

Northwest Wisconsin Regional Planning Commission  
**NWRPC**

City of Superior, Wisconsin



# Superior Transit

## Comprehensive Operations Analysis



December 2014



in conjunction  
with  
Bourne Transit  
Consulting



# Superior, Wisconsin – Transit Comprehensive Operations Analysis

## *Final Report*

**Northwest Wisconsin Regional Planning Commission**



December 2014



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# Introduction

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The Northwest Regional Planning Commission (NWRPC) retained the services of SRF Consulting Group and Bourne Transit Consulting to conduct a comprehensive operations analysis of transit services in Superior, Wisconsin with the assistance of the Duluth Transit Authority (DTA) and the Metropolitan Interstate Council (MIC). The objective of the analysis was to assess the existing conditions and trends related to transit service in Superior, and provide a five-year implementation plan for service improvement. The study was comprised of the following components:

1. **An assessment of the City of Superior’s existing community and transit service conditions.** This includes the travel characteristics of transit users and non-transit users alike, and the land use, demographic, and economic characteristics of the community. These factors are used to understand the market for transit service in Superior, travel behaviors, regional growth and change, and any geographic gaps in transit service.
2. **A review of DTA’s transit system performance in Superior.** This portion of the project reviews ridership, revenue, and service trends, as well as various transit performance measures. DTA also has various transit performance measures that are used for planning purposes upon which the Superior bus routes are evaluated. Building on the review of the community characteristics, the transit service assessment evaluates the adequacy of public transit in Superior. In this section the study assesses the interaction of the bus routes in downtown Superior, and transit boarding and alighting patterns. Boarding patterns, transfers, through routing, and the interface between fixed-route and paratransit service were observed and appraised. With the guidance of the technical committee, the team reviewed the current structure of the Superior bus routes and developed service alternatives.
3. **Recommendations to adjust schedules, running times, geographic coverage, fares, etc. based on the review and assessment.** The intent here is to reverse declining trends in performance and improve the transit system in Superior. These recommendations are organized into a five-year implementation plan and schedule that will meet short term needs. An emphasis is placed on changes and improvements that can be made using the existing financial and capital resources.

## **Project Technical Committee**

Sheldon Johnson .....Northwest Wisconsin Regional Planning Commission  
Ron Chicka..... Duluth-Superior Metropolitan Interstate Council  
Dennis Jensen ..... Duluth Transit Authority  
Jim Heilig..... Duluth Transit Authority  
Jason Serck ..... City of Superior

# Background and Scope of Transit Service in Superior

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The City of Superior is located within the Duluth-Superior, Minnesota and Wisconsin Urbanized Area and has a population of approximately 27,000. The city has a land area of 37 square miles, yielding a population density of about 730 persons per square mile. The city is bounded by Lake Superior, St. Louis Bay (St. Louis River), the Town of Superior, the Town of Parkland, the Town of Lakeside, the Village of Oliver, and the Village of Superior. Superior is the seat of Douglas County, Wisconsin.

The City of Superior contracts with Duluth Transit Authority (DTA) to provide public transit service through an intergovernmental agreement. DTA operates two fixed routes in Superior, along with paratransit operated by DTA's STRIDE service as per the requirements of the Americans with Disabilities Act. The two fixed routes are Route 16 and Route 17 (see Figures 1 and 2 for maps). Route 16 connects the City of Superior to the City of Duluth, and serves downtown Superior, University of Wisconsin – Superior (UWS), and the eastern portion of the city traveling along the East 5th Street and East 2nd Street corridor. Route 17 travels within Superior, primarily along the Tower Avenue corridor, and has variations operating during peak periods connecting downtown Superior and the Billings Park and South Superior neighborhoods. Other transit providers in the region include demand response for older adults provided by Douglas County Human Services, and a volunteer program that connects rural residents to doctor's appointments operated by North Country Independent Living.

The purpose of the initial part of the analysis is to gain a thorough understanding of the existing and projected conditions within which transit services operate. This analysis presents a detailed assessment of the study area characteristics, including patterns of the general population, employment, travel patterns, and land use conditions. These are all factors that offer an understanding of the transit market in Superior.

