fleet	$1,112,400	$2,101,200	$1,606,800	$1,606,800	$2,224,800	$1,730,400	$1,236,000

Source: Arrowhead Transit Capital Plan and Five-Year Plan Service Recommendations

Table 6. Revenue Vehicle Fleet

Vehicle Type	Year	Count in Fleet	Fuel	Seats	Wheelchair Capacity	Amenities
Star Trans Senator HD	2009	4	Gasoline	12	5	Cameras, AVL
Blue Bird	2011	2	Biodiesel	28	1	Cameras, AVL
Goshen G Force	2011	2	Gasoline	12	5	Cameras, AVL
Goshen G Force	2012	7	Gasoline	12	5	Cameras, AVL
Star Trans Senator	2013	6	Gasoline	6	5	Cameras, AVL
Eldorado Aero Elite	2013	8	Gasoline	12	5	Cameras, AVL
Goshen G Force HD	2013	2	Gasoline	12	5	Cameras, AVL
Eldorado Aero Elite	2014	9	Gasoline	12	5	Cameras, AVL
Eldorado Aerotech	2014	3	Gasoline	10	3	Cameras, AVL
Glaval Entourage	2015	9	Gasoline	10	5	Cameras, AVL
Elkhart EC II	2016	3	Gasoline	10	3	Cameras, AVL
Glaval Universal	2016	4	Gasoline	10	3	Cameras, AVL
Star Trans Senator HD	2016	9	Gasoline	10	5	Cameras, AVL
Elkhart EC II	2017	11	Gasoline	10	3	Cameras, AVL
Blue Bird Vision	2018	3	Gasoline	28	1	Cameras, AVL
Bluebird Vision	2019	9	Gasoline	10	5	Cameras, AVL
Elkhart EC II	2019	5	Gasoline	8	3	Cameras, AVL
Bluebird Vision	2020	6	Gasoline	8	5	Cameras, AVL

Source: Arrowhead Transit, May 2019

Table 7. Facilities

Facility Type	Facility Location	Facility Age	Facility Amenities	Maintenance Capabilities
Transit Administration and Maintenance Facility	Gilbert	30 years	Offices, Garage, Maintenance	3 bays
AEOA Facility	Two Harbors	15 years	Offices and Garage	None
AEOA Facility	International Falls	10 years	Offices and Garage	None
AEOA Facility	Grand Rapids	15 years	Offices and Garage	None
Garage	Sandstone	40 years	Offices and Garage	None
Garage	Floodwood	30 years	Leased Garage Space, 2019 purchase	None
Garage	Hermantown	50 years	Leased Office and Garage, 2019 purchase	None
Garage	Aitkin		Leased Garage Space	None
Garage	Carlton County		Leased Garage Space	None
Garage	Cook County		Leased Garage Space	None
Garage	Pine City		Leased Garage Space	None

Source: Arrowhead Transit

Figure 15. Fleet Vehicles (2014-2019)

Source: Arrowhead Transit, 2018 numbers are based on projections from MnDOT's asset management plan and may not reflect a consistent replacement/procurement timeframe

In 2017, MnDOT added a Transit Asset Management module to the BlackCat Grants Management System that facilitates streamlined communication between MnDOT and transportation providers regarding the maintenance and depreciation of assets. Additionally, MnDOT's updated 2018 *Transit Asset Management Plan* includes:

- Inventory of the number and type of capital assets
- Condition assessment of those inventoried assets for which a provider has direct capital responsibility
- Description of analytical processes or decision support tools that a provider uses to estimate capital investment needs over time and develop its investment prioritization
- Discussion of prioritization investment direction
- Plan implementation strategies and recommendations

Prior to 2020, fleet assets were prioritized based on life expectancy. For this five-year plan, the assets are identified for replacement based on the *Transit Asset Management Plan* submitted to FTA on October 1, 2018.

6. 2020-2025 Annual Needs

6.1 Needs Identification Process

To identify Arrowhead Transit's needs for the period between 2020 and 2025, the project team met with staff from the agency and Technical Advisory Committees four times to learn about and discuss the agency's operating structure and environment, challenges, and opportunities. The first three meetings were a chance to gather information and begin considering strategies and opportunities for they agency, as well as to use analysis and metrics to assess the agency's baseline conditions and performance. At the third meeting, the project team engaged with Arrowhead Transit staff to develop a comprehensive list of the agency's needs for the five-year period and to prioritize these needs according to their relative importance to the agency's operations. The needs prioritization exercise was not conducted with fiscal constraints; it was intended to determine the investments that could enhance the agency's operational efficiency and consider how it could invest strategically to better meet the needs of the community.

Agency input was the key driver for assigning priority to each need, based on agency employees' understanding of its operations and challenges. However, each need was vetted and reviewed by the project team to ensure that available data and information about the agency and its operations support these needs.

6.2 List of 2020-2025 Needs

The capital and non-service needs identified through this prioritization activity, in order of priority, are listed in Table 8. Service needs are listed in Table 9.

Table 9 lists recommended service changes for Arrowhead Transit's eight-county service area by year of recommendation implementation. Section 12.1.1 explains the types of service changes recommended in this table and the rationale(s) for these change types. Section 12.1.2 outlines the methodology used to estimate the cost for each change. These changes are summarized by year, cost, and county in Table 10.

Table 10 summarizes the costs of the proposed services changes in Table 9 by county and by year. Service changes have been proposed for each county in Arrowhead Transit's service area. Each change made in 2020 through 2024 is assumed to continue through 2025.

Table 8. Unconstrained Needs - Non-Service Needs

Need	Priority Level	Year	Description of Need	Rationale	Estimated Cost (2019 unless otherwise noted)
New maintenance facility in Gilbert	High	2020-20-21	New maintenance facility will have eight bus stalls, separate areas for welding, oil storage, office, break room, and restrooms[a]; existing transit facility to be repurposed to better accommodate administrative functions	Agency has outgrown current facility due to growth; fleet would benefit from additional maintenance capacity and indoor bus storage	$6 million[b]
Comprehensive facilities study	High	2021	Conduct study to identify a comprehensive facilities plan to minimize deadhead and cost while maximizing state of good repair of assets	To determine where equipment is needed and establish a long-term plan to optimize efficiency in where vehicles are stored and serviced	$150,000[c]
Farebox system implementation	High	2022-2023	Formalize and automate fare collection processes	Speed boarding and payment processes, as well as administrative time to collect and account for fare payments	$110,000[d] plus $10,000 annual O&M
Two additional mechanics	High	2020	Two additional mechanics to meet immediate staffing need[e]	Keep vehicles in improved condition, thereby enhancing reliability	$103,300 per year starting in 2020, increasing to $131,800 per year by 2025[f]
Continuation of Rural Rides Program	High	2020	Lack of Rural Rides program funding could have impacts on agency; extended hours will likely end absent additional operating funds	Some riders may otherwise lose service access	Unknown[g]

Need	Priority Level	Year	Description of Need	Rationale	Estimated Cost (2019 unless otherwise noted)
Expand fleet	High	2020-2025 2025	Additional vehicles to accommodate proposed services changes in Table 9	Vehicles are needed to provide additional service consistent with recommendations in this plan	$393,400 (2020), $270,200 (2021), $143,300 (2023), $147,600 (2024), $152,000 (2025)[h]
Accelerate replacement of high mileage buses	High	2020-2025	Accelerated replacement of vehicles to accommodate additional mileage due to proposed services changes in Table 9	Vehicles are needed to provide additional service consistent with recommendations in this plan while maintaining reliability	$1.84M (2020), $1.49M (2021), $1.81M (2022), $2.44M (2023), $1.92M (2024), $1.37M (2025)[h]
Upgraded reservation system	High	2021	Implement reservation system that allows people to book rides online and through a mobile device	More efficient use of staff time (dispatch staff no longer need to take as many calls or call as many people when a run is cancelled)	$200,000[i]
Website update	High	2020	Update and modernize website to make it more user-friendly	Provide clearer information to the public; enhance ridership	$10,000[j]
Additional marketing and advertising (TV, social media, radio, etc.)	High	2020-2025	More marketing, particularly in areas like Pine County that don't receive TV ads	Enhance awareness of services and ridership	$10,000 per year in 2020, increasing to $12,000 per year by 2025[k]
More drivers	High	Ongoing	Enhanced recruiting strategies and implementation of additional financial benefits	Drivers are essential to providing high quality, reliable service	Unknown[l]
Maintain free transfer program with DTA	High	2020-2022 (or longer)	Fare policy continuation (set to expire in 2019 without action)	Enhance access to public transportation, maintain ridership	$0[m]

Need	Priority Level	Year	Description of Need	Rationale	Estimated Cost (2019 unless otherwise noted)
Fleet replacement plan	High	2020	Develop comprehensive fleet expansion and replacement plan	Accurate forecasting of costs based on vehicle condition and service changes	$30,000[n]
Upgrade security cameras and maintenance capabilities at Hermantown facility	High	2020	Install security camera and system at Hermantown facility	Increase safety and security for personnel and assets	Unknown [o]
Four additional mechanics	High	2021, 2022 (two each year)	Additional mechanics, as needed, upon completion of Gilbert facility	Keep vehicles in improved condition by addressing vehicle maintenance needs more quickly	$108,500 (for 2) in 2021, $227,700 in 2022 (for 4), increasing to $263,600 in 2025[p]
Add Wi-Fi on buses (4G connection)	Medium	2021	Install 4G modems on 100 buses	Provide Wi-fi service to customers and live camera access	115,000 plus $3,500 per month for O&M [q]
Bike racks added to buses	Medium	2022	Add bike racks to 100 revenue vehicles	Provide multimodal trip option for riders who rely on bicycles	$200,000 [r]
Camera system installation at Gilbert and International Falls facilities	Medium	2022	Installation of camera system at two facilities	Increase safety and security for personnel and assets	$47,000 [s]
Bus washing equipment at Sandstone facility	Medium	2022	Implement modernized bus washing equipment at Sandstone facility	Enable buses to be washed at more than one location throughout the large service area; Improve vehicles' appearance and condition (reduce salt damage)	$150,000 [t]

Need	Priority Level	Year	Description of Need	Rationale	Estimated Cost (2019 unless otherwise noted)
Bus washing equipment at Hermantown	Medium	2022	Implement modernized bus washing equipment at Hermantown facility	Enable buses to be washed at more than one location throughout the large service area; Improve vehicles' appearance and condition (reduce salt damage)	$150,000[u]
Two Harbors facility upgrade	Medium	2022	Upgrade facility with new software, soap dispensing system, water softening system, and sensors	Provide necessary facilities to conduct maintenance activities at Two Harbors and maintain vehicles in a high state of good repair	$50,000 [v]
Establish customer service department	Low	2022	Establish customer service department to handle customer inquiries	Right now, dispatchers are serving customer service function)	$20,000[w]
Feasibility study for building own radio tower	Low	2024	Study possibility of constructing and owning radio tower to facilitate communications across service area	Currently leasing radio tower for $30,000 per year; may be an opportunity to reduce costs long-term	$50,000 [x]

[a] *The current facility may transition to office space and/or additional storage space.*

[b] *Per cost estimate provided by Arrowhead Transit. Estimate may need to increase slightly depending on year of expenditure.*

[c] *Estimate.*

[d] *Assumed five user accounts at $3,750 each, 100 bus licenses and boxes at $925 each (in 2019 dollars). Estimate rounded.*

[e] *See staffing analysis in Section 12.3.*

[f] *Two times the 2017 mean annual wage for a bus and truck mechanic ($44,600) for the northeast Minnesota non-metropolitan region plus 5% escalation per year, based on historical operating cost increases. Totals rounded. See https://www.bls.gov/oes/current/oes_2700002.htm. Estimate includes wages only, not benefits.*

[g] *Data on funding amount from this program received by Arrowhead Transit unavailable.*

[h] *According to data provided by Arrowhead Transit, its buses in regular operation traveled an average of about 29,000 miles per bus, per year. Based on the proposed change in revenue miles for each of the next five years, fleet replacements were accelerated based on mileage increases. In other words, one bus replacement was moved up each year (e.g., from 2021 to 2020) for every additional 29,000 miles added to the agency's total service miles). Fleet expansion numbers in Table 5 come from the assumptions in Table 9 about new vehicle needs to implement service expansions. Costs include 3% annual escalation. Year-by-year cost data for vehicle purchases can be found in Table 5. The following table shows a summary of the expansion and accelerated replacement vehicles by year. In order for expansion to occur in the year planned, the vehicle procurement process must be initiated approximately one year before implementation.*

Year	Expected Change in Miles	Fleet Replacement Acceleration (i.e., increase to planned # of vehicles each year)	Fleet Expansion
2020	87,011	4	3
2021	76,509	3	2
2022	17,000	1	0
2023	36,086	2	1
2024	16,944	1	1
2025	0	0	1
Total	233,550	11	8

[i] *Estimate based on available information.*

[j] *See, for example: https://digital.com/blog/how-much-does-website-cost/. Estimated cost includes some contingency for costs associated with the procurement process.*

[k] *Estimate for initial campaign. Marketing and advertising metrics should be tracked to assess effectiveness of strategies and re-allocate resources among strategies to achieve the highest impact. The agency currently keeps information on people who have requested rides from certain areas in the past; this data should be used by Arrowhead Transit's marketing department in the future to reach out to people whose past requests indicate they may be interested in particular service changes.*

[l] *The need for additional bus operators is not unique to Arrowhead Transit; rather, it applies to most providers in Minnesota and the majority of agencies around the country as well. The exact amount that will be needed to adequately recruit, train, retain, and compensate drivers over the five-year plan period is not precisely known; it is recommended that the state's transit agencies and MnDOT work together to stay apprised of the labor situation impacting the supply of drivers.*

[m] *This is the continuation of an existing fare policy, not a new or expanded service.*

[n] *Estimate for consultant-supported fleet management plan development. Fleet management plan will identify replacement and expansion timing and appropriate vehicle sizes for each purchase. It will also outline procedures for disposing of vehicles that have passed their useful life benchmark and are no longer in service.*

[o] *Arrowhead Transit is currently piloting building security camera upgrades in International Falls. If this pilot is successful, this capability may be added at all Arrowhead Transit facilities eventually. Arrowhead Transit can supply cost data.*

[p] *Four times the 2017 mean annual wage for a bus and truck mechanic ($44,600) for the northeast Minnesota non-metropolitan region plus 5% escalation per year, per historical operating cost increases. Totals rounded. See https://www.bls.gov/oes/current/oes_2700002.htm. Estimate includes wages only, not benefits.*

[q] *Estimate based on information provided by Arrowhead Transit, which received a quote from AT&T for modems at a cost of $1,148.50 per bus to install and $35 per month per bus for service.*

[r] *Based on assumption that bike racks cost approximately $2,000 each to purchase and install (https://www.9and10news.com/2019/05/08/emmet-county-raising-funds-to-install-bike-racks-on-buses/),*

[s] *Per information provided by Arrowhead Transit, the equipment in Gilbert would cost $25,975 and the cost for the facility in International Falls would be $20,510.*

[t] *Estimate based on available information from Arrowhead Transit.*

[u] *Further study needed to determine exact cost to upgrade maintenance equipment and facility in Hermantown.*

[v] *Per estimate information provided by Arrowhead Transit.*

[w] *Exact cost depends upon many variables. Estimate includes staff time for internal reorganization, establishment of roles, protocols, and guidelines for positions, possible additional office need, printed materials, new phone line, website update, etc.*

[x] *Estimate - exact value unknown.*

Table 9. Unconstrained Service Needs

Need	Year	Description of Need	Type of Need	Estimated Annual Cost (2019 $) [a]	Expansion Vehicle Needed?	Agency Request?
Dial-A-Ride service expansion in Cloquet	2020	Add additional bus between 8 a.m. and 9 a.m. on weekdays (1 extra hour per day)	Dial-A-Ride service increase	$17,487	No	Yes
Dial-A-Ride service expansion in Cloquet	2020	Add additional bus between 4 p.m. and 8 p.m. weekdays (4 extra hours per day)	Dial-A-Ride service increase	$52,461	Yes	Yes
Dial-A-Ride service expansion in Grand Rapids	2020	Add additional bus between 7 a.m. and 9 a.m. weekdays (2 extra hours per day)	Dial-A-Ride service increase	$34,974	Yes (one bus for a.m. and p.m. - next row)	Yes
Dial-A-Ride service expansion in Grand Rapids	2020	Add additional bus between 6 p.m. and 8 p.m. weekdays (2 extra hours per day)	Dial-A-Ride service increase	$34,974	Yes (see above - single vehicle)	Yes
Dial-A-Ride service expansion in Hermantown	2020	Expand service to match baseline spans by adding service between 7 a.m. and 8 a.m. on weekdays (1 extra hour per day)	Dial-A-Ride service increase	$17,487	No	Yes
Dial-A-Ride service expansion in Hermantown	2020	Expand service to match baseline spans by adding service between 5 p.m. and 7 p.m. on weekdays (2 extra hours per day)	Dial-A-Ride service increase	$34,974	No	Yes
Dial-A-Ride service expansion in Hermantown	2020	Expand service to add an additional bus between 10 a.m. and 2 p.m. on Saturdays (4 extra hours per day)	Dial-A-Ride service increase	$13,936	No	Yes
Dial-A-Ride service expansion in Pine City	2020	Add additional bus between 8 a.m. and 9:30 a.m. weekdays (1.5 extra hours per day)	Dial-A-Ride service increase	$26,231	No	Yes

Need	Year	Description of Need	Type of Need	Estimated Annual Cost (2019 $) [a]	Expansion Vehicle Needed?	Agency Request?
Dial-A-Ride service expansion in Virginia/ Mountain Iron	2020	Expand service in Mountain Iron to operate 7 a.m. to 8 p.m. weekdays to match Virginia service hours (4 extra hours per day) and operate Dial-A-Ride service in Virginia and Mountain Iron as a single service	Dial-A-Ride service increase	$52,461	No	No
Dial-A-Ride service expansion in Virginia/ Mountain Iron	2020	Add weekend service in Mountain Iron and operate Dial-A-Ride service in Virginia and Mountain Iron as a single service	Dial-A-Ride service increase	$48,776	Yes	Yes
Dial-A-Ride service in Sandstone	2020	Add Dial-A-Ride service in Sandstone for 4 hours per day, 2 days per week	New Dial-A-Ride service	$20,904	No	Yes
Discontinue the Hill City-Grand Rapids "shopping run"	2020	Despite efforts to increase ridership in Hill City, this service rarely meets "5 to go" requirement. Hill City will still be served by a commuter service.	Discontinue service	$(6,968)	No	Yes
Make Pine City-Duluth route guaranteed	2020	Make once-per-month run between Duluth and Pine City guaranteed (run regardless of number of passengers who make requests)	Guaranteed service expansion	$0[b]	No	No
Make McGregor-Palisade-Aitkin-Brainerd route guaranteed	2020	Guarantee service will run each time it is scheduled to run (twice per month)	Guaranteed service expansion	$0[b]	No	Yes
Make the Aitkin-McGregor-Cromwell-Duluth service a seasonal, summer only service (three times per year)	2020	Reduce service to operate only Memorial Day-Labor Day (maintaining “five to go” requirement)	Service reduction	$(5,858)	No	Yes

Need	Year	Description of Need	Type of Need	Estimated Annual Cost (2019 $) [a]	Expansion Vehicle Needed?	Agency Request?
Make the Meadowlands-Culver-Duluth run guaranteed	2020	Guarantee service will run each time it is scheduled to run (twice per month)	Guaranteed service expansion	$1,608	No	No
Make the Moose Lake-Cloquet run guaranteed	2020	Guarantee service will run each time it is scheduled to run (once per month)	Guaranteed service expansion	$402	No	No
Make the Sandstone-Hinckley-Pine City run guaranteed	2020	Guarantee service will run each time it is scheduled to run (weekly)	Guaranteed service expansion	$1,273	No	No
Streamline Duluth services	2020	Adjust Duluth services to increase frequency and traveler options by reallocating existing resources	Intercity optimization	$0[c]	No	No
Make the Pine City-North Branch-Cambridge run guaranteed	2020	Guarantee service will run each time it is scheduled to run (once per month)	Guaranteed service expansion	$2,412	No	Yes
Develop through service on US 169 Corridor (Gilbert/Virginia – Hibbing – Grand Rapids)	2021	Implement initial phase of corridor service by operating new trips from Grand Rapids and Gilbert with timed transfers in Hibbing	Deviated service expansion	$187,993	Yes	No
Dial-A-Ride service expansion in Two Harbors	2021	Add additional bus for 9 additional service hours per weekday	Dial-A-Ride service increase	$157,383	Yes	Yes
Increase McGregor-Palisade-Aitkin-Brainerd frequency to weekly	2022	Operate route weekly in response to high average ridership levels	Service expansion	$8,040	No	Yes

Need	Year	Description of Need	Type of Need	Estimated Annual Cost (2019 $) [a]	Expansion Vehicle Needed?	Agency Request?
Dial-A-Ride service expansion in Grand Rapids	2022	Expand service to match baseline spans by adding an additional hour of service on Saturdays	Dial-A-Ride service increase	$3,484	No	No
Dial-A-Ride service expansion in Hermantown	2022	Expand service to match baseline spans by adding an additional hour of service on Saturdays	Dial-A-Ride service increase	$3,484	No	No
Dial-A-Ride service expansion in International Falls	2022	Expand service to match baseline spans by adding three additional hours of service on Saturdays	Dial-A-Ride service increase	$10,452	No	No
Dial-A-Ride service expansion in Two Harbors	2022	Establish service on Saturday in accordance with baseline standards for Dial-A-Ride	Dial-A-Ride service increase	$31,442	No	Yes
Dial-A-Ride service expansion in Virginia/Mountain Iron	2022	Expand service to match baseline spans by adding an additional hour of service on Saturdays in Virginia and Mountain Iron	Dial-A-Ride service increase	$6,968	No	Yes
Two Harbors-Duluth Commuter Service	2023	Operate commuter bus service two times per day on weekdays between Two Harbors and Duluth	New service	$77,293	Yes	Yes
Dial-A-Ride service expansion in Grand Rapids	2023	Expand service to match baseline spans by adding three additional hours of service on Sundays	Dial-A-Ride service increase	$10,452	No	Yes
Dial-A-Ride service expansion in Hermantown	2023	Expand service to match baseline spans by adding three additional hours of service on Sundays	Dial-A-Ride service increase	$10,452	No	No
Dial-A-Ride service expansion in Virginia/Mountain Iron	2023	Expand service to match baseline spans by adding three additional hours of service on Sundays in Virginia and Mountain Iron	Dial-A-Ride service increase	$31,356	No	No

Need	Year	Description of Need	Type of Need	Estimated Annual Cost (2019 $) [a]	Expansion Vehicle Needed?	Agency Request?
Implement new deviated routes in Grand Rapids	2025	Convert existing Dial-A-Ride service in Grand Rapids to deviated or point deviation route service to provide a more reliable, predictable service	Deviated service expansion	$0[d]	No	No
Increase through service on MN 61 Corridor (Cook County-Lake County-Duluth)	2025	Increase service by implementing 1-3 trips in each direction per weekday between Grand Marais, Silver Bay, Two Harbors, and Duluth	Deviated service expansion	$523,814	Yes	No

[a] *Estimated cost is for the year of implementation.*

[b] *Based on annual ridership figures, this route is believed to be running all or close to all the times it is scheduled to operate. The costs associated with guaranteeing the service are therefore assumed to be minimal because the only change would be that the service would operate on its existing schedule regardless of how many reservations have been made.*

[c] *No change in hours or miles would be required to enact this proposal, the only change would be the days of the week and/or the days of the month these services operate in order to maximize travel options for all passengers, especially those in areas served by more than one route to Duluth.*

[d] *Transition to a deviated route or point deviation is not assumed to have any marginal additional cost. Arrowhead Transit does not currently operate multiple deviated routes within the communities currently served by the agency. As a result, there are no comparable cost per mile or cost per hour figures that can be used to project the operating costs for this proposal. However, it can be assumed that a transition from Dial-A-Ride service to deviated route or point deviation service, whether partial or total, would only be undertaken if resource requirements are relatively similar to those required to operate the Dial-A-Ride service.*

Table 10. Summary of Service Change Costs by Year and County (2019 Dollars) (2020-2025)

Location	2020	2021	2022	2023	2024	2025	Total
Aitkin	($5,858)	--	$8,040	--	--	--	$2,182
Carlton	$3,953	--	($16,884)	($13,936)	--	--	($26,867)
Cook	--	--	--	--	$30,253	$83,938	$114,190
Itasca	$62,980	($16,080) [a]	$3,484	$3,484	--	--	$53,868
Koochiching	--	--	$10,452	--	--	--	$10,452
Lake	--	$157,383	$31,356	$77,293	--	$318,866	$584,898
Pine	$50,820	--	--	--	--	--	$50,820
St. Louis (including Hermantown)	$256,610	--	$13,936	$55,744	--	--	$326,290
Multiple Counties	--	$204,073	--	--	--	$121,010	$325,083
Total	$368,504	$345,376	$50,834	$122,585	$30,253	$523,814	$1,440,916
% Increase from Previous Year's Operating Budget	4.6%	4.1%	0.6%	1.4%	0.3%	5.9%	N/A

[a] *On net, service is not being removed in Itasca County; rather, the streamlining of service is reflected in the "multiple counties" category.*

The project team conducted additional analysis of some service changes that were discussed at the workshop to determine feasibility and benefits of such changes. These are described in more detail in Section 12.1.

6.3 Historical and Projected Annual Summary

Arrowhead Transit's largest need is the expansion of its Gilbert facility to meet the agency's operating and fleet needs. In addition, given the size of the agency's service area, it is recommended that Arrowhead Transit complete a comprehensive facilities study. Arrowhead's other needs include a variety of service changes and increases, new vehicles (both to replace existing high mileage vehicles and to accommodate service increases), a fleet replacement plan, additional drivers and mechanics, continued operational funding, a new farebox and payment system, new bus washing equipment at one facility, an upgraded reservation system, establishment of a new customer service department, additional marketing support including a website update, continued data collection efforts, and a feasibility study for a potential new radio tower. These are described in more detail in this chapter.

6.3.1 Fleet

Arrowhead Transit's fleet consists of approximately 100 service vehicles, which carry between 6 and 43 passengers each, as noted in Table 6. The MnDOT Fleet Outlook and the MnDOT Office of Transit and Active Transportation's *Transit Asset Management Plan*, as well as Arrowhead Transit's Capital Plan, outline the agency's plans for fleet replacements and expansions. This five-year plan calls for replacement of 77 vehicles between 2020 and 2025, and the purchase of an additional 8 vehicles to accommodate service expansions during that same period. These numbers are based on the service changes listed in Table 9. To estimate the need to accelerate vehicle replacements, the increase in mileage expected to occur as a result of the service changes each year was divided by about 29,000, which is the average of miles one of Arrowhead Transit's buses travels per year. The result of that calculation was rounded up and the number of scheduled vehicle replacements per Arrowhead Transit's Capital Plan was increased by that number for each respective year. In other words, one bus replacement was moved up each year (e.g., from 2021 to 2020) for every additional 29,000 miles added to the agency's total service miles. Table 5 contains details regarding this plan's fleet replacement and expansion recommendations.

This plan also recommends development of a fleet management plan, which will refine these recommendations through more detailed analyses to identify replacement and expansion timing and appropriate vehicle sizes for each purchase and each year. It will also outline procedures for disposing of vehicles that have passed their useful life benchmark and are no longer in service and metrics for tracking fleet management performance metrics. Expansion-related vehicle orders should be made in the year prior to the implementation of service changes, due to the length of the vehicle procurement process. Years shown in Table 5 reflect the year in which the procurement and purchase would be completed.

Other fleet-related needs for Arrowhead Transit include the installation of Wi-Fi and bike racks on buses to improve the customer experience and to provide live camera access and enhance accessibility and travel options for bike riders by enabling them to use Arrowhead Transit for their longer-distance travel needs.

6.3.2 Facility

Arrowhead Transit owns five facilities and leases garage space in six additional locations throughout the service area. These facilities are shown in Table 7. Arrowhead Transit's most significant need is the construction of a new facility in Gilbert to replace and supplement the

existing facility there. The agency has outgrown the current facility, and its fleet would benefit from additional maintenance capacity, office space, and indoor bus storage. Arrowhead Transit has studied the new facility, and preliminary designs include eight bus stalls, separate areas for welding, oil storage, offices, a break room, and restrooms. The agency is moving ahead with negotiations for the facility and expects the cost to be approximately $6 million.

Arrowhead Transit would also significantly benefit from a comprehensive facilities study. Given the agency's large service area, large fleet, and the cost of deadhead hours and miles, it is important that the agency have a comprehensive and long-term strategy for optimizing efficiency in where vehicles are stored and serviced.

A third facility-related need for Arrowhead Transit is the acquisition of bus washing equipment at the Sandstone and Hermantown facilities. Currently, only the Gilbert facility has bus washing equipment, and many buses do not get washed for many months, and the dirt and salt buildup that occurs has negative consequences in terms of the vehicles' exterior condition. The Hermantown facility would also benefit from upgrades to its security camera system to improve safety and security for all personnel and assets, as well as increased maintenance equipment and capabilities to reduce the need for vehicles to go to Gilbert for their maintenance needs to be met.

In addition to installing a security camera system in Hermantown, the Gilbert and International Falls facilities would benefit from upgraded camera systems to increase safety and security for personnel and assets. These systems are being piloted at one facility first to ensure their efficacy and, assuming a successful pilot, will be implemented at other facilities.

Finally, the Two Harbors facility requires an upgrade to include new software, soap dispensing and water softening systems, and sensors. This will enable the facility to conduct routine maintenance on vehicles to maintain them in a high state of good repair.

6.3.3 Technology

Arrowhead Transit has three technology-related needs. The first of these is implementation of an upgraded reservation system. This reservation system would allow customers to book rides online and/or via mobile application. This will save staff scheduling time and enhance operational efficiency as, for example, Arrowhead Transit staff will no longer need to call people who have requested rides that are not going to run. It will also significantly improve the customer experience.

The second technology-related need is the implementation of a new farebox and payment system to streamline the collection of fares and reduce the amount of time drivers spend processing payments. MnDOT has a data committee work group, of which Arrowhead Transit staff are members, that is going to be involved in the Statewide Technology Plan, which will identify best practices and define technology standards for agencies across the state and identify options and pricing for software upgrades. This plan may also identify potential opportunities to enhance purchasing power by having multiple agencies join forces to make large software purchases.

The third technology-related need is to study the feasibility of Arrowhead Transit constructing its own radio tower to support its communication system. Currently, the agency leases space on a tower for $30,000 per year, and this study will determine whether there is an opportunity to reduce this cost in the long run.

6.3.4 Other

Arrowhead Transit has a number of needs of other types.

This plan recommends a variety of service changes (Table 9) that will update Arrowhead Transit's levels of service to reflect existing demand for services at specific times of the day, dates of the week, and/or for particular services. As outlined in detail in Section 12.1, these changes fall into a number of categories. Implementing these changes, which are based upon both data-driven analysis as well as input from agency staff, will result in increased productivity for Arrowhead Transit's services overall and ensure resources are being directed to serve the greatest number of customers.

Arrowhead Transit has two main types of staffing needs. The first relates to mechanics. As demonstrated through detailed analysis based on national data from over 320 agencies in Section 12.3, Arrowhead Transit is currently significantly understaffed with mechanics. This is due in part to limited capacity at the Gilbert facility, where most vehicle maintenance occurs. For this reason, this five-year plan recommends that Arrowhead Transit add only two additional mechanics in the short-term, but increase its mechanics staffing level to 12 mechanics (from the current level of 6) by 2022, following completion of the new Gilbert facility in 2020-2021.

Arrowhead Transit's second major staffing issue relates to drivers. Difficulty attracting and retaining drivers is a need that is not unique to Arrowhead Transit; rather, it applies to most providers in Minnesota and the majority of agencies around the country as well. The exact amount that will be needed to adequately recruit, train, retain, and compensate drivers over the five-year plan period is not precisely known; it is recommended that the state's transit agencies and MnDOT work together to stay apprised of the labor situation impacting the supply of drivers.

The third staffing-related need comes from the peer analysis of overall staffing levels in Section 12.2, which shows that Arrowhead Transit is somewhat understaffed overall compared to two peer agencies. Arrowhead Transit therefore may benefit from increasing its overall level of staffing, particularly including staff in administrative roles. Additional administrative support would enable Arrowhead Transit to continue and strengthen its efforts to keep and analyze data on its performance, and to gain a high response rate to an annual customer satisfaction survey.

For the past few years, Arrowhead Transit has benefitted from MnDOT's Rural Rides program, which subsidizes rides for some customers who would otherwise be unable to afford transit services. This program is set to expire in 2019, but continued operational funding support, whether through this program or another, remains a need for Arrowhead Transit's customers. In addition, Arrowhead Transit may be able to increase its current role as a "mobility manager." In this role, Arrowhead Transit takes on responsibility for, when possible, connecting riders with available transportation resources and services regardless of whether these are provided directly by Arrowhead Transit or by partners or other providers. Given that Arrowhead Transit offers a number of services that are contingent upon adequate demand, and that sometimes the demand for Arrowhead Transit's services exceed its capacity, there could be a significant benefit to residents of Arrowhead Transit serving as an additional resource to the public in helping meet transportation needs, particularly for people experiencing socioeconomic and disability-related challenges.

A need that is possibly related to Arrowhead Transit's role as a "mobility manager" in northeastern Minnesota is the establishment of a customer service department. Currently, Arrowhead Transit's dispatchers serve as both dispatchers and customer service representatives. While this is not necessarily problematic, it can result in regular passengers, who know exactly what service they want to book, having difficulty reaching a dispatcher if dispatchers are busy answering callers' questions about different services. By creating separate phone numbers for different types of requests, passengers with specific requests can be added to the queue of riders more quickly, which can expedite requests and result in fewer regular passengers being placed on hold while waiting to schedule rides. This proposal would not mean that staff would necessarily be dedicated to only one function; for example, if relatively few dispatch calls are coming in, a customer service question could be redirected to a staff

dispatcher to answer questions if all the customer service representatives are currently busy, and vice versa. A customer service department, which presumably would answer less time-sensitive calls, would likely implement (if not already in place) a call system through which people can be given the option to be called back if no customer service representative is currently available to answer their questions, so that they don't need to remain on the line to have their call received. The creation of a customer service department would also support Arrowhead Transit's role as a regional mobility manager. Over time, it is likely that some staff in customer service will gain specialized knowledge in a variety of transportation resources available throughout the region to which people can be referred if appropriate and will be able to answer more complex questions.

Arrowhead Transit's website (http://arrowheadtransit.com/) is a great source of information for riders. However, it would benefit from a more user-friendly design. Investing in a website redesign would be an effective way to make the service more visible and clearer, especially given that websites are increasingly the first place most people go to get information. There is also an opportunity to integrate relatively simple but interactive features that allow people to better understand the services available to them and the fares.[2]

While Arrowhead Transit's marketing program is strong in many parts of the service area, there are a few areas such as Pine County where the agency's television and other advertisements do not reach people as frequently. In these locations, it is recommended that Arrowhead Transit take extra steps both to enhance general awareness of its services, and to alert current or potential customers about service increases or changes. It is also recommended that Arrowhead Transit continue tracking data of people who make requests for service, whether they are fulfilled or not, so that it can reach out, for example, when services that used to be subject to the "five to go" requirement are converted into guaranteed services. Anecdotal information indicates that the "five to go" requirement serves as a deterrent to people relying on the service for critical activities such as doctors' appointments, so getting the word out about such service changes is particularly important for increasing ridership on these routes.

Finally, a need identified for Arrowhead Transit is to maintain the free transfer program agreement that it currently has with Duluth Transit Authority, which is set to expire in 2019, at least through 2020. The program works for passengers transferring between the two agencies' services, and whichever agency provides the service on the first leg of the trip retains the revenues for that trip. This arrangement is mutually beneficial for both agencies and for customers in the region and should therefore be continued.

7. System Performance

Performance measurement tracking establishes a consistent way to evaluate a route or service type, provides a regular opportunity to reflect on future needs and service improvements, and ensures compliance with the ADA, MnDOT's Olmstead Plan, and any other local performance expectations. For state-funded transit services, MnDOT requires performance tracking of annual ridership, baseline span of service, on-time performance, and asset management. Additionally, each provider is required to track denials based on the ADA trip denial definitions and process documentation in FTA Circular 4710.1 as well as service and performance indicators.

7.1 Historical Performance

This section evaluates the performance of the system, each county, and selected routes. Due to the large number of vehicles in service and data collection limitations, it is difficult to reconcile

[2] For example, see http://map.ridecartsak.org/.

service statistics reported by run or by vehicle with advertised route information. As a result, the sum of county-level and service type subtotals summarized in Table 11 may differ from the system-wide service hours, miles, and costs presented in Chapters 4 and 8.

On average, Arrowhead Transit spends $59 per revenue hour of service. Operational expenses for each route are estimated based on this unit cost times the annual revenue hours. All other service effectiveness and cost efficiency metrics described in Sections 7.1.1 and 7.1.2 are derived from these estimated costs and reported trips, miles, and hours as shown in Table 11. Arrowhead Transit does not track trip denials or on-time performance.

7.1.1 Service Effectiveness

Service effectiveness describes the amount of service utilized per unit of transit service provided. Service effectiveness is measured based on two indicators: passengers per mile and passengers per hour.

Passengers per mile is a measure of efficiency and trip length. Large numbers indicate either shorter trips or high passenger loads. Smaller numbers indicate either longer trips or poorer performing routes. According to the *2017 Rural Transit Fact Book* the national average for passengers per mile for rural transit demand response service providers is 0.15 and in Minnesota is 0.31. Arrowhead Transit averages 0.27 passengers per mile, as shown in Table 12. In general, demand response services, which tend to operate in smaller well-defined areas around larger municipalities, generate more passengers per mile than deviated routes, which typically make longer-haul connections between multiple cities. Cook County generated the most passengers per mile of service at 0.86, likely driven by the Grand Marais Dial-A-Ride service.

Passengers per hour measures ridership as a function of the amount of service provided and will vary based on the geographic spread of the area and average operating speed. Higher numbers indicate a more efficient system. Arrowhead Transit averages 5.1 passengers per hour. As shown in Table 13, Aitkin County routes had the highest passengers per revenue hour with 6.64. Arrowhead Transit's system-wide average passengers per hour is greater the state rural average (4.57) and the national rural average (2.6 according to the *2017 Rural Transit Fact Book*.) The *Greater Minnesota Transit Investment Plan 2017-2037* outlines performance metrics for passengers per hour based on service type and area. The minimum threshold for demand response routes in rural areas, set by MnDOT, is three passengers per hour. Although individual route detail is not available, all county level averages exceed three.

Table 11. 2018 Service Metrics by Service Type

County	Service	Passenger Trips	Revenue Miles	Revenue Hours	Operating Costs [a]	Passenger Revenue [b]
Aitkin	Demand Response	4,487	6,644	610	$35,991	N/A
Aitkin	Route Deviation	8,971	39,072	1,418	$83,655	N/A
Aitkin	Aitkin Total	13,458	45,716	2,028	$119,646	$2,042
Carlton	Demand Response	47,370	145,874	12,839	$757,382	N/A
Carlton	Route Deviation	37,689	154,945	7,520	$443,584	N/A
Carlton	Carlton Total	85,059	300,819	20,358	$1,200,966	$39,778
Cook	Demand Response	9,509	11,069	1,998	$117,870	N/A
Cook	Route Deviation	9,437	74,068	2,497	$147,319	N/A
Cook	Cook Total	18,946	85,137	4,495	$265,189	$19,678
Itasca	Demand Response	67,957	161,089	12,301	$725,644	N/A
Itasca	Route Deviation	83,214	314,912	13,217	$779,710	N/A
Itasca	Itasca Total	151,171	476,001	25,518	$1,505,354	$118,311
Koochiching	Demand Response	28,688	66,243	5,650	$333,294	N/A
Koochiching	Route Deviation	10,638	52,664	2,038	$120,206	N/A
Koochiching	Koochiching Total	39,326	118,907	7,688	$453,500	$25,502
Lake	Demand Response	10,104	21,170	2,439	$143,862	N/A
Lake	Route Deviation	23,615	89,099	4,134	$243,875	N/A
Lake	Lake Total	33,719	110,269	6,573	$387,737	$10,984

County	Service	Passenger Trips	Revenue Miles	Revenue Hours	Operating Costs [a]	Passenger Revenue [b]
Pine	Demand Response	28,329	66,405	5,873	$346,473	N/A
Pine	Route Deviation	81,140	442,590	13,930	$821,765	N/A
Pine	Pine Total	109,469	508,995	19,804	$1,168,237	$19,639
St. Louis	Demand Response	63,210	178,944	14,960	$882,478	N/A
St. Louis	Route Deviation	114,274	493,916	22,615	$1,334,091	N/A
St. Louis	St Louis Total	177,484	672,860	37,575	$2,216,569	$224,855

Source: Arrowhead Transit

[a] *County level detail for 2018 operating costs were estimated based on service hours times an average systemwide cost per hour of $58.99. Estimated totals are within 1% of reported total system costs.*

[b] *Passenger revenue includes both farebox revenue and transit ticket revenue.*

Table 12. 2018 Passengers per Revenue Mile by County and Service Type

County	Demand Response	Route Deviation	Average
Aitkin	0.68	0.23	0.29
Carlton	0.32	0.24	0.28
Cook	0.86	0.13	0.22
Itasca	0.42	0.26	0.32
Koochiching	0.43	0.20	0.33
Lake	0.48	0.27	0.31
Pine	0.43	0.18	0.22
St. Louis	0.35	0.23	0.26
All Counties	0.39	0.22	0.27

Source: Arrowhead Transit

Table 13. 2018 Passengers per Revenue Hour by County and Service Type

County	Demand Response	Route Deviation	Average
Aitkin	7.35	6.33	6.64
Carlton	3.69	5.01	4.18
Cook	4.76	3.78	4.21
Itasca	5.52	6.30	5.92
Koochiching	5.08	5.22	5.12
Lake	4.14	5.71	5.13
Pine	4.82	5.82	5.53
St. Louis	4.23	5.05	4.72
All Counties	4.58	5.48	5.07

Source: Arrowhead Transit

7.1.2 Cost Efficiency

Cost efficiency measures how well the dollars put into the system are being used to produce trips. The most commonly tracked cost efficiency metrics are cost per passenger, cost per mile, cost per hour, farebox recovery, and subsidy per passenger. Costs per revenue hour and fare revenues are only available at the system level, with insufficient fare detail to determine average passenger subsidy. Costs per passenger and costs per revenue mile are available by route, geography, or service type. Historic system-wide cost efficiency metrics are presented in Table 14.

Table 14. System Cost Efficiency by Year (2013-2018)

Year	Cost/Hour	Cost/Mile	Cost/Passenger	Farebox Recovery
2013	$65.75	$3.13	$10.89	3.1%
2014	$56.77	$2.86	$9.91	3.1%
2015	$64.16	$3.20	$11.49	2.5%
2016	$61.03	$3.05	$11.57	2.5%
2017	$59.49	$3.14	$11.89	2.5%
2018	$58.99	$3.18	$11.58	2.3%

Source: Arrowhead Transit

In 2018, Arrowhead Transit's average cost per revenue hour was $58.99. This average cost per hour is the same across all routes and is the basis (along with revenue hours for each route) for determining route-level costs upon which all other efficiency indictors are based. Arrowhead Transit's average cost per hour is below the MnDOT target of $60 per hour.

Cost per passenger is the overall cost to operate a route divided by the number of passengers. As shown in Table 15, the average cost per passenger for Arrowhead Transit is $11.64. The lowest costs per passenger are for Aitkin's demand response services ($8.02) and the highest are associated with demand response routes in Carlton County ($15.99). According to the *2017 Rural Transit Fact Book,* the national average for cost per passenger for rural transit providers is $14.68. The *2017 MnDOT Transit Report* lists the average cost per passenger in a rural area as $13.30. On average Arrowhead Transit costs per passenger are slightly lower than both the state and national averages. The Greater Minnesota Transit Investment Plan 2017-2037 has set a performance metric that compares route-level costs per rider to system-level costs per rider. Additional performance tracking guidelines by MnDOT state that the target cost per passenger for Dial-A-Ride services should not exceed $15.00.

Table 15. 2018 Cost per Passengers by County and Service Type

County	Demand Response	Route Deviation	Average
Aitkin	$8.02	$9.33	$8.89
Carlton	$15.99	$11.77	$14.12
Cook	$12.40	$15.61	$14.00
Itasca	$10.68	$9.37	$9.96
Koochiching	$11.62	$11.30	$11.53
Lake	$14.24	$10.33	$11.50
Pine	$12.23	$10.13	$10.67
St. Louis	$13.96	$11.67	$12.49
All Counties	$12.87	$10.77	$11.64

Source: Arrowhead Transit

Cost per mile measures financial efficiency of providing service and will vary based on the average operating speed. The smaller the number indicates more financial efficient routes and/or faster operating speeds. Arrowhead Transit services cost $3.16 per mile on average. As shown in Table 16, demand response routes, which operate at significantly slower speeds, cost more per mile than deviated routes. On average, Aitkin and Pine Counties have the lowest costs per mile, while Carlton and Koochiching have the highest.

Table 16. 2018 Cost per Mile by County and Service Type

County	Demand Response	Route Deviation	Average
Aitkin	$5.42	$2.14	$2.62
Carlton	$5.19	$2.86	$3.99
Cook	$10.65	$1.99	$3.11
Itasca	$4.50	$2.48	$3.16
Koochiching	$5.03	$2.28	$3.81
Lake	$6.80	$2.74	$3.52
Pine	$5.22	$1.86	$2.30
St. Louis	$4.93	$2.70	$3.29
All Counties	$5.08	$2.39	$3.16

Source: Arrowhead Transit

7.2 Projected Performance

If Arrowhead Transit's needs for 2020-2025 are met, it is reasonable to expect that the quality and level of service it provides to residents will increase. In order to ensure transparency, accountability, and informed decision-making, it is critical that Arrowhead Transit continue to track the metrics it is already using, as well as additional metrics for which a baseline still needs to be established. Metrics for Arrowhead Transit to use to measure its quality and level of service, as well as efficiency, are described in Table 17.

These metrics will enable Arrowhead Transit to assess its performance and identify benefits that are being achieved from investments in the system and operating improvements and investments.

Table 17. Arrowhead Transit Performance Metrics

Performance Measure	Current Baseline	Goal/Target	Frequency of Measurement
Farebox recovery	2.5%	3.5-7%[a]	Monthly
Cost per trip	$13.14	$13-15[b]	Monthly
Annual ridership	630,000	652,000 for 2020 [c] 673,000 for 2021 677,000 for 2022 684,000 for 2023 687,000 for 2024 719,000 for 2025	Monthly and Annually
Riders per revenue hour	5.1	5.1-6 [d]	Monthly
Frequency with which “five to go” routes are operated, by route	75% (estimate)	Increase	Monthly
Vehicle miles per mechanic (to measure that mechanic staffing levels are in line with national ranges)	437,733	Be within 70% range for mechanics staffing as soon as facility capacity allows	Annually
Annual revenue hours per staff (for all labor categories) are in line with peers	1,248	Address any staff capacity issues identified by the agency or through peer review	Annually or bi-annually
Average rider wait times for Dial-A-Ride service	Not known - baseline must be established	TBD	Monthly
On-time performance for deviated route service	Not known - baseline must be established	TBD	Monthly
Number of ride denials (requests for Dial-A-Ride service that could not be met within 60 minutes of the requested time)	Not known - baseline must be established	Reduce	Monthly
Number of denied rides for deviated route service (i.e., requested rides not provided due a service not meeting the “five to go” requirement)	Not known - baseline must be established	Reduce	Monthly
Rider satisfaction, via short annual customer satisfaction survey (jointly with on-board survey when possible)	Not known - baseline must be established	TBD	Annually

Source: Arrowhead Transit, AECOM

[a] Nationally, in 2016, the average farebox recovery for demand response service was 7.3%; and for demand response service operated by taxi, it was 14.8%. Arrowhead Transit's current farebox recovery is significantly below national averages; however, this is likely because of the immense size of its service area and affordability of its fares, which make transit more accessible to price-sensitive populations. For more information, see https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/ntd/66011/2016-ntst.pdf.

[b] In 2016, the national average cost per passenger trip was $4.43 for fixed route bus service, $43.79 for demand response service, and $28.71 for demand response service operated by taxi. Arrowhead Transit's current cost per trip of $13.14, which is less than a third of the national demand response average and less than half of the demand response operated by taxi average, is impressive. Therefore, it is recommended that Arrowhead Transit maintain or further improve its performance with respect to this metric. Service increases should be accompanied by similar productivity performance as existing routes, at a minimum. For more information on national averages, see https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/ntd/66011/2016-ntst.pdf.

[c] Given national trends of declining ridership, maintaining or increasing current ridership, and ensuring additional services achieve similar levels of productivity as current services (five riders per hour), is a reasonable goal for Arrowhead Transit. Arrowhead Transit increased its ridership from 2016 to 2017, indicating that increasing its ridership is a reasonable goal, despite national trends.

[d] Arrowhead Transit's demand response service currently exceeds many other agencies' performance with respect to riders per hour; even in more densely populated areas across the country. For example, see https://humantransit.org/2018/02/is-microtransit-a-sensible-transit-investment.html. For this reason, maintaining or increasing its current riders per hour is a reasonable goal for the agency. While Arrowhead Transit's performance with respect to riders per hour on its deviated route is in line with performance of peer agencies, increasing riders per hour is a reasonable goal as additional services are provided.

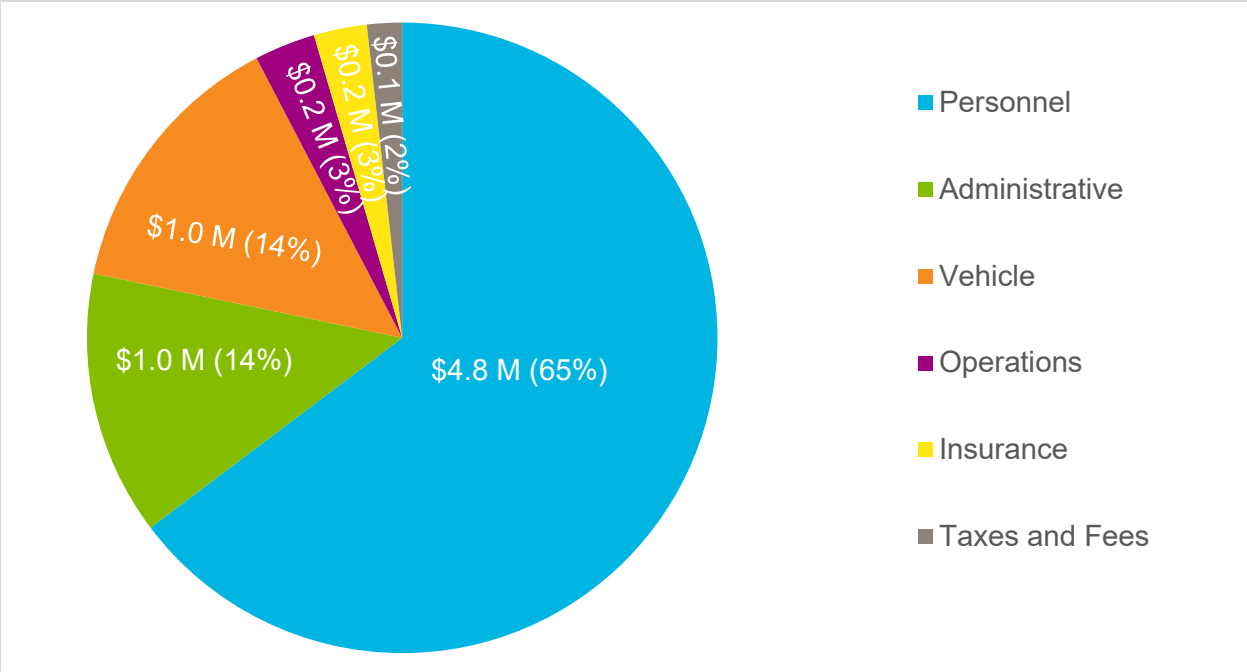
8. Operations

Arrowhead Transit operates scheduled stop, Dial-A-Ride and Rural Rides transit service across eight counties. To operate these services, Arrowhead Transit employs over 350 full-time, part-time, and volunteer drivers. Arrowhead Transit also has 34 full-time and part-time staff dedicated to management, dispatch, maintenance, and administrative functions.

8.1 Background

In 2018, Arrowhead Transit reported $7.2 million in operating expenses (after fuel tax reimbursement). As shown on Figure 16, 2018 operating costs consisted primarily of personnel expenses such as salaries, wages, and fringe benefits.

Figure 16. 2018 Operating Costs



Source: Arrowhead Transit 2018 Operating Budget

8.2 Historical and Projected Annual Summary

Table 18 highlights the changes in revenue service and costs from 2013 to 2018. Service for Arrowhead Transit grew the most between 2013 and 2014, with a 17% increase in service hours from 84,735 to 99,099 and an 11% increase in revenue miles.

Table 18. System Cost Efficiency by Year (2013-2018)

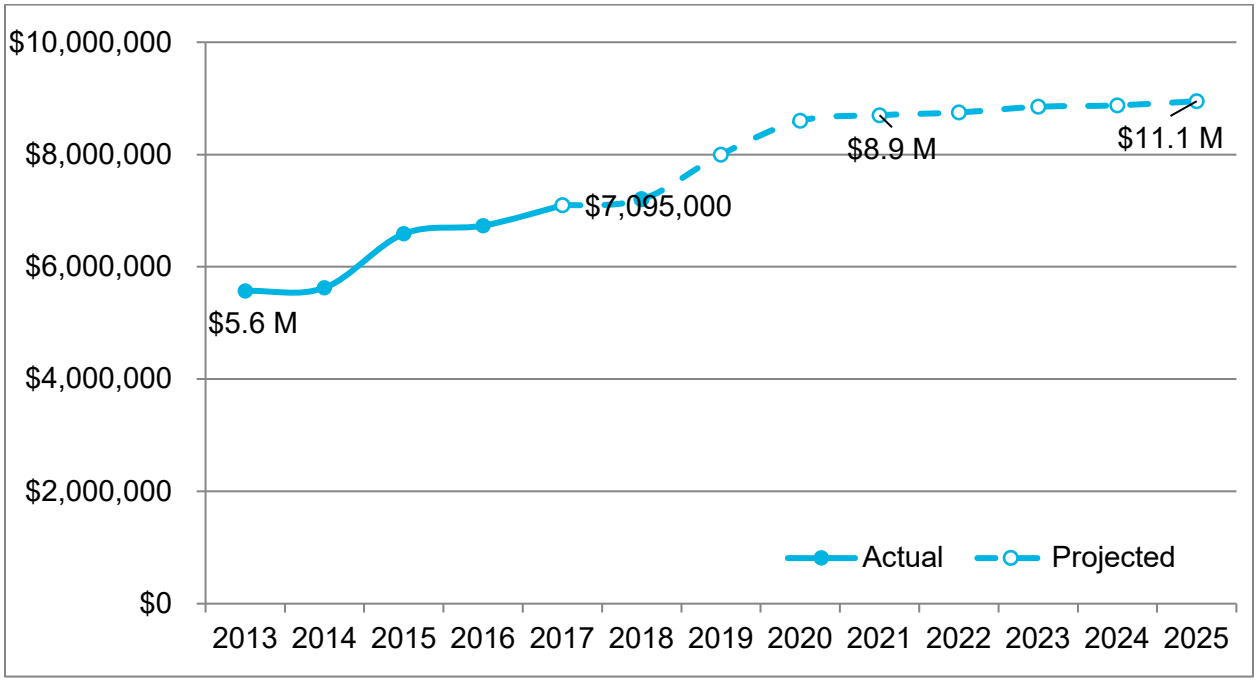
Year	Revenue Hours	Percent Change Revenue Hours	Revenue Miles	Percent Change Revenue Miles	Operating Cost	Percent Change Operating Cost
2013	84,735	—	1,779,718	—	$5,571,000	—
2014	99,099	17.0%	1,969,775	10.7%	$5,626,000	1.0%
2015	102,681	3.6%	2,061,036	4.6%	$6,588,000	17.1%
2016	110,326	7.4%	2,205,562	7.0%	$6,733,000	2.2%
2017	119,268	8.1%	2,256,427	2.3%	$7,095,000	5.4%
2018	123,725	3.7%	2,293,897	1.7%	$7,298,670	2.9%

Source: Arrowhead Transit, Financial Template

In February 2015, Arrowhead Transit established two new guaranteed weekly service routes from the North Shore to Duluth and from International Falls to Bemidji. This new service corresponds with a 17% growth in operating costs from $5.6 million in 2014 to $6.6 million in 2015. Other investments have included increased marketing efforts in 2014 and 2015 and dispatcher training in 2016.

Historic and projected operating costs are shown on Figure 17. Costs have grown by approximately $1.7 million since 2013, with an average annual increase of 6.2% per year. Arrowhead Transit projects operating costs increasing by approximately 3.0% annually for existing services. With service expansion reflecting documented needs, costs could increase to $11 million, by approximately 7.5% annually.

Figure 17. Actual and Projected Operating Costs by Year (2013-2025)



Source: Arrowhead Transit, AECOM

8.3 Staffing

Table 19 summarizes full-time and part time staff by labor category. Of the 132 paid employees, approximately 56% are full time and 44% are part time. The majority of employees (74%) are drivers, while maintenance staff comprise only 5% of the workforce. In addition to these paid employees, 254 volunteer drivers are used in service of Arrowhead Transit's Regional Ride program. Volunteer drivers are reimbursed for vehicle operating costs at a rate of 54.5 cents per mile.[3]

Table 19. Arrowhead Transit Staffing

Type of Staff	Management/ Supervising	Drivers	Dispatch/ Scheduling	Administrative/ Support	Maintenance	Total
Full Time	6	41	9	12	6	74
Part Time	0	57	0	1	0	58
Total	6	98	9	13	6	132

Source: Arrowhead Transit

[3] Arrowhead Rural Rides, accessed November 2018, http://arrowheadtransit.com/services/rural-rides/.

8.4 2020-2025 Annual Needs

TCRP Report 161 outlines methods for quantifying need and forecasting demand for rural passenger transportation. Transportation need, summarized in Table 20, is defined as the total number of households without a vehicle times the difference between the daily trip rate for rural households having one personal vehicle and rural households having no personal vehicle. Within the Arrowhead Transit service area, there is an annual need for seven million one-way trips. Almost five million of these are located in St. Louis County, where Duluth Transit Authority also operates. Transportation needs can be met through a variety of options, including taxi service, volunteer drivers, community partners, or other local transit providers, and do not reflect needs to be met solely by Arrowhead Transit.

Table 20. Transit Need by Jurisdiction

Transit Need/Mobility Gap by Jurisdiction	Annual Number of One-Way Trips Needed
Aitkin County	255,800
Carlton County	429,700
Cook County	179,600
Itasca County	550,000
Koochiching County	233,100
Lake County	197,800
Pine County	371,100
St. Louis County	4,977,000
Total Service Area	7,194,100

Source: Arrowhead Transit, 2017 ACS 5-year estimates, AECOM (based on TCRP Report 161)

TCRP Report 161 provides several methods for estimating categories of transit demand, provided in Table 21. General purpose rural non-program demand is based entirely on demographic factors indicating decreased mobility, including population over age 60, population with a disability, and population without access to a vehicle. Demand for general public rural passenger transportation is calculated based on the unmet trip need and passenger miles of service in operation. Both estimates of demand are below Arrowhead Transit's 2017 ridership of 596,823 (see Section 4.1), indicating that current services are performing better than demographic factors and service levels would predict. Accordingly, ridership targets and revenue estimation for future service expansions should be based on demonstrated performance of the system rather than national indicators.

Table 21. Transit Demand by Service Area

Transit Demand Type	Annual Number of One-Way Trips In Demand
Aitkin County	16,900
Carlton County	23,200
Cook County	5,600
Itasca County	36,600

Transit Demand Type	Annual Number of One-Way Trips In Demand
Koochiching County	10,900
Lake County	9,600
Pine County	21,900
St. Louis County	152,500
General Purpose Rural Non-Program Demand	277,200
General Public Rural Passenger Transportation	451,800

Source: Arrowhead Transit, 2017 ACS 5-year estimates, LEHD 2015, AECOM (based on TCRP Report 161)

8.4.1 Staffing Needs

Arrowhead Transit has three main staffing needs. The first relates to its staff level for mechanics. As shown in Section 12.3, Arrowhead Transit is currently significantly understaffed with mechanics compared to peer agencies according to an industry report (TCRP Report 184) that surveyed over 320 agencies. This is currently due in part to limited capacity at the Gilbert facility, where most of Arrowhead Transit's vehicle maintenance occurs. This plan recommends that Arrowhead Transit add two additional mechanics to its staff in the short-term (2020), and that it increase its staff to have 12 mechanics (from the current 6) by 2022, following completion of the new Gilbert facility in 2020-2021.

Arrowhead Transit's second major staffing issue relates to drivers. Difficulty attracting and retaining drivers is a need that is not unique to Arrowhead Transit; rather, it applies to most providers in Minnesota and the majority of agencies around the United States as well. The exact amount that will be needed to adequately recruit, train, retain, and compensate drivers over the five-year plan period is not precisely known; it is recommended that the state's transit agencies and MnDOT work together to stay apprised of the labor situation impacting the supply of drivers.

The third staffing-related need comes from the peer analysis of overall staffing levels in Section 12.2, which shows that Arrowhead Transit is a bit understaffed overall compared to two peer agencies (which were chosen due to the common characteristics they share with Arrowhead Transit). This analysis shows that Arrowhead Transit could potentially benefit from increasing its overall level of staffing, particularly including among staff in administrative roles. Additional administrative support would enable Arrowhead Transit to continue and strengthen its efforts to keep and analyze data on its performance, and to gain a high response rate to an annual customer satisfaction survey, among other responsibilities

8.4.2 Operations Funding Needs

For the past few years, Arrowhead Transit has benefitted from MnDOT's Rural Rides program, which subsidizes rides for some customers who would otherwise be unable to afford transit services. This program is set to expire in 2019, but continued operational funding support, whether through this program or another, remains a need for Arrowhead Transit's customers. In addition, Arrowhead Transit may be able to increase its current role as a "mobility manager." In this role, Arrowhead Transit takes on responsibility for, when possible, connecting riders with available transportation resources and services regardless of whether these are provided directly by Arrowhead Transit or by partners or other providers. Given that Arrowhead Transit

offers a number of services that are contingent upon adequate demand, and that sometimes the demand for Arrowhead Transit's services exceeds its capacity, there could be a significant benefit to residents of Arrowhead Transit serving as an additional resource to the public in helping meet transportation needs, particularly for people experiencing socioeconomic and disability-related challenges.

8.4.3 Service Change Recommendations

This plan recommends a variety of service changes that will update Arrowhead Transit's levels of service to reflect existing demand for services at specific times of day, dates of the week, and/or for particular services. As listed in Table 9 and discussed in detail in Section 12.1, these changes fall into a number of categories. Implementing these changes will result in increased productivity for Arrowhead Transit's services overall and ensure resources are directed to serve a greater number of customers.

9. Financial

As shown in Table 22, gross operating costs for Arrowhead Transit in 2018 were approximately $7.3 million. These costs were offset by $166,226 in fare revenue (approximately 2.3% farebox recovery) for a net operating expenditure of $7.1 million. Arrowhead Transit receives federal and state operating assistance and generates local funding through contracts with the local entities served. Approximately $552,000 in revenue was generated above Arrowhead Transit's local match commitments and can be set aside into the reserve account. This reserve account can be used to fund Arrowhead Transit's local share of capital improvements or to bridge potential revenue shortfalls in future years.

Table 22. 2018 Operating Financial Profile

Expense/Revenue Category	Amount	Percentage of Net Expenditure
Operating Costs	$7,298,670	—
Fare Revenue	$166,226	—
Net Operating Expenditure	$7,132,444	—
State and Federal Revenue Share	$6,062,577	85%
System Revenue	$1,621,580	—
Estimated Local Revenue Share	$1,069,867	15%
Estimated Excess Revenue (Reserve Account)	$551,713	8%

Source: Arrowhead Transit

Farebox revenue is not a major revenue stream for Arrowhead Transit, accounting for only 3.1% of operating costs in 2013 and 2014, 2.5% of costs in 2015 through 2017, and 2.3% in 2018. Across all services and pass types, approximately $0.30 of fare revenue is generated per passenger trip. The fare structure for specific services and rider categories is shown in Table 23. On all Arrowhead Transit routes, children under 6 ride free while children between 6 and 12 years of age pay half price.

Table 23. Fare Structure

Route/Service	Adult Fare	Child Fare	Other Fare	Monthly Pass
Dial-A-Ride Services: Aitkin, Chisholm, Ely, and Floodwood Dial-A-Rides	$1.00	$0.50	N/A	$15.00
Dial-A-Ride Services: Moose Lake Dial-A-Ride	$1.00	$0.50	$0.90	N/A
Dial-A-Ride Services: Hermantown to Duluth	$1.00	$0.50	$0.91	$20
Dial-A-Ride Services: Two Harbors Dial-A-Ride	$1.25	$0.63	N/A	$25.00
Dial-A-Ride Services: Cloquet and Pine City Dial-A-Ride	$1.25	$0.63	$1.13	$22.50
Dial-A-Ride Services: Grand Marais Dial-A-Ride	$1.25	$0.63	$1.14	$25.00
Dial-A-Ride Services: International Falls Dial-A-Ride	$1.50	$0.75	N/A	$30.00
Dial-A-Ride Services: Grand Rapids Dial-A-Ride	$1.75	$0.85	N/A	$32.50
Dial-A-Ride Services: Virginia/ Mountain Iron Dial-A-Ride	$1.75	$0.85	N/A	$32.50
Scheduled Stop Services: International Falls to Virginia	$7.50	N/A	N/A	N/A
Scheduled Stop Services: Grand Marais to Duluth	$10.00	N/A	N/A	$47.50
Scheduled Stop Services: International Falls to Duluth	$12.50	N/A	N/A	N/A
Scheduled Stop Services: International Falls to Bemidji	$15.00	N/A	N/A	N/A
Scheduled Stop Services: Other Scheduled Routes[a]	$2.00 - $5.00	N/A	N/A	N/A

Source: Arrowhead Transit

[a]Fares for scheduled services vary by route and distance rider travels along the route. One-way fares are typically $5 or less with the exception of routes listed individually.

9.1 Background

Transit providers serving Greater Minnesota receive funding from several sources at the federal, state, and local levels. Specifically, transit funding is comprised of:

- Federal Transit Funding, USDOT (FTA)
- State General Fund appropriations
- State Motor Vehicle Sales Tax (MVST)

- State Motor Vehicle Lease Sales Tax (MVLST)
- Local Share: farebox recovery, local tax levies, local contracts for service

Transit providers in Greater Minnesota generally receive federal funding through the Section 5311 Non-urbanized Area Formula Program, which provides capital and operating funding for small urban and rural areas, including intercity bus transportation. MnDOT is responsible for distributing federal funds to transit providers in Greater Minnesota.

MnDOT also distributes state funding from the General Fund and Transit Assistance Fund to Greater Minnesota transit providers. Transit services have received funding from the state's General Fund every year for decades. However, the majority of state funding for Greater Minnesota transit providers comes from the Transit Assistance Fund, which receives revenue through the MVST and MVLST.

Minnesota State law requires local participation in funding public transit services in Greater Minnesota. A statutory fixed-share funding formula sets a local share of operating costs by system classification as noted in Table 24. Local revenue sources that can provide the local match include farebox recovery, local property taxes, local sales taxes, contracted route revenues, advertising revenue, or program revenue.

Table 24. Local Share Requirements

Program (Recipient Classification)	Percentage of Required Local Match
Elderly and Disabled	15%
Rural (population <2,500)	15%
Small Urban (population >2,500 and <50,000)	20%
Urbanized (population > 50,000)	20%

Source: MnDOT Greater Transit Funding in Minnesota

State and federal funding for public transit should cover the remaining 80% or 85% of operating costs. In reality, the percentage of total funds spent on transit that are provided locally are higher than the mandated local share. Transit systems in Greater Minnesota often provide additional service that is not recognized in the funding formula, thus the total percentage of local funding for transit service in Greater Minnesota is more than 20%.

9.2 History

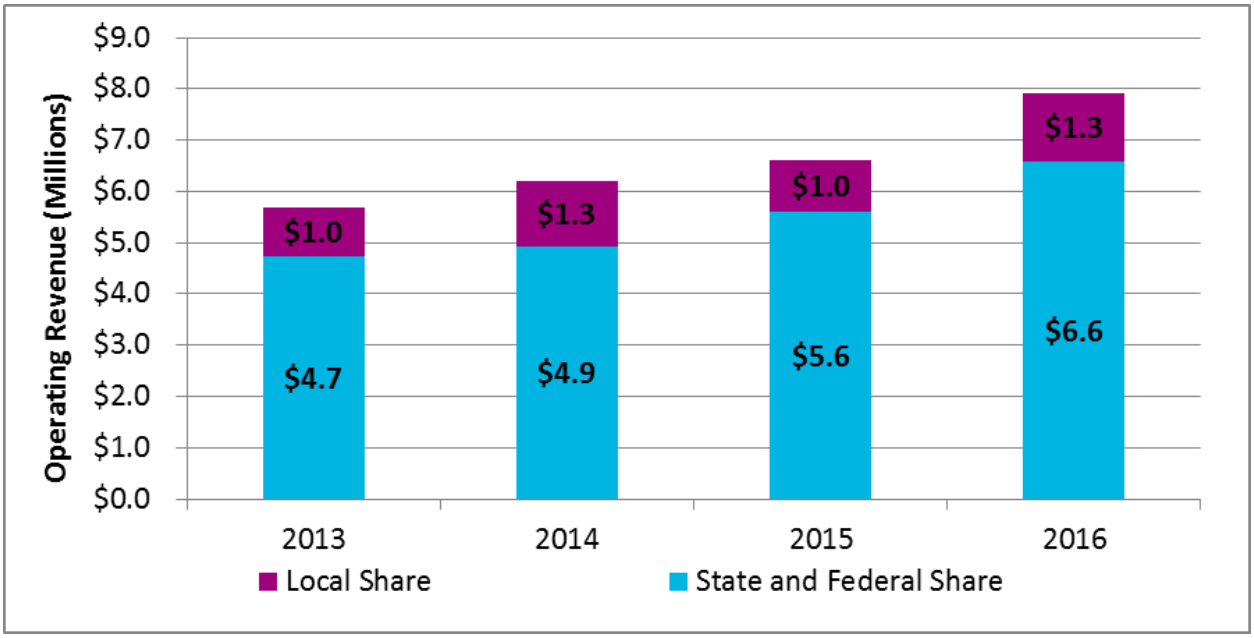
Table 25 provides the annual operating expenditure and operating revenue sources for 2013 to 2016. The local share has been approximately 17% of operating expenditures but peaked at a 20.6% share in 2014. Figure 18 illustrates the distribution of operating revenue sources for 2013 to 2016.

Table 25. Arrowhead Transit Operating Expenditures (2013-2016)

Year	Operating Expenditures	State and Federal Share	Local Share	% Local Share
2013	$5,679,761	$4,728,913	$950,848	16.70%
2014	$6,211,274	$4,933,825	$1,277,449	20.60%
2015	$6,604,254	$5,599,800	$1,004,454	15.20%
2016	$7,923,138	$6,594,300	$1,328,838	16.80%

Source: 2014 MnDOT Annual Transit Report, 2015 MnDOT Annual Transit Report, 2016 MnDOT Annual Transit Report, 2017 MnDOT Annual Transit Report

Figure 18. Arrowhead Transit Operating Revenue Sources (2013-2016)



Source: 2014 MnDOT Annual Transit Report, 2015 MnDOT Annual Transit Report, 2016 MnDOT Annual Transit Report, 2017 MnDOT Annual Transit Report

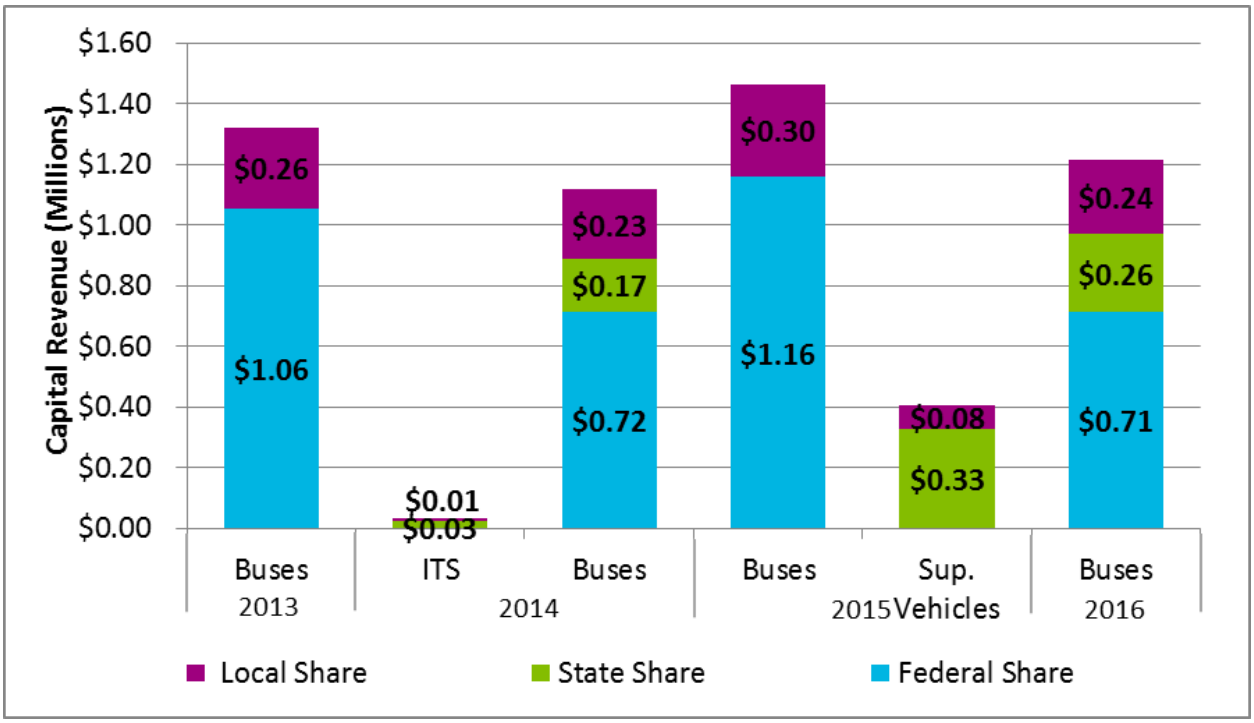
Capital expenditures and revenue sources are provided in Table 26 and Figure 19. Bus purchases represented the overwhelming source of capital needs each year. In addition, Arrowhead Transit invested in ITS infrastructure in 2014 and support vehicles in 2015. The local share comprised approximately 20% of each capital expenditure, with state revenue covering the remainder of ITS and support vehicle costs. In 2013 and 2015, federal revenue sources were used to fund 80% of bus expenditures. In 2014 and 2016, state and federal funds combined to fund the remaining bus costs.

Table 26. Arrowhead Transit Capital Expenditures (2013-2016)

Year	Asset Category	Total Expenditures	Federal Share	State Share	Local Share
2013	Buses	$1,319,484	$1,055,587	$0	$263,897
2014	ITS	$32,563	$0	$26,051	$6,513
2014	Buses	$1,117,150	$715,000	$172,800	$229,350
2015	Buses	$1,463,420	$1,159,200	$0	$304,220
2015	Support Vehicles	$406,800	$0	$325,440	$81,360
2016	Buses	$1,214,016	$711,475	$259,738	$242,803

Source: 2014 MnDOT Annual Transit Report, 2015 MnDOT Annual Transit Report, 2016 MnDOT Annual Transit Report, 2017 MnDOT Annual Transit Report

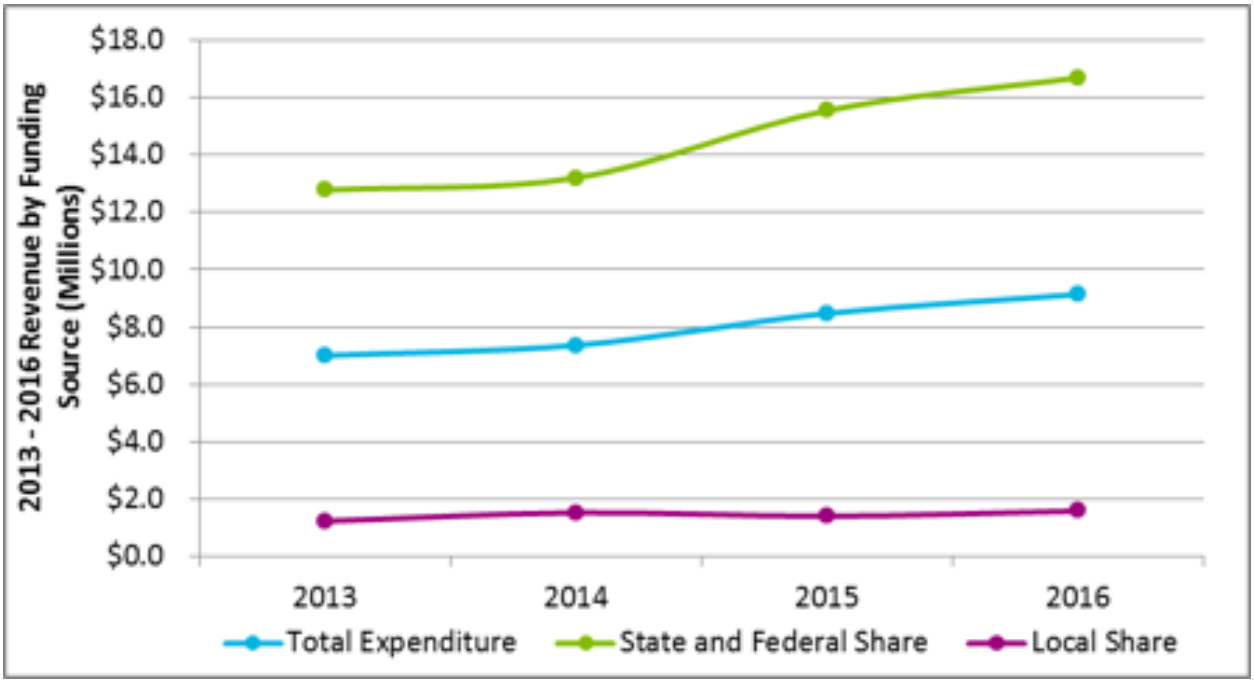
Figure 19. Arrowhead Transit Capital Revenue Sources (2013-2016)



Source: 2014 MnDOT Annual Transit Report, 2015 MnDOT Annual Transit Report, 2016 MnDOT Annual Transit Report, 2017 MnDOT Annual Transit Report

Figure 20 illustrates annual changes to the total available capital and operating revenue by revenue source. As shown, local funding has remained steady at approximately $11.4 million per year.

Figure 20. Change in Total Available Capital and Operating Revenue by Source (2013-2016)



Source: 2014 MnDOT Annual Transit Report, 2015 MnDOT Annual Transit Report, 2016 MnDOT Annual Transit Report, 2017 MnDOT Annual Transit Report

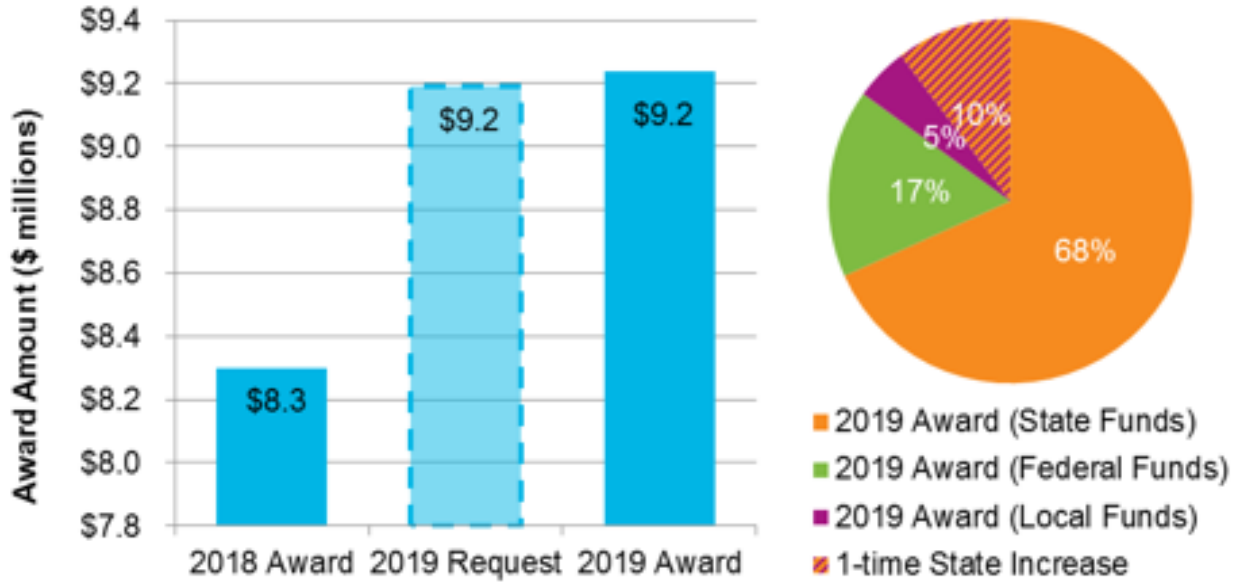
9.3 Budgeted Revenue

MnDOT has approved a one-time across-the-board 10% reduction in the local share required for Greater Minnesota Transit providers' 2019 Public Transit Operating Grant. This means that the local share for Arrowhead Transit has been reduced from 15% to 5% for 2019 only. Figure 21 illustrates requested and granted funds from 2018 to 2019. The 2019 grant award is approximately $50,000 more than the amount requested by Arrowhead Transit and represents an 11% increase from the 2018 award.

9.4 2020-2025 Needs vs. Projected Revenue

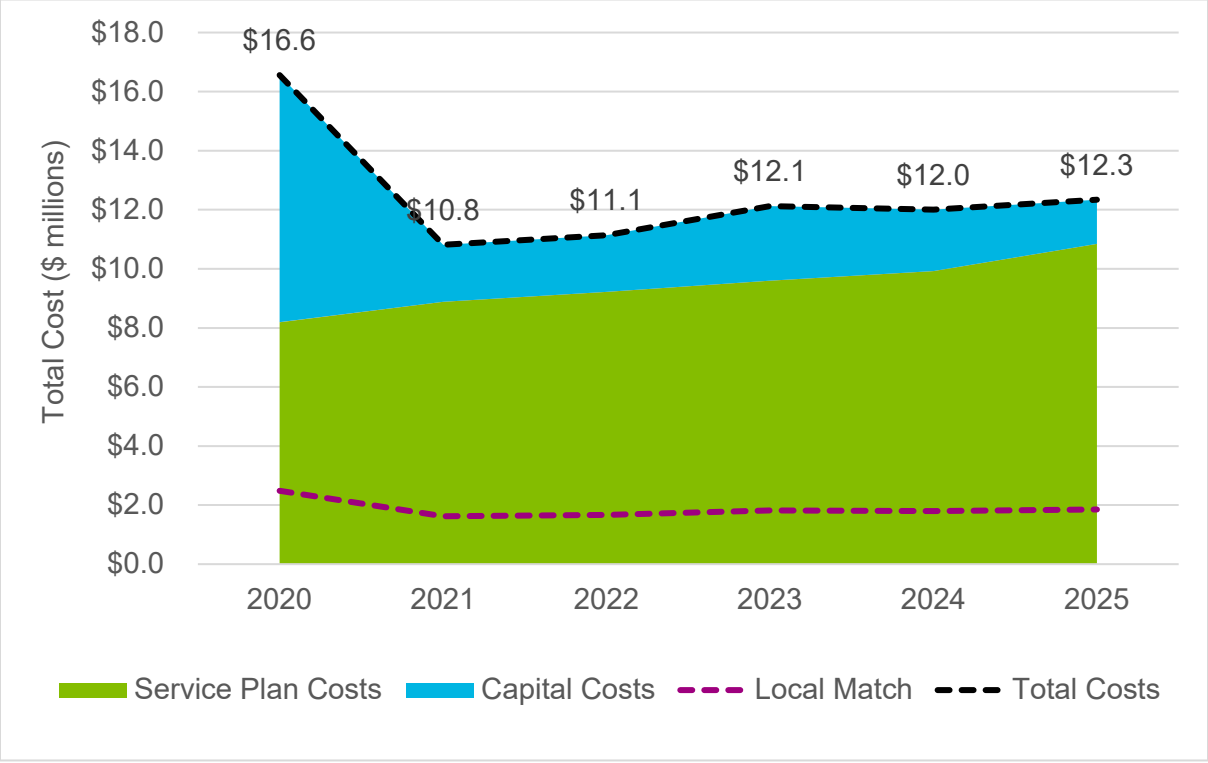
Capital and operating plans for 2020 through 2025 are included in Appendix A. Total costs for the five-year plan are shown on Figure 22. As shown, capital costs are front loaded in 2020 for expansion of the Gilbert maintenance facility and expedited replacement of the oldest fleet vehicles. Service costs increase with cost escalation and expansion throughout the five-year plan period, with many Dial-A-Ride service increases occurring particularly in 2020 and 2021. In 2025, larger increases are associated with expansion of deviated route services in Cook and Lake Counties.

Figure 21. Grant Requests and Awards (2018-2019)



Source: MnDOT

Figure 22. 2020-2025 Plan, Local Revenue Requirements



Source: AECOM

10. Agency Strategic Direction

The five-year planning process for all the rural transit service providers (FTA Section 5311) in Greater Minnesota, the first of its kind, has identified and quantified the transit services being operated around the state, which vary greatly in size and scope, and identified potential areas for improvement, expansion, and regional coordination. The provision of transit service is subject to many federal and state guidelines, which may impact how improvements, expansion, and coordination recommendations are implemented. This section describes both overarching areas of potential improvement and opportunities identified across the state as well as those specific to Arrowhead Transit in addition to local, state, and federal requirements.

10.1 Requirements

The provision of transit service is subject to many local, state, and federal guidelines.

10.1.1 Federal Transit Administration (FTA)

FTA Section 5311 provides formula-based grants to support rural and small urban areas for transit capital, planning, and operating assistance. Guidance on the grant, requirements, compliance and application process is available online and through MnDOT Office of Transit and Active Transportation (OTAT).

FTA is a major funder of rural transit service in Greater Minnesota. MnDOT operates as the primary recipient of FTA Section 5311 funds. As such, all Greater Minnesota transit service providers (sub-recipients) receiving FTA Section 5311 funds, through MnDOT as the recipient, must comply with FTA regulations. FTA regulations pertain, but are not limited to, major topic areas, including training, safety, maintenance, service, and procurement. Any contracted service by transit agencies, including taxi services, must also comply with FTA requirements.

Arrowhead Transit is not aware of any issues related to FTA compliance. Development of a formalized vehicle replacement plan will help the agency document its compliance with vehicle procurement, maintenance, and disposal guidelines.

10.1.2 Olmstead Plan

In 1999, the Supreme Court affirmed that mental illness is a type of disability, that individuals with disabilities, including those with mental illness, have a right to live in their communities as opposed to forcing institutionalization, and are covered by the ADA in *Olmstead vs. L.C and E.W.*[4] The State of Minnesota is one of the more progressive states in instituting a specific Olmstead Plan. Minnesota's Olmstead Plan was updated most recently in March 2018[5].

For transit providers in Greater Minnesota, the Olmstead Plan requires that people with disabilities, including those with mental illness, are covered by the same requirements of the Americans with Disabilities Act (discussed in Section 10.1.4). It means that the level of transit service available to the general public (the span of service, frequency of service, and service area coverage) is also available to people with disabilities, including mental illness. It also means that social and human service agencies and public transit agencies should coordinate as much as possible to provide service to individuals with disabilities.

[4] https://supreme.justia.com/cases/federal/us/527/581/.
[5] https://www.dhs.state.mn.us/olmstead/.

Arrowhead Transit's demand response and deviated route services are available to all persons with disabilities, including mental illness, at no additional fee. Continued and enhanced coordination with local human service agencies is a recommended component of the marketing and public education action plan discussed in Section 11.2.

10.1.3 Title VI

FTA requires all recipients and sub-recipients to comply with USDOT Title VI regulations, based on Title VI of the Civil Rights Act of 1964. Title VI requirements for transit services are generally related to supplying language access to persons with limited English proficiency[6]. In Greater Minnesota, MnDOT is the primary recipient of FTA funds, so all the Section 5311 transit service providers are sub-recipients. Thus, MnDOT has the primary responsibility for Title VI compliance. MnDOT may request information related to Title VI compliance, including language assistance plans or activities, public participation plans or activities including language access, etc., from the transit service providers as needed.

In Greater Minnesota, with primarily deviated route and demand response service, Title VI responsibilities pertain to identifying communities with limited English proficiency and providing materials and outreach in appropriate languages.

Arrowhead Transit staff have not noted a demand for materials in other languages.

10.1.4 Americans with Disabilities Act (ADA)

The ADA is designed to prohibit discrimination based on disability. In terms of FTA and the provision of transit service, the ADA is structured to ensure equal opportunity and access for persons with disabilities[7]. ADA requirements apply to facilities, vehicles, equipment, bus stops, level of service, fares, and provision of service.

In Greater Minnesota, with most service provided via deviated route or demand response, most service-related requirements (i.e., complementary paratransit service associated with fixed route service) are inherently met by mode. Any contracted service by transit agencies, including taxi services, must also comply with FTA and ADA requirements.

MnDOT defines the types of vehicles that are available for service provision in Greater Minnesota. All the vehicles on the list are ADA compliant. Any new facilities or bus stops must be constructed to be ADA compliant. All transit service providers must complete required training.

Service provision-related equivalencies include the following for demand response service:

- The response time, fares, geographic area of service, hours and days of service, trip purpose restrictions, and availability of information and reservations capability must be the same for all riders, including those with disabilities.
- With regard to capacity denials (denials within the existing service parameters in the above bullet), denials are allowed for demand response service, as long as the frequency of denials is the same as the frequency for riders without disabilities.
- Any priority given to persons with disabilities or higher levels of service is a local decision.

[6] https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Title_VI_FINAL.pdf.
[7] https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/Final_FTA_ADA_Circular_C_4710.1.pdf.

- Requirements for demand response service are different than those required for ADA complementary paratransit associated with fixed route service.

Service provision-related practices include the following for deviated route service:

- Advertise route deviation policies, including distance and availability.
- Establish a reasonable service area in which deviations are permitted (e.g. ¾ mile).
- Establish reasonable limits on numbers of deviations per trip to ensure that scheduled stops are able to operate on time.
- Apply reasonable surcharges for deviations (e.g. deviation surcharges no more than twice the base fare).

All Arrowhead Transit vehicles are ADA compliant. Capital estimates associated with bus stop improvement recommendations are inclusive of ADA standards. Arrowhead Transit does not provide fixed route service.

10.1.5 Agency

MnDOT is responsible for making sure each provider (sub-recipient) complies with FTA Section 5311 requirements. MnDOT also has additional requirements for the transit service providers, including:

- Service data for National Transit Database (NTD)
  - Monthly and annually
  - By mode
- Grant management
- Fleet inventory
- Denials
  - Capacity
  - Unmet Need
- On-time performance (pickup window)
- Percentage of communities with baseline span of service
- Performance metrics (required, but not tracked)
  - Passengers per hour
  - Cost per service hour
  - Cost per trip
  - Others (3; at the discretion of the transit service provider)

MnDOT reports annual NTD statistics and also created and maintains the *Transit Asset Management Plan* for all FTA Section 5311 transit service providers.

Arrowhead Transit does not specify any additional service metrics to be tracked through its internal guidelines or policies.

11. Increasing Transit Use for Agency

As the goal set forth by state legislature is to understand what level of funding it would take to meet 90% of the transportation needs in Greater Minnesota by 2025, the primary assumption in the development of the five-year transit system plans is that transit agencies need to expand and grow ridership. Strategies to improve transit services and increase ridership are described in detail in previous chapters. Another crucial element to increasing ridership and growing transit mode share in an area is a comprehensive marketing and education strategy. Ridership will not increase if the community does not know that the service exists or how to use it.

Section 11.1 describes the elements of a comprehensive marketing and education program that could help provider grow ridership and community awareness. Section 11.2 describes an action plan for growing ridership and community awareness.

11.1 Marketing

Complementing the recommendations previously described in this five-year transit system plan, continuous marketing and education on the transit services available and how they work are crucial to the success of the transit program and to entwining the service into the fabric of the community. Some goals for ongoing marketing and education could include:

- Increase awareness, understanding, and utilization of the transit service by residents, employees, and visitors
- Promote transit service as both a fiscally responsible and green choice
- Position Arrowhead Transit as the bus service in the region
- Standardize/Harmonize regional service information across counties

Possible strategies to achieve these goals include:

- Update website
  - Include concise, clear instructions on how to use the service and who is eligible (everyone!)
  - Include easy-to-understand schedules and maps of services
  - Link to website from other town/city/county/partner websites
  - Provide downloadable brochures
  - Embed an online trip planner or link to an online trip planner
  - Add a ‘Where’s my Bus’ option to the website
- Develop a social media presence
  - Post/update regularly
  - Advertise changes
  - Profile riders
  - Introduce new programs
  - Announce weather delays or cancellations
  - Promote the benefits of transit service

- Consider smartphone apps
  - Develop general transit feed specification (GTFS) so that provider services show up as an option in common mapping apps (e.g., Google Maps, Apple Maps) and/or online trip planners. GTFS-Flex is the appropriate specification for deviated route or demand response service
  - Add a 'Where's my Bus' option to the website or a separate app so that customers can track their rides
  - Allow customers to request trips/negotiate trips with schedulers
- Embrace the mobility management role in the community
  - Add a mobility manager to staff or share a regional mobility manager with partner transit service providers (as appropriate by provider based on plan)
  - Train schedulers and dispatchers to function as mobility managers
    - Educate on all services/programs available in the service area and beyond
    - Train to negotiate and make connections until the customer has a viable option to meet their request/need
- Continue establishing brand awareness for Arrowhead Transit service
- Others that would be beneficial to provider or all providers, as appropriate

11.2 Action Plan

A marketing and education strategy for Arrowhead Transit should be based on input from existing riders, county and municipal stakeholders, and the larger community. Based on discussions with Arrowhead Transit, stakeholder outreach, and survey results, the following ideas were identified:

- Improved outreach to local human service agencies and stakeholder to help identify target riders.
- Coordinated marketing, such as advertisement of transfer opportunities or dual-purpose routes, and partnership opportunities with other transit providers in the region.

Other possible strategies include:

- Put together a marketing campaign that 'speaks' to potential customers – identify local advocates who have positive stories to share about their use of Arrowhead Transit bus service. Some examples may include:
  - Provide an example of a rider who used to spend X on commuting costs, but riding the bus to commute only costs Y, a savings of % percent annually
  - Work with local senior groups to identify benefits to seniors in longevity and quality of life when mobility options are available that allow them to get out of their homes and attend events, run errands, and make it to medical appointments
- Include a 'Benefits of Transit Service' section on the website and brochures
  - Use national research statistics on the benefits of transit service
  - Identify different themes to capture the attention of different audiences and strategically utilize the themes in materials publicized with community partners and on Arrowhead Transit materials

- For mainstream materials, periodically focus on different themes to capture different audiences and re-engage others
- Benefit themes may include: economic development, aging in place, reduction in air pollution, technology, community building, access to education and employment opportunities, quality of life for seniors and disabled persons, reduction in dependence on personal vehicles, mobility options for people living in rural areas, attraction of international tourists who will only visit destinations that do not require the use of personal vehicles, etc.

Based on the marketing and education priorities identified for Arrowhead Transit, the following are steps towards implementing a new or improved marketing strategy:

1. Arrowhead Transit staff currently conducting stakeholder outreach in Itasca County and will continue this effort in other counties in 2019 and 2020.
2. Arrowhead Transit will update its website in 2020 and establish an annual recurring budget of approximately $10,000 per year to fund advertisements and other marketing opportunities.
3. Arrowhead Transit will establish a customer service department in 2022.

12. Technical Memoranda

12.1 Service Analysis

Table 9 contains a list of the recommended service changes for Arrowhead Transit to make between 2020 and 2025 to better serve its customers. This section provides background information regarding why these service changes are being recommended and the methodologies used to estimate the costs for these service changes.

12.1.1 Rationale for Changes by Service Change Type

Service changes recommended for Arrowhead Transit fall into a few different categories, as described in this section.

12.1.1.1 Dial-A-Ride Service Increase

This plan recommends a variety of service increases for Dial-A-Ride services. These recommendations are made for at least one (and often more) of the following reasons:

- The service has a high level of productivity, as measured in riders per hour, suggesting that demand is high enough to justify additional service.
- A service increase was explicitly noted by Arrowhead Transit staff as a service with a high level of need, possibly including unmet needs. Arrowhead Transit staff regularly receive feedback from the public regarding service needs, and this feedback has informed their understanding of service increase needs.
- The Dial-A-Ride service in adjacent/neighboring communities (e.g., Virginia and Mountain Iron) has different service hours, and there is regular demand for travel between these areas during the same time periods. Making service hours consistent across neighboring towns/communities also makes the system simpler for customers to understand (and use).
- The service does not meet MnDOT's baseline span of service guidelines, as shown in Figure 23. Progress towards meeting the span of service guidelines is collected and reported annually in the MnDOT *Annual Transportation Performance Report* and the *Annual*

Transit Report. This plan recommends increasing spans of service to match the MnDOT guidelines for cases in which the service meets minimum performance standards.

Figure 23. MnDOT Baseline Span of Service Guidelines

MUNICIPALITY POPULATION	PEER GROUP	WEEKDAY HOURS	SATURDAY HOURS	SUNDAY HOURS*
50,000 and over	Urbanized	20	12	9
49,999 – 7,000	Small Urban	12	9	9
6,999-2,500	Small Urban	9	9	NA
County Seat Towns* (<2,500 pop)	Rural	8 (3 days a week)	NA	NA

* As demand warrants based on individual system performance policies

12.1.1.2 Conversion to Guaranteed Service on All Trips

Many of Arrowhead Transit's longer-distance deviated route services have a "five to go" requirement - that is, at least five people must sign up to take the service in order for it to run. Feedback provided by Arrowhead Transit customers indicates that uncertainty about whether these routes will operate on any given date reduces the number of potential riders and likelihood that riders will depend on the service. Establishing service levels that allow all routes to operate on a guaranteed basis, as well as discontinuing routes that are not feasible to operate on a regular basis, will make Arrowhead Transit's services more attractive to potential riders. In addition, when Arrowhead Transit has converted higher ridership routes to guaranteed status in the past, it found that ridership on these routes further increased. It can also reasonably be assumed that on some routes, passengers may prefer knowing the bus is guaranteed to operate once a month instead of having it operate twice a month only if enough reservations are placed in advance. The recommendations in this plan for making specific routes guaranteed are based on a combination of data showing the frequency with which routes have run in the past, as well as feedback from Arrowhead Transit staff.

12.1.1.3 Increase in Deviated Route Service

In a few cases, a need was recognized by Arrowhead Transit staff for routes that transport a significant number of commuters to extend their hours so that a run would be provided in the afternoon to give workers a way to get home at the end of the work day. The McGregor-Aitkin route is an example of a route where it is being recommended to increase service to meet workforce needs in the region.

12.1.1.4 Intercity Service Optimization

Arrowhead Transit operates service from each of the counties in its service area to Duluth; frequencies on these services varies between weekly, twice a month, or once a month. Some communities are served by multiple routes, but the routes are not necessarily scheduled to maximize travel options for the residents of these communities. For example, three routes to Duluth pass through Cloquet. However, despite two of these routes only operating once a month and the third operating twice a month, there is only service from Cloquet to Duluth three days per month. Table 27 lists the current schedule for each of the routes to Duluth as well as a

scenario that would increase the level of service in communities such as Virginia, Cloquet, Moose Lake, and Sandstone without requiring additional vehicles.

Table 27. Duluth Service Optimization Scenario

Route	Current Schedule	Proposed Schedule
Grand Marais via Silver Bay, Two Harbors	Tuesdays	Tuesdays
International Falls via Virginia	2nd Friday	4th Friday
Hibbing via Virginia	2nd Friday	2nd Friday
Meadowlands	1st and 3rd Wednesday	1st and 3rd Wednesday
Grand Rapids	1st and 3rd Friday	1st and 3rd Friday
Aitkin via Cloquet	1st and 3rd Friday	1st and 3rd Friday
McGrath via Sandstone, Moose Lake, Cloquet	2nd Thursday	4th Friday
Pine City via Sandstone, Moose Lake, Cloquet	3rd Friday	2nd Friday

Source: AECOM

12.1.1.5 Corridor Services

A shift to a corridor-based planning process would allow Arrowhead Transit to plan its services not only to serve its passengers but also to create opportunities for pooling resources from multiple Arrowhead Transit facilities along the length of the corridor. In turn, this would allow resources to be deployed more efficiently and increase service to these communities. Two corridors have been identified where this planning approach could be considered: (1) Gilbert–Virginia–Hibbing–Grand Rapids and (2) Grand Portage–Grand Marais–Silver Bay–Two Harbors. Although the service-level increases that might result from this change in planning approach would require a significant amount of resources, the increases in access and mobility for the residents of these areas are in line with the Olmstead Plan's goals for transit access in rural Minnesota.

The communities along US 169 between Virginia and Grand Rapids are among the most populous in the Arrowhead Transit service area, and the Dial-A-Ride services within Virginia and Grand Rapids are among the most utilized services that Arrowhead Transit operates. The initial proposal is to have a timed transfer two times each weekday between routes operating from Gilbert to Hibbing and from Grand Rapids to Hibbing. However, the routes operating in this corridor already carry nearly 25,000 passengers per year, so while there may not be an explicit demand for service from Virginia to Grand Rapids today, providing these connections on a single, through route may be beneficial to potential travelers between these points in the future.

The existing services in the Grand Portage–Grand Marais–Silver Bay–Two Harbors corridor also carry over 25,000 passengers each year, including over 6,000 passengers on the weekly service to and from Duluth. However, the population of the communities along the Lake Superior shoreline is lower and the overall length of the corridor is longer than the Gilbert–Virginia–Hibbing–Grand Rapids, requiring a higher level of financial investment to create a viable service. Therefore, this plan recommends initially developing the Gilbert–Virginia–Hibbing–Grand Rapids corridor service. If this first corridor service is successful, this second corridor service can be introduced in phases at a later date.

12.1.1.6 Service Reductions

A few service-level reductions are noted as needs in this plan. In these cases, data indicates that demand for the service is low and, in the case of “five to go” routes, it is rare that there is enough demand for the route to run. In some cases, such as the Hill City-Grand Rapids route, Arrowhead Transit staff noted that they have tried to advertise the service to residents but simply found that demand was very low. In the case of the Aitkin-McGregor-Duluth service, demand appears to be seasonal, so service reduction during the seasons when it is unlikely to run has been recommended.

12.1.1.7 Summary: List of Recommended Service Changes and By Types

Table 28 summarizes each service change recommendation based on the type and justification for that change. For changes justified by levels of demand, detailed information about the performance of existing services can be found in Table 12 and Table 17.

12.1.2 Methodology for Estimating Cost Changes

The following formulas were used to calculate the projected annual cost for each service change, depending on the type of change. For all of these formulas, the cost per revenue hour was used, and this cost was assumed to include costs associated with mileage (i.e., fuel and maintenance of vehicles).

12.1.2.1 Dial-A-Ride Service Change

Change in Annual Cost = (Existing cost per hour) × (Change in hours per day × (Number of days of operation per year)where the number of days of operation per year for a service scheduled to operate five times a week is assumed to be 261 days

- *and where the number of days of operation per year for a service scheduled to operate less than five times a week is represented by {(Scheduled number of days of operation per week × 52) ÷ 261}.*

For Dial-A-Ride services, the number of revenue miles per revenue hour that are currently being operated on each Dial-A-Ride service was assumed to stay constant for the purpose of estimating the number of additional revenue miles that would be operated during the period of expanded service.

Holidays on which service is not provided at all are not factored in to the calculation as these holidays can fall on different days of the week each year.

Table 28. Service Change Recommendations and Justifications

Service Change	Year	Explicit Agency Request	Justified by Demand (High or Low)	Extension to Meet Baseline Span	Guarantee of Service a	Efficiency Gain	Consistency across Areas	Other/ Notes
Weekday Dial-A-Ride service expansion in Cloquet	2020	X	X	—	—	—	—	—
Weekday Dial-A-Ride service expansion in Grand Rapids	2020	X	X	—	—	—	—	—
Weekday Dial-A-Ride service expansion in Hermantown	2020	X	X	X	—	—	—	—
Saturday Dial-A-Ride service expansion in Hermantown	2020	X	—	—	—	—	X	—
Weekday Dial-A-Ride service expansion in Pine City	2020	X	X	—	—	—	—	—
Weekday Dial-A-Ride service expansion in Virginia/ Mountain Iron	2020	—	—	—	—	—	X	—
Weekend Dial-A-Ride service expansion in Virginia/ Mountain Iron	2020	X	—	—	—	—	X	—
Dial-A-Ride service in Sandstone	2020	X	—	—	—	—	—	Community Request
Discontinue the Hill City-Grand Rapids "shopping run"	2020	X	X	—	—	—	—	—
Make Pine City-Duluth route guaranteed	2020	—	X	—	X	—	—	—
Make McGregor-Palisade-Aitkin-Brainerd route guaranteed	2020	X	X	—	X	—	—	—

Service Change	Year	Explicit Agency Request	Justified by Demand (High or Low)	Extension to Meet Baseline Span	Guarantee of Service a	Efficiency Gain	Consistency across Areas	Other/ Notes
Make the Aitkin-McGregor-Cromwell-Duluth service a seasonal, summer only service (three times per year)	2020	X	X	—	X	X	—	—
Make the Meadowlands-Culver-Duluth run guaranteed	2020	—	—	—	X	—	—	—
Make the Moose Lake-Cloquet run guaranteed	2020	—	X	—	X	—	—	—
Make the Sandstone-Hinckley-Pine City run guaranteed	2020	—	X	—	X	—	—	—
Streamline Duluth Services	2020	—	—	—	—	X	X	—
Make the Pine City-North Branch-Cambridge run guaranteed	2020	X	—	—	X	—	—	—
Develop through service on US 169 Corridor (Gilbert/Virginia – Hibbing – Grand Rapids)	2021	—	—	—	—	—	—	Establish timed transfer in Hibbing twice daily on weekdays
Weekday Dial-A-Ride service expansion in Two Harbors	2021	X	X	—	—	—	—	—
Increase McGregor-Palisade-Aitkin-Brainerd frequency to weekly	2022	X	X	—	—	—	—	Contingent upon ridership meeting expectations
Saturday Dial-A-Ride service expansion in Grand Rapids	2022	—	X	X	—	—	—	

Service Change	Year	Explicit Agency Request	Justified by Demand (High or Low)	Extension to Meet Baseline Span	Guarantee of Service a	Efficiency Gain	Consistency across Areas	Other/ Notes
Saturday Dial-A-Ride service expansion in Hermantown	2022	—	—	X	—	—	—	—
Saturday Dial-A-Ride service expansion in International Falls	2022	—	X	X	—	—	—	—
Saturday Dial-A-Ride service expansion in Two Harbors	2022	X	—	X	—	—	—	—
Saturday Dial-A-Ride service expansion in Virginia/Mountain Iron	2022	X	X	X	—	—	—	—
Two Harbors-Duluth Commuter Service	2023	X	—	—	—	X	—	—
Sunday Dial-A-Ride service expansion in Grand Rapids	2023	X	X	X	—	—	—	—
Sunday Dial-A-Ride service expansion in Hermantown	2023	—	—	X	—	—	—	—
Sunday Dial-A-Ride service expansion in Virginia/Mountain Iron	2023	—	—	X	—	—	—	—
Implement new deviated routes in Grand Rapids	2025	—	X	—	—	X	—	X
Increase through service on MN 61 Corridor (Cook County-Lake County-Duluth)	2025	—	—	—	—	X	—	—

Source: AECOM

[a] *This category applies to routes that currently operate under the "five to go" requirement, but frequently or always met that requirement in 2018.*

12.1.2.2 Deviated Route Service Increase or Reduction

Change in Annual Cost = (Existing cost per hour) × (Change in hours per day × (Number of days of operation per year) where the number of days of operation per year for a service scheduled to operate five times a week is assumed to be 261 days

- *and where the number of days of operation per year for a service scheduled to operate less than five times a week is represented by {(Scheduled number of days of operation per week × 52) ÷ 261}.*
- *and where for routes that require "five to go" the number of days of operation per year is the number of days the service actually operated (since there are no costs incurred for the days on which the service does not operate due to a lack of demand, there are no savings achieved by reducing the level of service or discontinuing the service in its entirety).*

The methodology used to calculate the cost of increased frequency on a deviated route varied depending on the exact circumstances of each route.

The proposal to operate the McGregor-Palisaide-Aitkin-Brainerd route weekly instead of twice per month is the second phase of a two-phase plan to increase service on this route. In phase one, the service, which is already operating nearly every time it is scheduled to operate, would be converted to a guaranteed service operating twice each month. Implementing phase two would effectively double the number of hours scheduled, so the projected operating costs for phase one were simply multiplied by two. Holidays on which service is not provided at all are not factored in to the calculation as these holidays can fall on different days of the week each year.

The proposal to develop a service along the length of the US Route 169 Corridor between Virginia, Hibbing, and Grand Rapids would initially be implemented by adding two round trips per day between Gilbert and Hibbing and also between Grand Rapids and Hibbing. These trips would be timed to allow for transfers in Hibbing between these two routes. A mock schedule was created to determine how many hours and vehicles would be required to operate the proposed service, and the expected trip durations for each trip on each weekday were then multiplied to generate an annual cost estimate. The travel time between proposed stops was based on the existing schedules for the deviated routes that Arrowhead Transit currently operates along the proposed corridor.

The cost estimate for the MN Route 61 Corridor between Duluth, Two Harbors, Grand Marais, and Grand Portage was developed using the same process as the US Route 169 Corridor. However, it is also proposed that the service changes on the MN Route 61 Corridor be made in multiple phases. Therefore, a mock schedule was created for each phase, and the differences in annual cost are the differences in the annual cost of operating phase one versus phase two and phase two versus phase three.

Holidays on which service is not provided at all are not factored in to the calculation as these holidays can fall on different days of the week each year.

12.1.2.3 Conversion to Guaranteed Service on All Trips

Change in annual cost = (Projected daily cost of operation - Actual daily cost of operation) × (Number of days of operation per year ÷ 261)

- *where Projected annual cost of operation = (Scheduled annual revenue hours × Cost per hour) ÷ (Number of days of operation per year) and where Actual annual cost of operation = (Actual annual revenue hours × Cost per hour) ÷ (Number of days of operation per year)*

- *and where the number of days of operation per year for a service scheduled to operate five times a week is assumed to be 261 days*
- *and where the number of days of operation per year for a service scheduled to operate less than five times a week is represented by {(Scheduled number of days of operation per week × 52) ÷ 261}.*

It is assumed that the annual revenue hours totals represent the hours for days on which services requiring a certain number of passengers to reserve in advance actually operated. Therefore, the change in annual cost is determined by how many additional hours would have been needed to operate the service each day it was scheduled to operate but did not. To determine the number of hours a service could potentially operate, the start and end times for each service that were provided by Arrowhead Transit were used to determine the number of revenue hours for a single day of operation. This figure was then divided by the number of trips that would be made in a year if enough reservations were received each time the service was scheduled to operate (either once, twice, or four times per month) to determine the revenue hours on a daily basis as a ratio of 261. Holidays on which service is not provided at all are not factored in to the calculation as these holidays can fall on different days of the week each year.

12.2 Peer Analysis of Staffing Levels

Delivering high quality, reliable transit service requires adequate staffing of properly skilled staff. The purpose of this analysis was to identify how Arrowhead Transit compares to peer agencies with respect to its overall level of staffing. Achieving the appropriate level of staffing is important; without adequate staffing, service quality is likely to suffer as vehicles in need of repair are not returned to service as quickly or customer needs are not met. On the other hand, having excess staff increases agency expenses and reduces the funding available for providing service.

Due to its large service area and exclusive focus on demand responsive services, Arrowhead Transit is a fairly unique transit agency. Consequently, it does not have many clear peer agencies with a similar size service area who offer comparable levels of service.

To conduct this analysis, the study team identified several peer agencies based on service and community characteristics, and two agencies responded to requests for information (Table 29).

Table 29. Peer Agencies and Key Characteristics

Agency	State	Service Area Size (square miles)	Service Area Population	Population Density (persons per square mile)
Arrowhead Transit	Minnesota	23,578	354,117	15
Area Transportation Authority of North Central Pennsylvania	Pennsylvania	5,083	240,000	47
Central Pennsylvania Transportation Authority	Pennsylvania	5,060	1,232,111	244

Source: National Transit Database, 2017 Agency Profiles

That this peer analysis only includes two agencies does limit the extent to which broad conclusions about Arrowhead Transit's staff should be drawn but does provide two helpful points of reference.

The peer agencies identified are both located in Pennsylvania. The Area Transportation Authority of North Central Pennsylvania (ATA) serves a relatively large service area in central Pennsylvania. The area is predominantly rural with only a few small population centers. ATA offers a variety of different service types, including fixed route, deviated route, and demand response routes.

The Central Pennsylvania Transportation Authority (RabbitTransit) also serves a relatively large area in central Pennsylvania but includes the population centers of Harrisburg and York.[8] As a result, the population density of the service area is significantly higher than that of Arrowhead Transit. RabbitTransit operates fixed route service within York, regional commuter service to Harrisburg, and demand response service throughout the county.

These two peer agencies provided data on their vehicle fleets and number of staff by category. Data points included the number of bus operators, dispatchers, mechanics, supervisors, and administrative staff. The number of annual revenue hours and annual revenue miles were collected from the NTD agency profiles.[9] The revenue miles and revenue hours data associated with these providers from the NTD do not include revenue hours and miles that are contracted out to private operators. Table 30 summarizes these data points.

Table 30. Peer Agency Staffing Data

Data Point	Arrowhead Transit	Area Transportation Authority of North Central Pennsylvania (ATA)	Central Pennsylvania Transportation Authority (RabbitTransit)
Revenue hours – Demand response	41,679	71,009	268,666
Revenue hours – Route	86,868	39,154	116,307
Revenue miles – Demand response	507,831	874,193	5,068,641
Revenue miles – Route	2,118,566	575,025	1,640,748
Service vehicles – 29’ or larger buses	14	44	33
Service vehicles – cutaway buses or similar vehicles	91	52	49
Number of mechanics (Full Time Equivalents (FTEs) [a]	6	9	10.2
Number of operators [b] (FTEs)	69.5	110	202.5
Number of supervisors (FTEs)	-	5	4
Number of dispatchers (FTEs)	9	10	12

[8] RabbitTransit does not provide transit service within Harrisburg. A different agency is responsible for providing local bus service to Harrisburg.
[9] Available at https://www.transit.dot.gov/ntd/transit-agency-profiles.

Data Point	Arrowhead Transit	Area Transportation Authority of North Central Pennsylvania (ATA)	Central Pennsylvania Transportation Authority (RabbitTransit)
Number of administrative staff (FTEs)	18.5	20	70
Number of other positions (FTEs)	-	9	6

Source: National Transit Database, 2017 Agency Profiles

[a] Agencies use different calculations to determine what constitutes a "full time equivalent." For the purposes of this study, the numbers provided by the various peer agencies were treated as comparable across agencies.

[b] Arrowhead Transit and one of the identified peers employ part-time and volunteer drivers. These have been treated as 0.5 of a full-time position, resulting in a non-integer value.

Because the functions performed by employees in different labor categories can vary between agencies, the study team grouped staff positions into two main categories, administrative and operational, to allow for better overall comparison across agencies. Administrative positions were considered to include any role that contributes to the provision of transit service in an indirect way. These include general managers, financial officers, human resources, planners, schedulers, purchasing agents, utility workers, grant administrators, and bookkeepers. Positions were considered operational if the staff in these positions are directly involved in providing or facilitating transit service in the field. Operational positions include vehicle operators, mechanics, supervisors, or dispatchers.

The percentage of total staff for each agency that falls into each of these two categories is shown in Table 31. The average breakdown between administrative and operations staff was 20% and 80%, respectively. Relative to its peers, Arrowhead Transit has a similar staff breakdown as ATA, but a slightly larger portion of its staff work in operations than RabbitTransit.

Table 31. Percent Administrative and Operations Staff

Agency	Percent Administrative	Percent Operations
Arrowhead Transit	18%	82%
ATA	18%	82%
RabbitTransit	25%	75%

Source: National Transit Database, 2017 Agency Profiles

12.2.1 Staffing Levels Analysis Results

The study team normalized staffing data relative to each agency's level of service (revenue hours and revenue miles) to facilitate comparisons across agencies. Table 32 summarizes the number of annual revenue hours and annual revenue miles per total staff, per administrative staff, and per operations staff for each peer agency.

Table 32. Total Staff, Administrative, and Operations Staff per Level of Service

Agency	Annual Revenue Hours per Total Staff	Annual Revenue Miles per Total Staff	Annual Revenue Hours per Admin. Staff	Annual Revenue Miles per Admin. Staff	Annual Revenue Hours per Operations Staff	Annual Revenue Miles per Operations Staff
Arrowhead Transit	1,248	25,499	6,948	141,967	1,521	31,082
ATA	676	8,891	3,799	49,973	822	10,815
RabbitTransit	1,263	22,020	5,065	88,281	1,683	29,337

Source: National Transit Database, 2017 Agency Profiles

With respect to the total number of staff, Arrowhead Transit has a similar level of staffing as RabbitTransit, although about half as many staff relative to the service it provides as ATA. This is true when compared to revenue hours (Figure 24) and revenue miles (Figure 24).

This trend is also true for operational staff as well: Arrowhead Transit employs approximately the same number of operations people relative to its level of service as RabbitTransit, although less than ATA (Figure 24 and Figure 25).

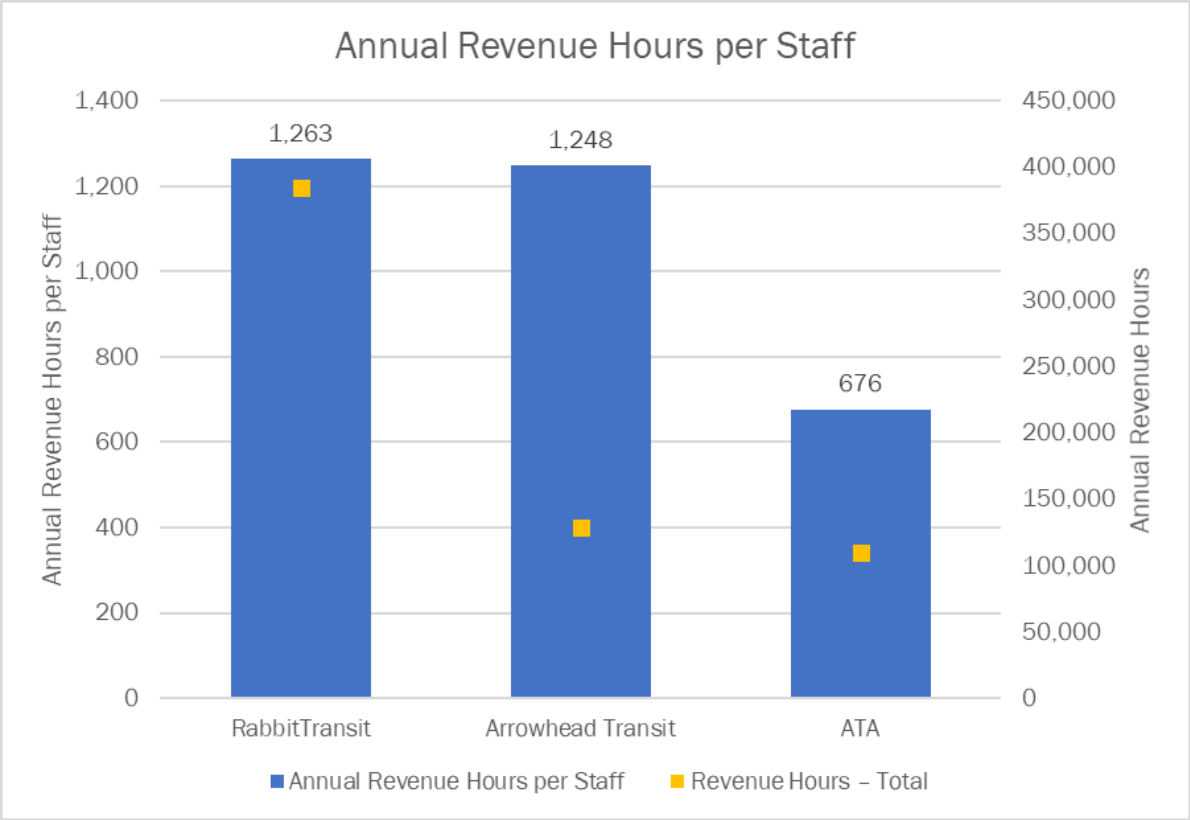
When it comes to administrative positions, however, Arrowhead Transit appears to be understaffed relative to both peer agencies. Per revenue hour, Arrowhead Transit employs 37% fewer administrative staff than RabbitTransit and 83% fewer than ATA (Figure 26). Per revenue mile, Arrowhead Transit employs 61% and 184% fewer, respectively (Figure 27).

The study team attempted to break down administrative and operational categories into specific job types, including vehicle operators, dispatchers, and mechanics. There was not, however, sufficient consistency in how positions were classified to facilitate accurate direct comparison across agencies.

12.2.2 Conclusion

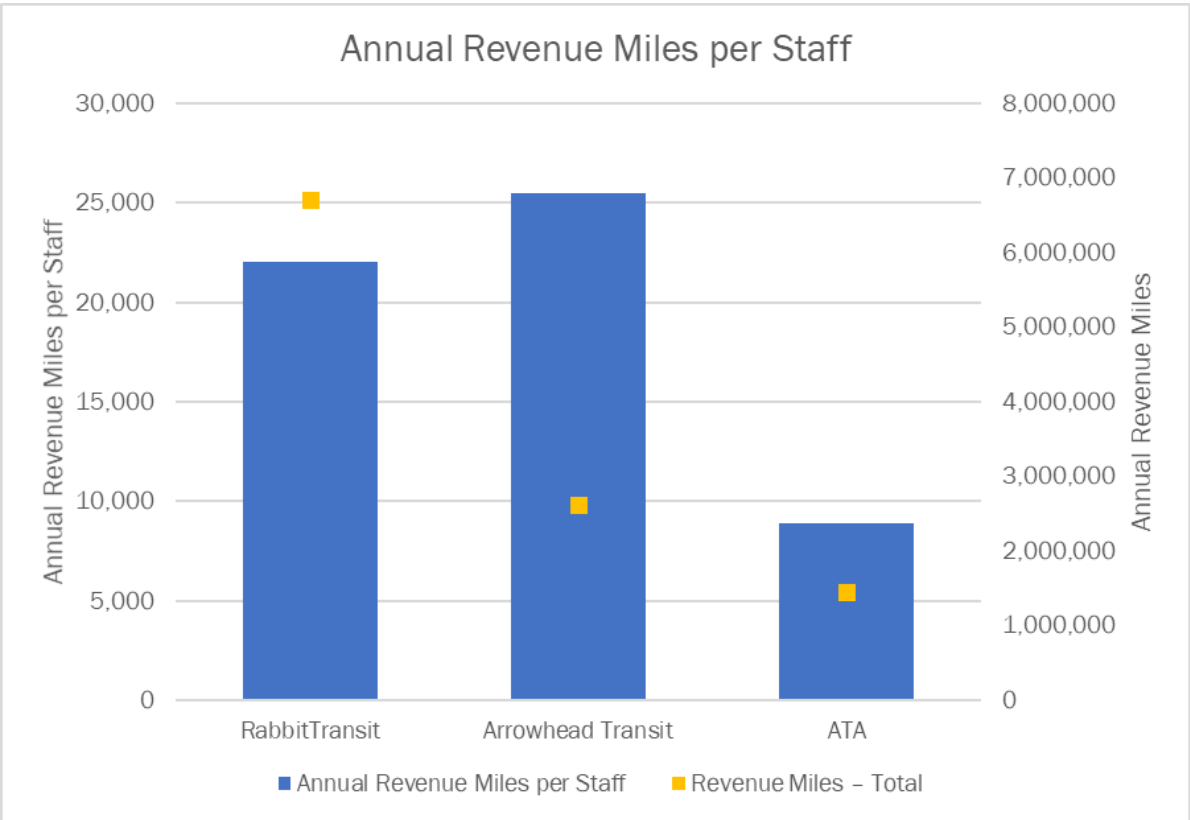
Overall, Arrowhead Transit employs similar levels of total staffing and operational staffing relative to RabbitTransit. ATA, which serves a much smaller service area but with a similar population density area, has a much larger staff relative to the its level of service. This may be because ATA employs a large number of part-time vehicle operators. Arrowhead Transit's administrative staffing levels, however, appear to be smaller than both RabbitTransit and ATA. In other words, Arrowhead Transit operates significantly more service with fewer administrative staff members. This suggests that Arrowhead Transit successfully and efficiently utilizes its existing human resources, which is a credit to the agency. This also, however, leaves open the possibility that additional administrative staff could improve the agency's capacity to meet the needs of its customers.

Figure 24. Peer Comparison - Annual Revenue Hours per Staff



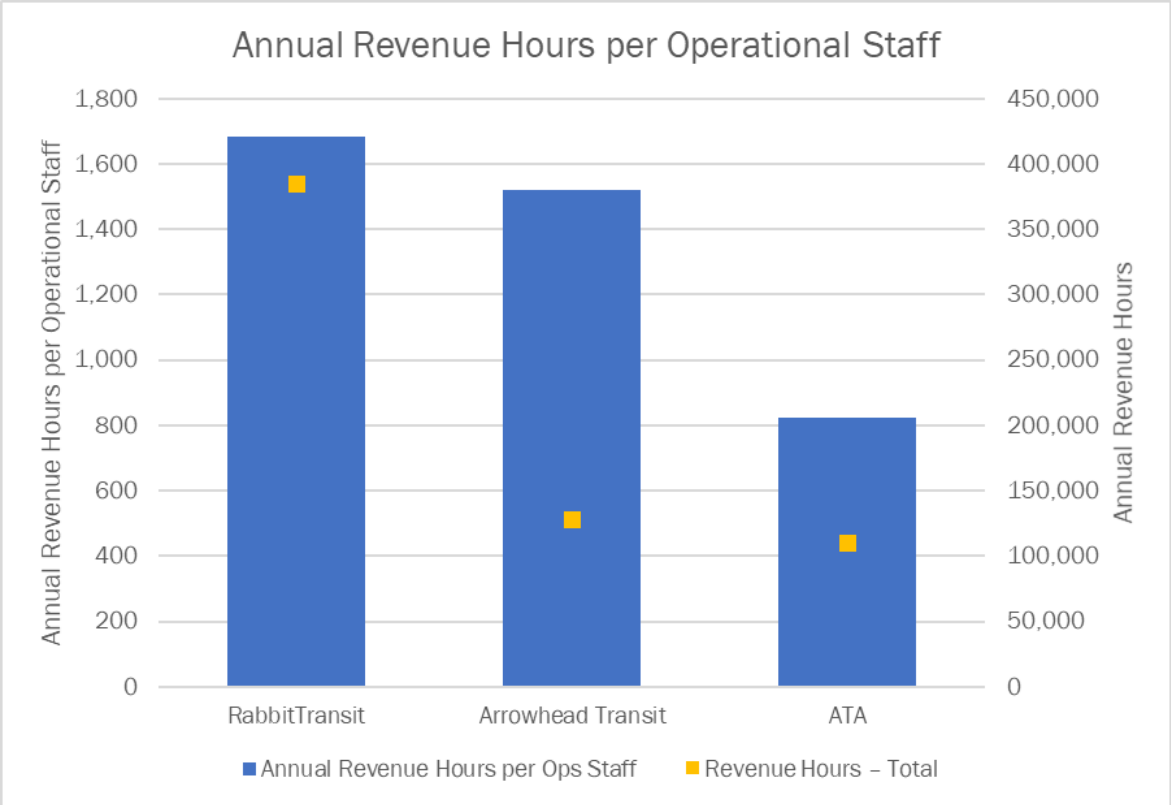
Source: National Transit Database, 2017 Agency Profiles, AECOM

Figure 25. Peer Comparison - Annual Revenue Miles per Staff



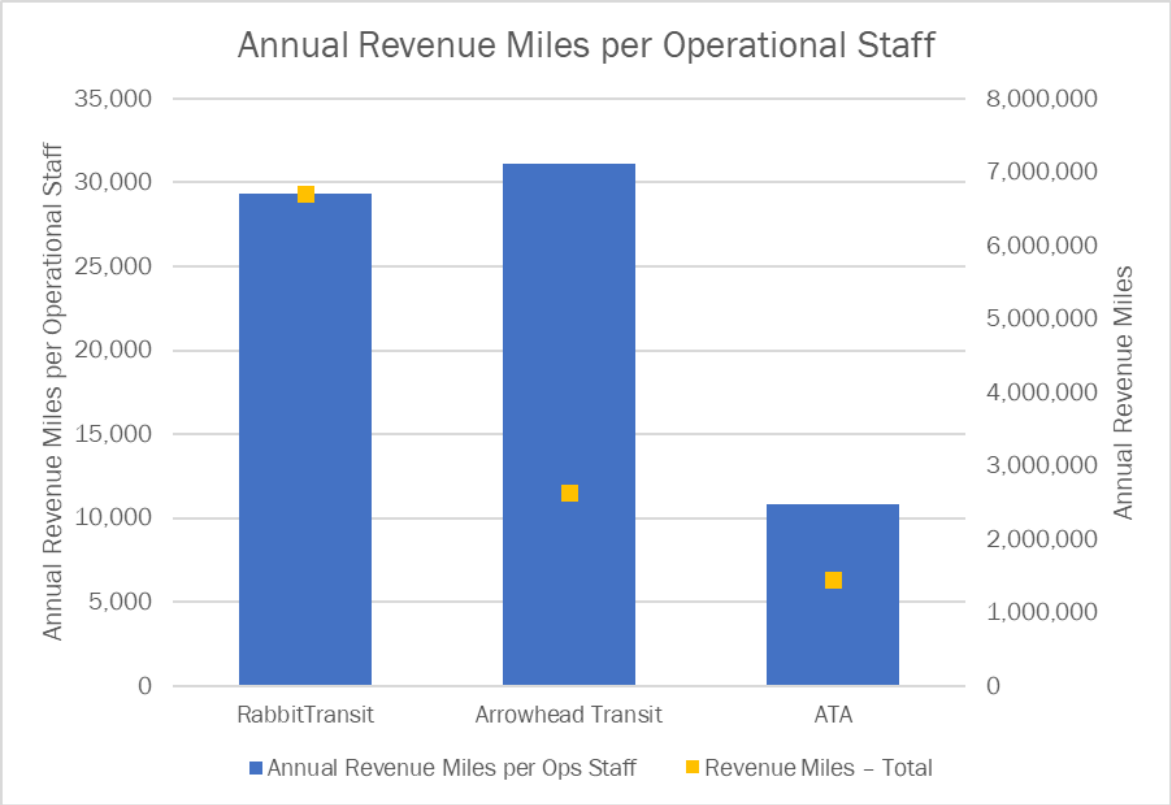
Source: National Transit Database, 2017 Agency Profiles, AECOM

Figure 26. Peer Comparison - Annual Revenue Hours per Operational Staff



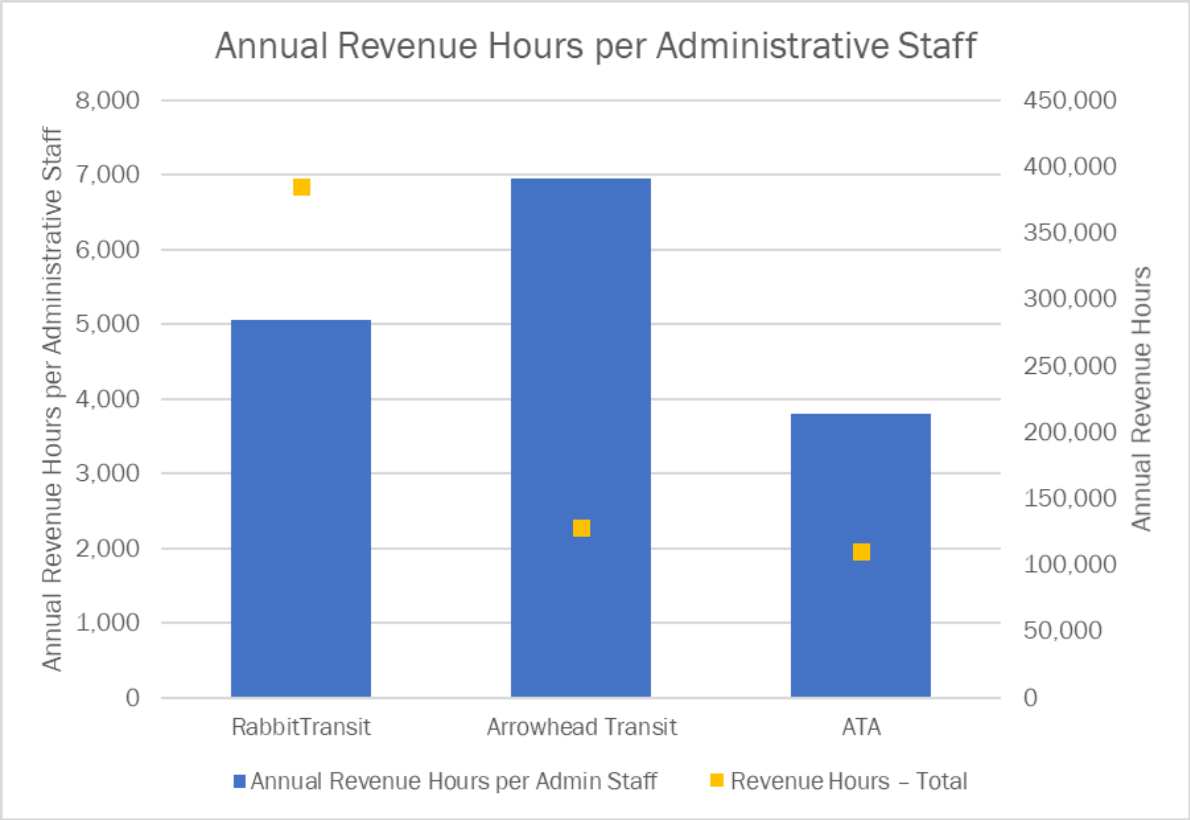
Source: National Transit Database, 2017 Agency Profiles, AECOM

Figure 27. Peer Comparison - Annual Revenue Miles per Operational Staff



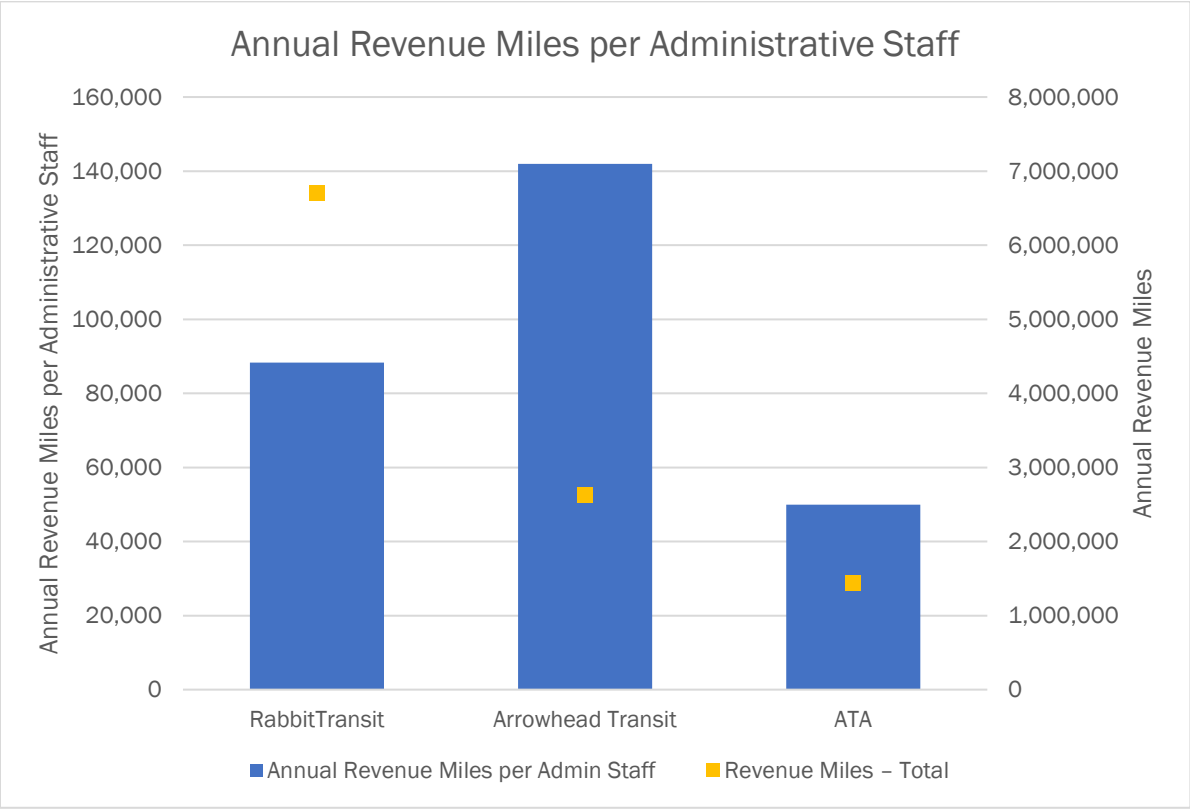
Source: National Transit Database, 2017 Agency Profiles, AECOM

Figure 28. Peer Comparison - Annual Revenue Hours per Administrative Staff



Source: National Transit Database, 2017 Agency Profiles, AECOM

Figure 29. Peer Comparison - Annual Revenue Miles per Administrative Staff



Source: National Transit Database, 2017 Agency Profiles, AECOM

12.3 Mechanic Staffing Level Analysis

12.3.1 Overview

Arrowhead Transit identified adding mechanics to its staff as a high need for the agency. The following analysis measures the level of need for additional mechanics using Transit Cooperative Research Program (TCRP) Report 184: Maintenance Technician Staffing Levels for Modern Public Transit Fleets (2016),[10] which is the most comprehensive study that has been done in the United States to look at the level of bus fleet maintenance staffing. TCRP Report 184 analyzes the factors transit agencies consider when making maintenance staffing level decisions, including the composition of the vehicle fleet, vehicle mileage and age, the type of bus service being provided (express versus local, urban versus rural), and the desired spare ratio.

While the report finds that there is no straightforward formula or calculation in widespread use in the transit industry to help determine the appropriate size of an agency's maintenance staff, the authors surveyed 321 transit agencies and reported their average staffing levels. This analysis serves as a guide for assessing Arrowhead Transit's current maintenance staffing level and estimating Arrowhead Transit's optimal staffing level.

12.3.2 Assumptions

To support this analysis, data from the NTD for Arrowhead Transit was used to identify systemwide revenue miles and hours. A set of assumptions was then used for Arrowhead Transit to estimate the number of maintenance hours that, on average, one of Arrowhead Transit's mechanics has available to spend on vehicle maintenance, including the following:

- Mechanics work 40 hours per week
- Mechanics receive a total of 20 days of paid leave (vacation, holiday, and/or sick)
- One FTE position is equal to 1,920 labor hours per year

12.3.3 Arrowhead Transit Compared to Benchmarks

Using these assumptions, Arrowhead Transit's existing capacity to perform vehicle maintenance (expressed by total available maintenance hours and FTEs) was compared to the size of its fleet and levels of service (expressed by vehicles operated in maximum service, annual revenue hours, and annual revenue miles, as reported in the NTD). The resulting metrics were then compared to the average for similarly sized transit agencies, as reported in TCRP Report 184. Using data from the report, a range of possible values was calculated in order to reflect the wide array of values that the researchers uncovered at different agencies. About 70% of agencies reviewed for TCRP Report 184 fall within these ranges.

The authors of the report divided their findings regarding mechanic staffing levels into categories based on the agency fleet size. Categories included agencies with fleets between 50 and 99 vehicles and between 100 and 249 vehicles. Arrowhead Transit's fleet of approximately 100 vehicles positions it right at the divide between these categories. Table 33 summarizes the results.

[10] The report is available for download at: http://www.trb.org/Publications/Blurbs/173927.aspx.

Table 33. Maintenance Staffing Metrics – Arrowhead Transit Compared to Industry Average

Data Point	Fleet Size 100-249	Range [a]	Fleet Size 50-99	Range	Arrowhead Transit
Vehicles Maintained per Technician	5.7	3.8 - 7.6	7.3	4.6 - 9.9	17.5
Vehicle Miles per Technician	177,628	122,122 - 233,134	213,378	133,421 - 293,335	437,733
Vehicle Hours per Technician	13,187	10,273 - 16,101	14,732	9,509 - 19,954	21,425
Annual Maintenance Hours per Vehicle	337.2	219 - 455	247.0	130 - 364	110
Annual Maintenance Hours per 10,000 Vehicle Miles	108.3	75 - 142	84.5	45 - 124	44
Annual Maintenance Hours per 1,000 Vehicle Hours	142.7	104 - 181	127.3	50 - 205	90

Source: National Transit Database, TCRP Report 184

[a] Just under 70% of agencies fall within this range, which represents one standard deviation from the mean result.

Using the metrics in Table 33, it is clear that Arrowhead Transit's maintenance department is highly understaffed relative to industry trends. Almost all of Arrowhead Transit's results on these metrics do not fall within the expected range of values identified in TCRP Report 184. Arrowhead Transit operates 17.5 vehicles per maintenance technician, significantly more than the rest of the industry. The same is true when considering the number of revenue miles and hours per technician: Arrowhead Transit operates significantly more service relative to its capacity to perform in-house maintenance work.

The number of annual maintenance hours was also calculated. This measure reflects the actual capacity of an agency to work on maintenance-related issues. This number was then normalized by the level of service provided by the agency, as measured by annual revenue miles and hours. Again, these metrics were below industry trends: Arrowhead Transit only has 110 available annual maintenance hours per vehicle in its fleet. This compares to general industry ranges of 130-455 hours per vehicle, depending on the size of the agency. The average age of an agency's vehicle fleet should also be considered: Newer vehicles are less likely to malfunction and therefore do not typically require as many maintenance hours. Arrowhead Transit has an average age of only four years, which could partially explain why its metrics are lower than other agencies in the industry. The only metric on which Arrowhead Transit's results are similar to industry levels is the number of maintenance hours per vehicle revenue mile: Arrowhead Transit's 90 hours falls on the lower end of the appropriate range.

A review of these metrics suggests that the agency could benefit from hiring additional maintenance staff, especially if internal processes and deliberations have revealed a need for more capacity.

If Arrowhead Transit were to increase its current maintenance staffing level from six technicians to twelve, per its current plans, its metrics would be more consistent with standards referenced in TCRP Report 184. Table 34 summarizes how the agency's metrics would become more in-line with industry norms. In each instance, Arrowhead Transit's metrics would fall solidly in the middle of the 70% ranges identified in TCRP Report 184.

Table 34. Maintenance Staffing Metrics – Arrowhead Transit Existing Staffing Levels Compared to Increase in Staff Capacity

Data Point	Range for Agencies with Fleet Size 100-249	Range for Agencies with Fleet Size 50-99	Arrowhead Transit (6 mechanics)	Arrowhead Transit (12 mechanics)
Vehicles Maintained per Technician	3.8 - 7.6	4.6 - 9.9	17.5	8.8
Vehicle Miles per Technician	122,122 - 233,134	133,421 - 293,335	437,733	218,866
Vehicle Hours per Technician	10,273 - 16,101	9,509 - 19,954	21,425	10,712
Annual Maintenance Hours per Vehicle	219 - 455	130 - 364	110	219
Annual Maintenance Hours per 10,000 Vehicle Miles	75 - 142	45 - 124	44	88
Annual Maintenance Hours per 1,000 Vehicle Hours	104 - 181	50 - 205	90	179

Source: National Transit Database, TCRP Report 184

A wide range of values was observed for agencies of all sizes in the data collection done for TCRP Report 184. There are many variables that factor into deciding appropriate staffing levels for maintenance technicians, such as the age and vehicle composition of the fleet, the agency's adopted operating spare ratio, the built environment of the service area, and the use of contracted services (among others). Arrowhead Transit's large service area, which results in vehicles being several hundred miles away from Gilbert in some cases, further complicates efforts to compare its staffing levels to industry peers and trends. None of these variables have a clear, one-way correlation to staffing levels; however, they collectively play a role in creating the need for maintenance work. Using NTD data for this analysis does not account for all the services Arrowhead Transit provides to regional partners (e.g., Head Start) and thus the workload of the agency's mechanics is even higher than this analysis reveals; the TCRP Report 184 analysis did not address services provided that are not reported to NTD.

Because Arrowhead Transit does not currently have enough space in its main maintenance facility to accommodate six additional mechanics, this plan recommends that it increase its maintenance staff by two mechanics in the short-term (in 2020), and then further increase its maintenance staff by two mechanics per year for two years (2021 and 2022) after the new maintenance facility in Gilbert is completed and as funding allows. This will result in Arrowhead having twelve mechanics by 2022. If funding for this level of staffing is not available, the workload for ten or eleven mechanics would still be within the middle ranges (into which about 70% of agencies fall) for the metrics analyzed in TCRP Report 184.

Appendix A Capital and Operating Plans for 2020 through 2025

Five Year Capital Plan

Arrowhead Transit

Line Number	Line Item Name	2019 Budget	Inflation Factor (3%/yr)	2020	2020 (local match)	2021	2021 (local match)	2022	2022 (local match)	2023	2023 (local match)	2024	2024 (local match)	2025	2025 (local match)
1711	Vehicle Cost (Replacements and Expansion)	$ -		$ 2,164,236	$ 324,635	$ 1,704,654	$ 255,698	$ 1,755,794	$ 263,369	$ 2,504,032	$ 375,605	$ 2,006,008	$ 300,901	$ 1,475,849	$ 221,377
1712	Farebox(es)	$ -		$ -	$ -	$ -	$ -	$ 120,200	$ 18,030	$ -	$ -	$ -	$ -	$ -	$ -
1713	AVL/MDT	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1714	Camera(s)	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1715	Logos	$ -		$ 20,600	$ 3,090	$ 10,609	$ 1,591	$ 10,927	$ 1,639	$ 11,255	$ 1,688	$ 11,593	$ 1,739	$ 11,941	$ 1,791
1716	Radio (Communication Equipment)	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 57,964	$ 8,695	$ -	$ -
1717	Other Bus Related Equipment	$ -		$ -	$ -	$ -	$ -	$ 32,782	$ 4,917	$ -	$ -	$ -	$ -	$ -	$ -
1720	Lift, Ramp Expenses, etc.	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1730	Radio Equipment Expenses	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1740	Fare Box Expenses	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ 11,255	$ 1,688	$ 11,593	$ 1,739	$ 11,941	$ 1,791
1750	Other Capital Expenses	$ -		$ -	$ -	$ 212,180	$ 31,827	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1760	Facility Purchase and/or Construction Cost	$ -		$ 6,180,000	$ 927,000		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Total Capital Budget			**$ 8,364,836**	**$ 1,254,725**	**$ 1,927,443**	**$ 289,116**	**$ 1,919,703**	**$ 287,955**	**$ 2,526,542**	**$ 378,981**	**$ 2,087,157**	**$ 313,074**	**$ 1,499,730**	**$ 224,959**
Capital	Total 1711 - 1740 (only)			$ 2,184,836	$ 327,725	$ 1,715,263	$ 257,289	$ 1,919,703	$ 287,955	$ 2,526,542	$ 378,981	$ 2,087,157	$ 313,074	$ 1,499,730	$ 224,959

Operations PLANNING - Arrowhead summary table

	2018	2019	2020	2020	2021	2021	2022	2022	2023	2023	2024	2024	2025	2025
			total cost	local share	total cost	local share	total cost	local share	total cost	local share	total cost	local share	total cost	local share
		plus 3%	plus 3%	20%	plus 3%	20%	plus 3%	20%	plus 3%	20%	plus 3%	20%	plus 3%	20%
Status Quo (Constrained)	**$ 7,298,670**	$ 7,517,630	$ 7,743,159	$ 1,548,632	$ 7,975,453	$ 1,595,091	$ 8,214,717	$ 1,642,943	$ 8,461,159	$ 1,692,232	$ 8,714,993	$ 1,742,999	$ 8,976,443	$ 1,795,289

	Implementation Year	2019 Cost Estimate	2020	2020	2021	2021	2022	2022	2023	2023	2024	2024	2025	2025
			total cost	local share	total cost	local share	total cost	local share	total cost	local share	total cost	local share	total cost	local share
			plus 3%	20%	plus 3%	20%	plus 3%	20%	plus 3%	20%	plus 3%	20%	plus 3%	20%
Expand/Grow														
Additional Mechanic 1	2020	$ 44,600	$ 45,938	$ 9,188	$ 47,316	$ 9,463	$ 48,736	$ 9,747	$ 50,198	$ 10,040	$ 51,704	$ 10,341	$ 53,255	$ 10,651
Additional Mechanic 2	2020	$ 44,600	$ 45,938	$ 9,188	$ 47,316	$ 9,463	$ 48,736	$ 9,747	$ 50,198	$ 10,040	$ 51,704	$ 10,341	$ 53,255	$ 10,651
Additional Mechanic 3	2021	$ 44,600	$ 45,938	$ 9,188	$ 47,316	$ 9,463	$ 48,736	$ 9,747	$ 50,198	$ 10,040	$ 51,704	$ 10,341	$ 53,255	$ 10,651
Additional Mechanic 4	2021	$ 44,600	$ 45,938	$ 9,188	$ 47,316	$ 9,463	$ 48,736	$ 9,747	$ 50,198	$ 10,040	$ 51,704	$ 10,341	$ 53,255	$ 10,651
Additional Mechanic 5	2022	$ 44,600	$ 45,938	$ 9,188	$ 47,316	$ 9,463	$ 48,736	$ 9,747	$ 50,198	$ 10,040	$ 51,704	$ 10,341	$ 53,255	$ 10,651
Additional Mechanic 6	2022	$ 44,600	$ 45,938	$ 9,188	$ 47,316	$ 9,463	$ 48,736	$ 9,747	$ 50,198	$ 10,040	$ 51,704	$ 10,341	$ 53,255	$ 10,651
Fleet replacement plan (one-time cost)	2020	$ 30,000	$ 30,900	$ 6,180	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Aitkin DAR expansion	2020	$ 41,808	$ 43,062	$ 8,612	$ 44,354	$ 8,871	$ 45,685	$ 9,137	$ 47,055	$ 9,411	$ 48,467	$ 9,693	$ 49,921	$ 9,984
Cloquet DAR expansion - AM and PM	2020	$ 69,948	$ 72,046	$ 14,409	$ 74,208	$ 14,842	$ 76,434	$ 15,287	$ 78,727	$ 15,745	$ 81,089	$ 16,218	$ 83,522	$ 16,704
Grand Rapids DAR expansion - AM and PM	2020	$ 69,948	$ 72,046	$ 14,409	$ 74,208	$ 14,842	$ 76,434	$ 15,287	$ 78,727	$ 15,745	$ 81,089	$ 16,218	$ 83,522	$ 16,704
Hermantown DAR expansion - AM and PM	2020	$ 52,461	$ 54,035	$ 10,807	$ 55,656	$ 11,131	$ 57,326	$ 11,465	$ 59,045	$ 11,809	$ 60,817	$ 12,163	$ 62,641	$ 12,528
Pine City DAR expansion	2020	$ 26,231	$ 27,018	$ 5,404	$ 27,828	$ 5,566	$ 28,663	$ 5,733	$ 29,523	$ 5,905	$ 30,409	$ 6,082	$ 31,321	$ 6,264
Virginia and Mountain Iron DAR expansion	2020	$ 52,461	$ 54,035	$ 10,807	$ 55,656	$ 11,131	$ 57,326	$ 11,465	$ 59,045	$ 11,809	$ 60,817	$ 12,163	$ 62,641	$ 12,528
Make Pine City-Duluth route guaranteed ($0 net cost)	2020	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Make McGregor-Brainerd route guaranteed ($0 net cost)	2020	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Make Meadowlands-Duluth run guaranteed	2020	$ 1,608	$ 1,656	$ 331	$ 1,706	$ 341	$ 1,757	$ 351	$ 1,810	$ 362	$ 1,864	$ 373	$ 1,920	$ 384
Make Moose Lake-Cloquet run guaranteed	2020	$ 402	$ 414	$ 83	$ 426	$ 85	$ 439	$ 88	$ 452	$ 90	$ 466	$ 93	$ 480	$ 96
Make Sandstone-Pine City run guaranteed	2020	$ 1,273	$ 1,311	$ 262	$ 1,351	$ 270	$ 1,391	$ 278	$ 1,433	$ 287	$ 1,476	$ 295	$ 1,520	$ 304
Streamline Duluth services (no net cost)	2020	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Make Pine City-Cambridge run guaranteed	2020	$ 2,412	$ 2,484	$ 497	$ 2,559	$ 512	$ 2,636	$ 527	$ 2,715	$ 543	$ 2,796	$ 559	$ 2,880	$ 576
US 169 corridor service	2021	$ 54,077	$ 55,699	$ 11,140	$ 57,370	$ 11,474	$ 59,091	$ 11,818	$ 60,864	$ 12,173	$ 62,690	$ 12,538	$ 64,571	$ 12,914
Two Harbors DAR expansion	2021	$ 157,383	$ 162,104	$ 32,421	$ 166,968	$ 33,394	$ 171,977	$ 34,395	$ 177,136	$ 35,427	$ 182,450	$ 36,490	$ 187,924	$ 37,585
Comprehensive facilities study (one-time cost)	2021	$ 150,000	$ 154,500	$ 30,900	$ 159,135	$ 31,827		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Additional PM McGregor-Aitkin run	2022	$ 43,718	$ 45,030	$ 9,006	$ 46,380	$ 9,276	$ 47,772	$ 9,554	$ 49,205	$ 9,841	$ 50,681	$ 10,136	$ 52,202	$ 10,440
Increase McGregor-Brainerd frequency to weekly	2022	$ 8,040	$ 8,281	$ 1,656	$ 8,530	$ 1,706	$ 8,786	$ 1,757	$ 9,049	$ 1,810	$ 9,321	$ 1,864	$ 9,600	$ 1,920
Grand Rapids DAR expansion - Saturdays	2022	$ 3,484	$ 3,589	$ 718	$ 3,696	$ 739	$ 3,807	$ 761	$ 3,921	$ 784	$ 4,039	$ 808	$ 4,160	$ 832
Hermantown DAR expansion - Saturdays	2022	$ 3,484	$ 3,589	$ 717.70	$ 3,696	$ 739	$ 3,807	$ 761	$ 3,921	$ 784	$ 4,039	$ 808	$ 4,160	$ 832
International Falls DAR expansion - Saturdays	2022	$ 10,452	$ 10,766	$ 2,153	$ 11,089	$ 2,218	$ 11,421	$ 2,284	$ 11,764	$ 2,353	$ 12,117	$ 2,423	$ 12,480	$ 2,496
Two Harbors DAR expansion - Saturdays	2022	$ 31,442	$ 32,385	$ 6,477	$ 33,357	$ 6,671	$ 34,358	$ 6,872	$ 35,388	$ 7,078	$ 36,450	$ 7,290	$ 37,543	$ 7,509
Virginia DAR expansion - Saturdays	2022	$ 3,484	$ 3,589	$ 718	$ 3,696	$ 739	$ 3,807	$ 761	$ 3,921	$ 784	$ 4,039	$ 808	$ 4,160	$ 832
Establish customer service department (one-time cost)	2022	$ 20,000	$ 20,600	$ 4,120	$ 21,218	$ 4,244	$ 21,855	$ 4,371	$ -	$ -	$ -	$ -	$ -	$ -
Two Harbors-Duluth commuter service	2023	$ 77,293	$ 79,612	$ 15,922	$ 82,000	$ 16,400	$ 84,460	$ 16,892	$ 86,994	$ 17,399	$ 89,604	$ 17,921	$ 92,292	$ 18,458
Grand Rapids DAR expansion - Sundays	2023	$ 10,452	$ 10,766	$ 2,153	$ 11,089	$ 2,218	$ 11,421	$ 2,284	$ 11,764	$ 2,353	$ 12,117	$ 2,423	$ 12,480	$ 2,496
Hermantown DAR expansion - Sundays	2023	$ 10,452	$ 10,766	$ 2,153	$ 11,089	$ 2,218	$ 11,421	$ 2,284	$ 11,764	$ 2,353	$ 12,117	$ 2,423	$ 12,480	$ 2,496
Virginia DAR expansion - Sundays	2023	$ 10,452	$ 10,766	$ 2,153	$ 11,089	$ 2,218	$ 11,421	$ 2,284	$ 11,764	$ 2,353	$ 12,117	$ 2,423	$ 12,480	$ 2,496
MN 61 mid-day service	2024	$ 30,253	$ 31,161	$ 6,232	$ 32,095	$ 6,419	$ 33,058	$ 6,612	$ 34,050	$ 6,810	$ 35,072	$ 7,014	$ 36,124	$ 7,225
Grand Rapids - new deviated routes ($0 net cost)	2025	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
MN 61 through service increase	2025	$ 523,814	$ 539,528	$ 107,906	$ 555,714	$ 111,143	$ 572,386	$ 114,477	$ 589,557	$ 117,911	$ 607,244	$ 121,449	$ 625,461	$ 125,092
Expansion/Growth Cost		**$ 1,764,432**	**$ 450,885**	**$ 90,177**	**$ 910,689**	**$ 182,138**	**$ 1,007,184**	**$ 201,437**	**$ 1,137,175**	**$ 227,435**	**$ 1,206,361**	**$ 241,272**	**$ 1,868,014**	**$ 373,603**
NEW TOTAL OPERATING BUDGET	-	-	**$ 8,194,043**	**$ 1,638,809**	**$ 8,886,143**	**$ 1,777,229**	**$ 9,221,901**	**$ 1,844,380**	**$ 9,598,333**	**$ 1,919,667**	**$ 9,921,355**	**$ 1,984,271**	**$ 10,844,457**	**$ 2,168,891**

Five Year Transit Sytem Plan -- Constrained Operating Budget																			
Provider																			
Line Item	Operating Expenses	2018 Budget	2018 (local match)	2019 Projected	Cost Factor	Inflation Factor (3% / year)	2020	2020 (local match)	2021	2021 (local match)	2022	2022 (local match)	2023	2023 (local match)	2024	2024 (local match)	2025	2025 (local match)
1010	Admin, Management & Supervisory Salaries	$239,608.30	$ 47,921.66	$ 246,796.55	Fixed	3%	$ 254,200.45	$ 50,840.09	$ 261,826.46	$ 52,365.29	$ 269,681.25	$ 53,936.25	$ 277,771.69	$ 55,554.34	$ 286,104.84	$ 57,220.97	$ 294,687.99	$ 58,937.60
1020	Operator's Wages	$2,125,245.12	$ 425,049.02	$ 2,189,002.47	$ / Hour	3%	$ 2,254,672.55	$ 450,934.51	$ 2,322,312.72	$ 464,462.54	$ 2,391,982.11	$ 478,396.42	$ 2,463,741.57	$ 492,748.31	$ 2,537,653.82	$ 507,530.76	$ 2,613,783.43	$ 522,756.69
1030	Vehicle Maintenance and Repair Wages	$257,462.18	$ 51,492.44	$ 265,186.05	$ / Mile	3%	$ 273,141.63	$ 54,628.33	$ 281,335.88	$ 56,267.18	$ 289,775.95	$ 57,955.19	$ 298,469.23	$ 59,693.85	$ 307,423.31	$ 61,484.66	$ 316,646.01	$ 63,329.20
1040	General Office Support Wages	$612,529.36	$ 122,505.87	$ 630,905.24	Fixed	3%	$ 649,832.40	$ 129,966.48	$ 669,327.37	$ 133,865.47	$ 689,407.19	$ 137,881.44	$ 710,089.41	$ 142,017.88	$ 731,392.09	$ 146,278.42	$ 753,333.85	$ 150,666.77
1050	Operations Support Wages	$312,388.57	$ 62,477.71	$ 321,760.23	Fixed	3%	$ 331,413.03	$ 66,282.61	$ 341,355.42	$ 68,271.08	$ 351,596.09	$ 70,319.22	$ 362,143.97	$ 72,428.79	$ 373,008.29	$ 74,601.66	$ 384,198.54	$ 76,839.71
1060	Fringe Benefits	$1,245,740.28	$ 249,148.06	$ 1,283,112.49	variable	3%	$ 1,321,605.86	$ 264,321.17	$ 1,361,254.04	$ 272,250.81	$ 1,402,091.66	$ 280,418.33	$ 1,444,154.41	$ 288,830.88	$ 1,487,479.04	$ 297,495.81	$ 1,532,103.41	$ 306,420.68
Personnel Services	Total 1000 (1010 - 1060)	$ 4,792,723.37	$ 958,594.76	$ 4,936,763.02			$ 5,084,865.92	$ 1,016,973.18	$ 5,237,411.89	$ 1,047,482.38	$ 5,394,534.25	$ 1,078,906.85	$ 5,556,370.28	$ 1,111,274.06	$ 5,723,061.39	$ 1,144,612.28	$ 5,894,753.23	$ 1,178,950.65
1110	Management Fees	$0.00	$ -	$ -	Variable	3%	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1120	Drug and Alcohol Testing and Administration Fee Expenses	$9,924.66	$ 1,984.93	$ 10,222.40	Variable	3%	$ 10,529.07	$ 2,105.81	$ 10,844.94	$ 2,168.99	$ 11,170.29	$ 2,234.06	$ 11,505.40	$ 2,301.08	$ 11,850.56	$ 2,370.11	$ 12,206.08	$ 2,441.22
1130	Advertising, Marketing and Promotional Charges	$181,477.27	$ 36,295.45	$ 186,921.59	Variable	3%	$ 192,529.24	$ 38,505.85	$ 198,305.11	$ 39,661.02	$ 204,254.27	$ 40,850.85	$ 210,381.89	$ 42,076.38	$ 216,693.35	$ 43,338.67	$ 223,194.15	$ 44,638.83
1140	Legal, Auditing, and Other Professional Fees	$89,226.73	$ 17,845.35	$ 91,903.53	Variable	3%	$ 94,660.64	$ 18,932.13	$ 97,500.46	$ 19,500.09	$ 100,425.47	$ 20,085.09	$ 103,438.23	$ 20,687.65	$ 106,541.38	$ 21,308.28	$ 109,737.62	$ 21,947.52
1150	Staff Development Costs	$86,964.73	$ 17,392.95	$ 89,573.67	Variable	3%	$ 92,260.88	$ 18,452.18	$ 95,028.71	$ 19,005.74	$ 97,879.57	$ 19,575.91	$ 100,815.96	$ 20,163.19	$ 103,840.44	$ 20,768.09	$ 106,955.65	$ 21,391.13
1160	Office Supplies	$182,612.12	$ 36,522.42	$ 188,090.48	Variable	3%	$ 193,733.20	$ 38,746.64	$ 199,545.19	$ 39,909.04	$ 205,531.55	$ 41,106.31	$ 211,697.50	$ 42,339.50	$ 218,048.42	$ 43,609.68	$ 224,589.87	$ 44,917.97
1170	Leases and Rentals - Administrative Facilities	$5,114.17	$ 1,022.83	$ 5,267.60	Variable	3%	$ 5,425.62	$ 1,085.12	$ 5,588.39	$ 1,117.68	$ 5,756.04	$ 1,151.21	$ 5,928.72	$ 1,185.74	$ 6,106.59	$ 1,221.32	$ 6,289.78	$ 1,257.96
1180	Utilities	$402,362.91	$ 80,472.58	$ 414,433.80	Variable	3%	$ 426,866.81	$ 85,373.36	$ 439,672.82	$ 87,934.56	$ 452,863.00	$ 90,572.60	$ 466,448.89	$ 93,289.78	$ 480,442.36	$ 96,088.47	$ 494,855.63	$ 98,971.13
1190	Other Direct Administrative Charges	$46,565.78	$ 9,313.16	$ 47,962.75	Variable	3%	$ 49,401.64	$ 9,880.33	$ 50,883.69	$ 10,176.74	$ 52,410.20	$ 10,482.04	$ 53,982.50	$ 10,796.50	$ 55,601.98	$ 11,120.40	$ 57,270.04	$ 11,454.01
Administrative Charges	Total 1100 (1110 - 1190)	$ 1,004,248.37	$ 200,849.67	$ 1,034,375.82	Variable		$ 1,065,407.10	$ 213,081.42	$ 1,097,369.31	$ 219,473.86	$ 1,130,290.39	$ 226,058.08	$ 1,164,199.10	$ 232,839.82	$ 1,199,125.07	$ 239,825.01	$ 1,235,098.82	$ 247,019.76
1210	Fuel	$706,133.70	$ 141,226.74	$ 727,317.71	$/mile	3%	$ 749,137.24	$ 149,827.45	$ 771,611.36	$ 154,322.27	$ 794,759.70	$ 158,951.94	$ 818,602.49	$ 163,720.50	$ 843,160.57	$ 168,632.11	$ 868,455.38	$ 173,691.08
1220	Preventive Maintenance (PM) Labor, Parts and Material Expenses (Vehicles)	$158,775.65	$ 31,755.13	$ 163,538.92	$ / Mile	3%	$ 168,445.09	$ 33,689.02	$ 173,498.44	$ 34,699.69	$ 178,703.39	$ 35,740.68	$ 184,064.49	$ 36,812.90	$ 189,586.43	$ 37,917.29	$ 195,274.02	$ 39,054.80
1230	Corrective Maintenance (CM) Labor, Parts and Materials Expense (Vehicles)	$101,248.67	$ 20,249.73	$ 104,286.13	$ / Mile	3%	$ 107,414.71	$ 21,482.94	$ 110,637.16	$ 22,127.43	$ 113,956.27	$ 22,791.25	$ 117,374.96	$ 23,474.99	$ 120,896.21	$ 24,179.24	$ 124,523.09	$ 24,904.62
1240	Tires	$51,565.00	$ 10,313.00	$ 53,111.95	$ / Mile	3%	$ 54,705.31	$ 10,941.06	$ 56,346.47	$ 11,269.29	$ 58,036.86	$ 11,607.37	$ 59,777.97	$ 11,955.59	$ 61,571.31	$ 12,314.26	$ 63,418.45	$ 12,683.69
1250	Other Vehicle Charges	$25,182.29	$ 5,036.46	$ 25,937.76	$ / Mile	3%	$ 26,715.89	$ 5,343.18	$ 27,517.37	$ 5,503.47	$ 28,342.89	$ 5,668.58	$ 29,193.18	$ 5,838.64	$ 30,068.97	$ 6,013.79	$ 30,971.04	$ 6,194.21
Vehicle Charges	Total 1200 (1210 - 1250)	$ 1,042,905.31	$ 208,581.06	$ 1,074,192.47			$ 1,106,418.24	$ 221,283.65	$ 1,139,610.79	$ 227,922.16	$ 1,173,799.11	$ 234,759.82	$ 1,209,013.09	$ 241,802.62	$ 1,245,283.48	$ 249,056.70	$ 1,282,641.98	$ 256,528.40
1310	Purchase of Service	$0.00	$ -	$ -	$ / Hour	3%	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1330	Mileage Reimbursement for Public Transit Service	$26.97	$ 5.39	$ 27.78	Fixed	3%	$ 28.61	$ 5.72	$ 29.47	$ 5.89	$ 30.35	$ 6.07	$ 31.27	$ 6.25	$ 32.20	$ 6.44	$ 33.17	$ 6.63
1340	Repair and Maintenance of Other Property	$93,735.45	$ 18,747.09	$ 96,547.51	Variable	3%	$ 99,443.94	$ 19,888.79	$ 102,427.26	$ 20,485.45	$ 105,500.07	$ 21,100.01	$ 108,665.08	$ 21,733.02	$ 111,925.03	$ 22,385.01	$ 115,282.78	$ 23,056.56
1350	Leases and Rentals of Facilities or Equipment	$62,631.36	$ 12,526.27	$ 64,510.30	Variable	3%	$ 66,445.61	$ 13,289.12	$ 68,438.98	$ 13,687.80	$ 70,492.15	$ 14,098.43	$ 72,606.91	$ 14,521.38	$ 74,785.12	$ 14,957.02	$ 77,028.67	$ 15,405.73
1360	Other Operations Charges	$75,439.15	$ 15,087.83	$ 77,702.32	$ / Hour	3%	$ 80,033.39	$ 16,006.68	$ 82,434.40	$ 16,486.88	$ 84,907.43	$ 16,981.49	$ 87,454.65	$ 17,490.93	$ 90,078.29	$ 18,015.66	$ 92,780.64	$ 18,556.13
Operation Charges	Total 1300 (1310 - 1360)	$ 231,832.93	$ 46,366.59	$ 238,787.92		3%	$ 245,951.56	$ 49,190.31	$ 253,330.10	$ 50,666.02	$ 260,930.01	$ 52,186.00	$ 268,757.91	$ 53,751.58	$ 276,820.64	$ 55,364.13	$ 285,125.26	$ 57,025.05
1410	Public Liability and Property Damage on Vehicles	$143,102.15	$ 28,620.43	$ 147,395.21	Fixed	3%	$ 151,817.07	$ 30,363.41	$ 156,371.58	$ 31,274.32	$ 161,062.73	$ 32,212.55	$ 165,894.61	$ 33,178.92	$ 170,871.45	$ 34,174.29	$ 175,997.59	$ 35,199.52
1420	Public Liability and Property Damage - Other than on Vehicles	$58,465.56	$ 11,693.11	$ 60,219.53	Fixed	3%	$ 62,026.11	$ 12,405.22	$ 63,886.90	$ 12,777.38	$ 65,803.50	$ 13,160.70	$ 67,777.61	$ 13,555.52	$ 69,810.94	$ 13,962.19	$ 71,905.26	$ 14,381.05
Operation Charges	Total 1400 (1410 - 1420)	$ 201,567.71	$ 40,313.54	$ 207,614.74			$ 213,843.18	$ 42,768.64	$ 213,843.18	$ 44,051.70	$ 226,866.23	$ 45,373.25	$ 233,672.22	$ 46,734.44	$ 240,682.39	$ 48,136.48	$ 247,902.86	$ 49,580.57
1510	Vehicle Registration and Permit Fees	$ 8,630.80	$ 1,726.16	$ 8,889.72	Fixed	3%	$ 9,156.42	$ 1,831.28	$ 9,431.11	$ 1,886.22	$ 9,714.04	$ 1,942.81	$ 10,005.46	$ 2,001.09	$ 10,305.63	$ 2,061.13	$ 10,614.80	$ 2,122.96
1520	Federal Fuel and Lubricant Taxes and Excise Taxes on Tires	$ 53,616.95	$ 10,723.39	$ 55,225.46	Fixed	3%	$ 56,882.22	$ 11,376.44	$ 58,588.69	$ 11,717.74	$ 60,346.35	$ 12,069.27	$ 62,156.74	$ 12,431.35	$ 64,021.44	$ 12,804.29	$ 65,942.09	$ 13,188.42
1540	Other Taxes and Fees	$ 70,602.64	$ 14,120.53	$ 72,720.72	Fixed	3%	$ 74,902.34	$ 14,980.47	$ 77,149.41	$ 15,429.88	$ 79,463.89	$ 15,892.78	$ 81,847.81	$ 16,369.56	$ 84,303.24	$ 16,860.65	$ 86,832.34	$ 17,366.47
Taxes and Fees	Total 1500 (1510 - 1540)	$ 132,850.39	$ 26,570.08	$ 136,835.90			$ 140,940.98	$ 28,188.20	$ 140,940.98	$ 29,033.84	$ 149,524.28	$ 29,904.86	$ 154,010.01	$ 30,802.00	$ 158,630.31	$ 31,726.06	$ 163,389.22	$ 32,677.84
1594	Fuel Tax Refunds	$ (181,431.70)	$ (36,286.34)	$ (186,874.65)	Fixed	3%	$ (192,480.89)	$ (38,496.18)	$ (198,255.32)	$ (39,651.06)	$ (204,202.98)	$ (40,840.60)	$ (210,329.07)	$ (42,065.81)	$ (216,638.94)	$ (43,327.79)	$ (223,138.11)	$ (44,627.62)
1596	Insurance Reimbursement	$ (34,290.07)	$ (6,858.01)	$ (35,318.77)	Fixed	3%	$ (36,378.34)	$ (7,275.67)	$ (37,469.69)	$ (7,493.94)	$ (38,593.78)	$ (7,718.76)	$ (39,751.59)	$ (7,950.32)	$ (40,944.14)	$ (8,188.83)	$ (42,172.46)	$ (8,434.49)
	TOTAL OPERATING BUDGET	$ 7,298,669.73	$ 1,438,131.35	$ 7,406,376.45			$ 7,628,567.75	$ 1,525,713.55	$ 7,846,781.25	$ 1,571,484.96	$ 8,093,147.52	$ 1,618,629.50	$ 8,335,941.95	$ 1,667,188.39	$ 8,586,020.21	$ 1,717,204.04	$ 8,843,600.81	$ 1,768,720.16

Appendix B Arrowhead Transit Online Survey Results

The survey questions were prepared in consultation with Arrowhead Transit. The online survey opened on June 25th, 2019 and was available through July 2nd, 2019. The survey was open to all individuals who live, work, or visit the Arrowhead Transit service area regardless of current bus usage. Individuals where asked about their knowledge of and usage of the system and based on the response they were directed to the appropriate set of questions. All were then asked to provide any additional comments they might have. Responses were received from 78 individuals.

1. Have you heard about Arrowhead Transit?

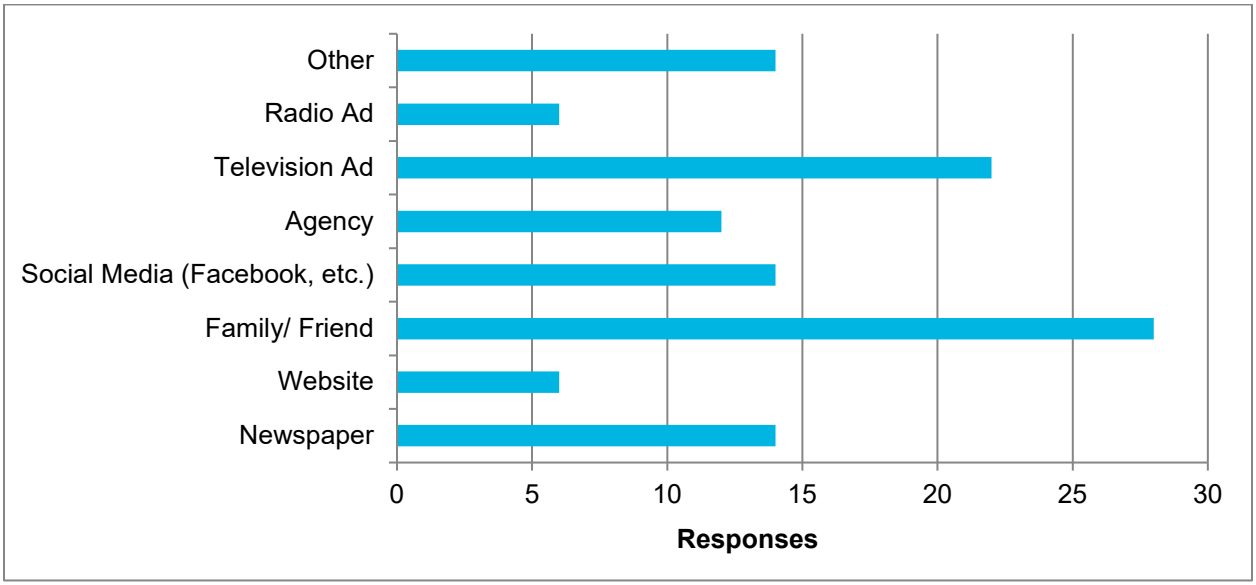
Question was asked of all survey takers, there were 78 respondents.

- Yes – 78 (100%)
- No – 0 (0%)

2. How did you hear about Arrowhead Transit?

Question was asked of only those who responded yes in question 1, there were 71 respondents and multiple responses were allowed.

Figure 30. Survey Results: How Individuals Heard About Arrowhead Transit



Those that responded other wrote in the following:

- Seeing it drive by our house and in town
- Ive seen the buses.
- They drive for my work, northern lights community school.
- Seen it in our town
- Mainly seeing the buses around.
- See the transit around town
- Social worker

- I saw the bus with name on it
- Community connect
- Have seen the buses
- Sight
- I ride the bus
- Having to use Dial-A-Ride
- Mailing

3. Do you use Arrowhead Transit?

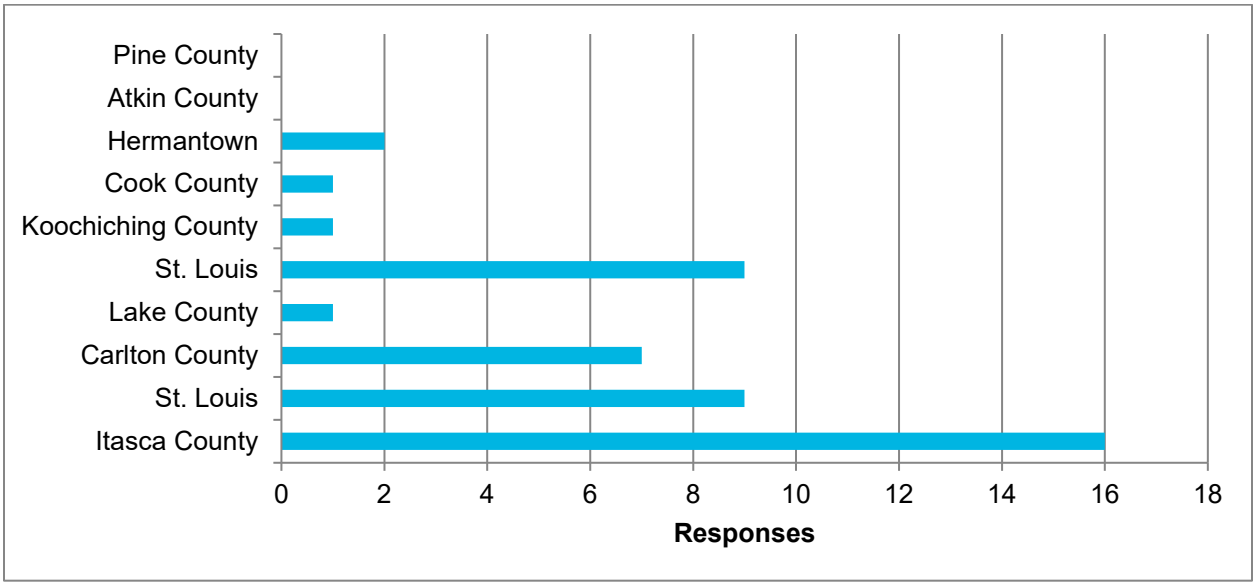
Question was asked of only those who responded yes in question 1, there were 71 respondents.

- Yes – 37 (52%)
- No – 34 (48%)

4. What area of transit service do you live closest to??

Question was asked of only those who responded yes in question 1 and have used Arrowhead Transit, there were 46 respondents.

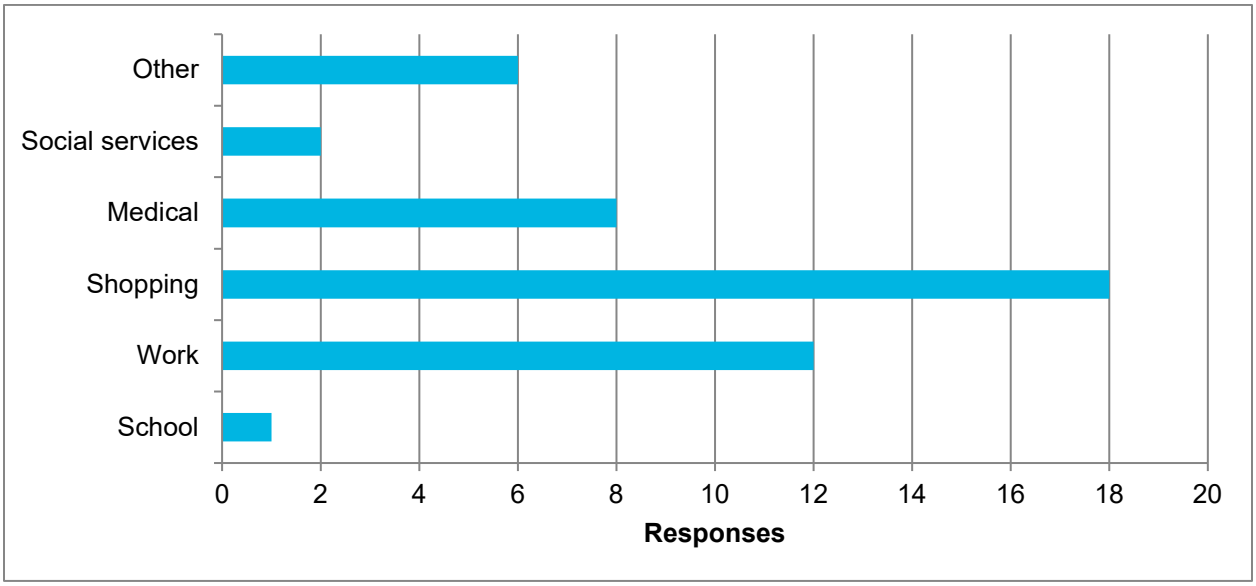
Figure 31. Survey Results: Area of Transit Live By



5. What type of trips do you use the bus for most often?

Question was asked of only those who responded yes in question 1 and have used Arrowhead Transit, there were 37 respondents. More than one response was allowed.

Figure 32. Survey Results: Trip Purpose



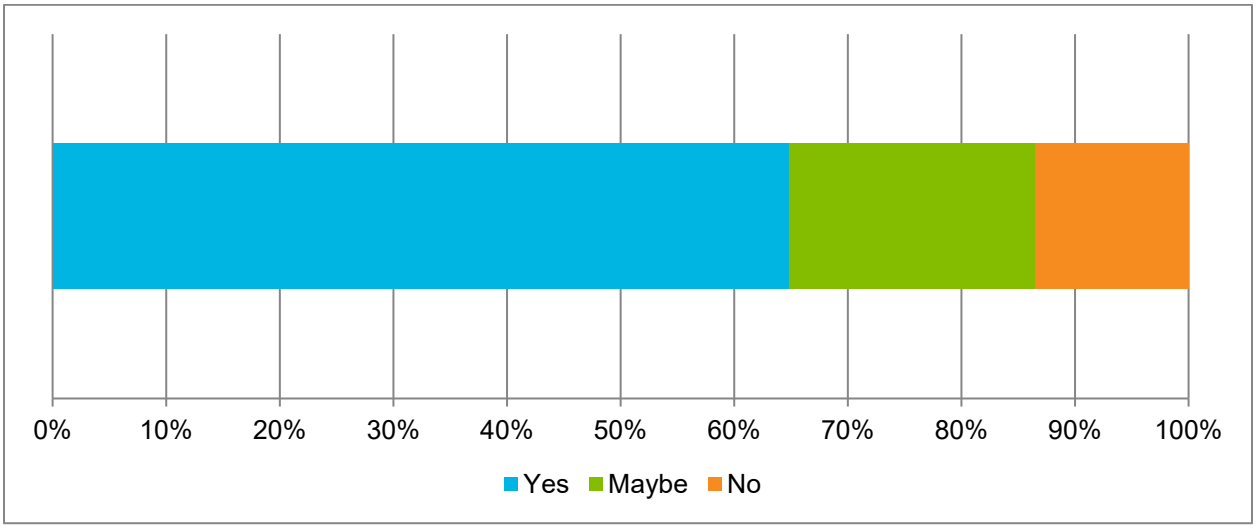
Those that choose other wrote in the following:

- Events
- Library
- Access my work out place
- A ride back from somewhere
- Various Reasons
- Virginia

6. Would you use a Smartphone app to schedule rides if one were available?

Question was asked of only those who responded yes in question 1 and have used Arrowhead Transit, there were 37 respondents.

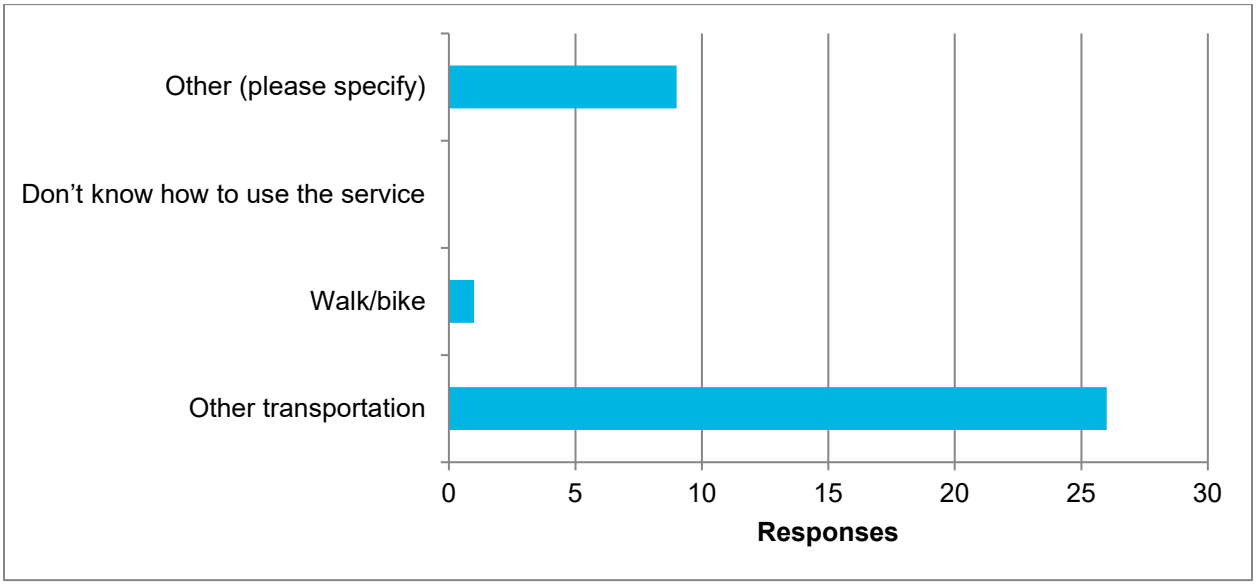
Figure 33. Survey Results: Potential Use of Smartphone App for Scheduling



7. Why don't you currently use transit?

Question was asked of only those who responded yes in question 1 and have not used Arrowhead Transit, there were 34 respondents. More than one response was allowed.

Figure 34. Survey Results: Why Respondents Don't Currently use Transit



Those that choose other wrote in the following:

- Doesn't stop by on right days in Lawrence lake
- Cumbersome to get picked up, took over an hour to get home, with all the assisted stops
- The time never matched up with my schedule
- You don't come out to where I live
- Have heard it's unreliable
- Underpayed, sub-par drivers
- Service is unreliable outside the biggest towns. Im either 2 hours early or an hour late
- Not convenient
- Car

8. Thank you for your time and participation. Do you have any suggestions for improved public transportation in the Arrowhead service area?

Question was asked of all survey takers, and was open-ended. There were 27 respondents, below lists their comments.

- Signs at pick up spots.
- Phone service. It is hard to get a call through sometimes 45 mn.
- Wish more people would use it.
- Wonderful service
- More rural pickups

- Even though I drive, sometimes using the bus would be nice. It would great to see more schedule information printed in newspaper or flyers available for easy pick up at various locations.
- More stops. Post schedules on facebook. Go to cohasset more frequently.
- No. I have seen the bus in many areas. Hopefully it will still be around if I can no longer drive.
- Being on time is important to get to work
- Go to the more rural area.
- For Itasca county we need more scheduled routes along with the dial a ride service
- Pay drivers more and properly train the ones you have, especially regarding lane changes and railroad crossings.
- Regular bus route like Duluth has. Grand rapids is big enough for that!
- Would be nice if at times I wasnt on hold for several minutes waiting for Dispatch to pick up the phone for me to schedule a ride. At times, Ive had to be on hol d for longer then what it takes to wait for the bus to get to where Im at. Would also be nice if Dial -A-Ride had 2 buses on Sunday, instead of one. At times Ive had to wait awhile to be picked up on a Sunday do to quite a few people needing to use the bus & has gone past the 2:00 quitting time because of having quite a few extra passengers on board.
- more buses! bigger areas and service to duluth.
- Bike racks
- Round trip from Ely to Virginia
- Each town, including hibbing, needs regular stops throughout the day
- Make it more convenient for families.
- Sounds like a great service. I may need to use it in the future. I am still driving my own auto.
- Maybe some later times for returns.
- Expand your dial a ride services to Eveleth.
- Faster service, have to wait over an hour most times
- A second bus Saturdays. I quit riding that morning as I was always late to work
- I took the bus for years then started walking to work because it was faster to get there. I am at AEOA on Tuesdays and see the mess it can create. Ive seen people take 4 hours to di errands. Its like a full day to do anything on the bus. I think an app would be great because one of the biggest problems Ive seen is the hold with dispatch. Then not having an understanding on how our town operates. You 1. Need a dispatch in Two Harbors, and 2. Have the drivers more in control like with an app. It gets too backed up when the drivers go on their break. Please follow through with this and start listening to the comment cards that Ive watch 10s of people fil l out
- Get decent management
- In cloquet daily routes from cloquet to Duluth.

Appendix C Transit Need and Demand Analysis (TCRP 161)

Transportation need/ Mobility Gap in each County	the annual number of trips (1-way) needed because no access to a vehicle.
Aitkin	255,800
Carlton	429,700
Cook	179,600
Itasca	550,000
Koochiching	233,100
Lake	197,800
Pine	371,100
St. Louis	4,977,000
Total Need for service area	**7,194,100**

Demand for Public Transit (tab "3. Demand)	Demand only occurs in places where public transit service already exists.
Aitkin	16,900
Carlton	23,200
Cook	5,600
Itasca	36,600
Koochiching	10,900
Lake	9,600
Pine	21,900
St. Louis	152,500
Total Demand for public transit in service area	**277,200**
Total Demand for public transit in service area	**451,800**

Commuters from Rural Counties to Urban Centers (Duluth metro area)	Demand only occurs in places where public transit service already exists.
Aitkin	1,000
Carlton	N/A
Cook	0
Itasca	12,200
Koochiching	0
Lake	4,600
Pine	8,200
St. Louis	N/A
Total Demand for public transit in service area	**26,000**

Target Ridership*	
2020 ridership target	663,459
2021 ridership target	680,833
2022 ridership target	698,662
2023 ridership target	716,958
2024 ridership target	735,733
2025 ridership target	755,000

*Ridership targets based on 1/2 mobillity gap x 90% rely on demographics which include the City of Duluth in St. Louis County. Within Duluth, DTA offers transit services which provide over 2.8 million annual passenger trips. When combined with Arrowhead Transit passenger trips, these services account for more than 1/2 the mobility gap for this area. As an alternative measure, ridership targets above reflect the total of all TCRP-calculated demand measures. Plan ridership targets for Arrowhead Transit (see Section 7.2) are based on new services generating a consistent 5 riders per hour.