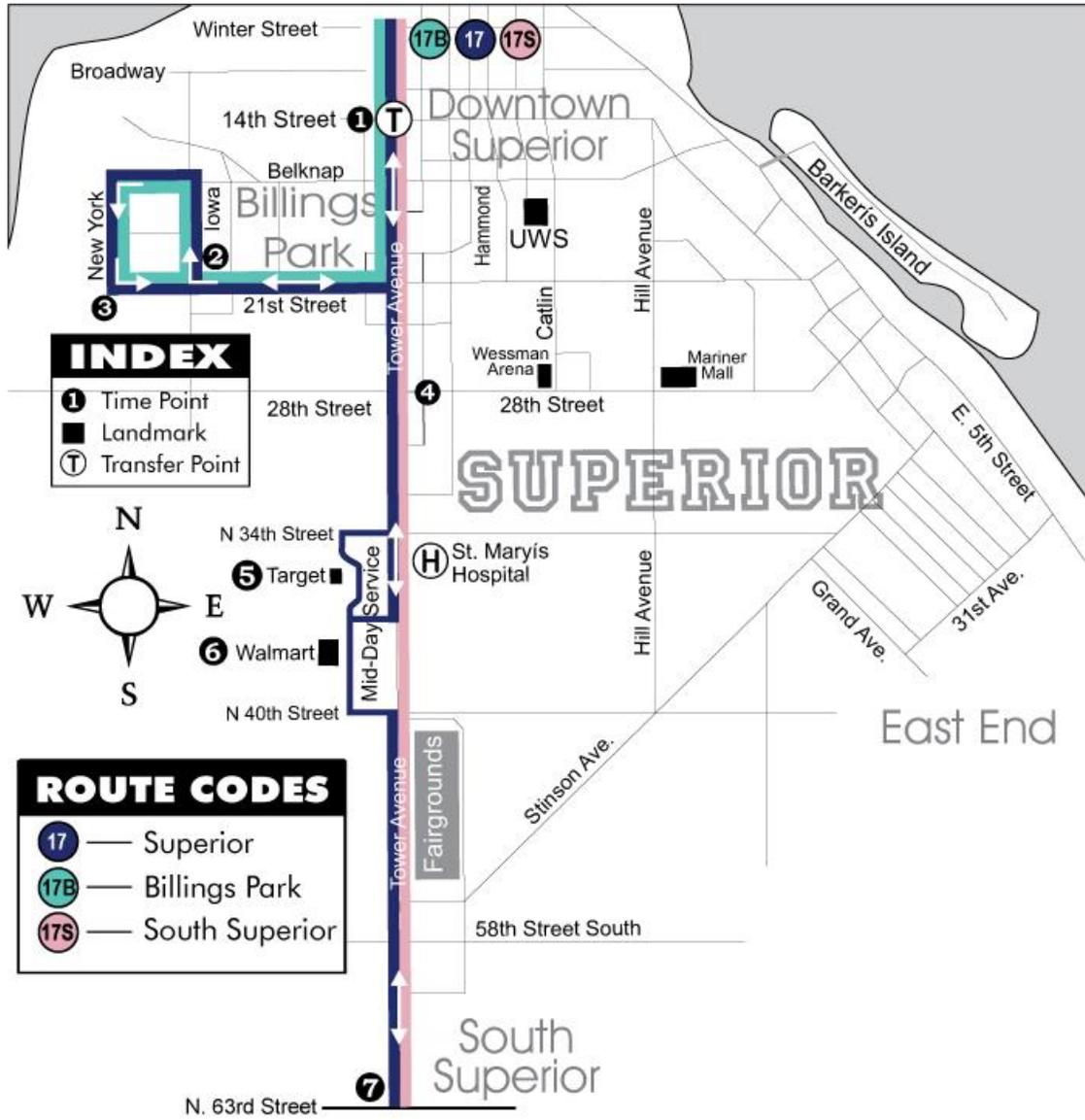
## Scope of Transit Services

### Route 16

Route 16 connects Duluth and Superior and operates 7 days per week. On weekdays the service begins with a Duluth bound trip at 5:52 a.m., and ends with a Superior bound trip that ends at 7:30 p.m. On Saturdays Route 16 services begin with a Duluth bound trip at 6:44 a.m. and ends with a Duluth bound trip terminating downtown at 7:31 p.m. Sunday service begins at 10:44 a.m. and ends at 7:19 p.m. following a similar pattern. Weekend frequencies are hourly, and weekday frequencies are approximately 30 minutes during the morning and afternoon peak periods with hourly service midday. Some trips are interlined with other DTA routes at the Duluth Transit Center.



Figure 2. DTA Route 17 Map



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# Demographic Characteristics

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The following demographic patterns and market characteristics are reviewed:

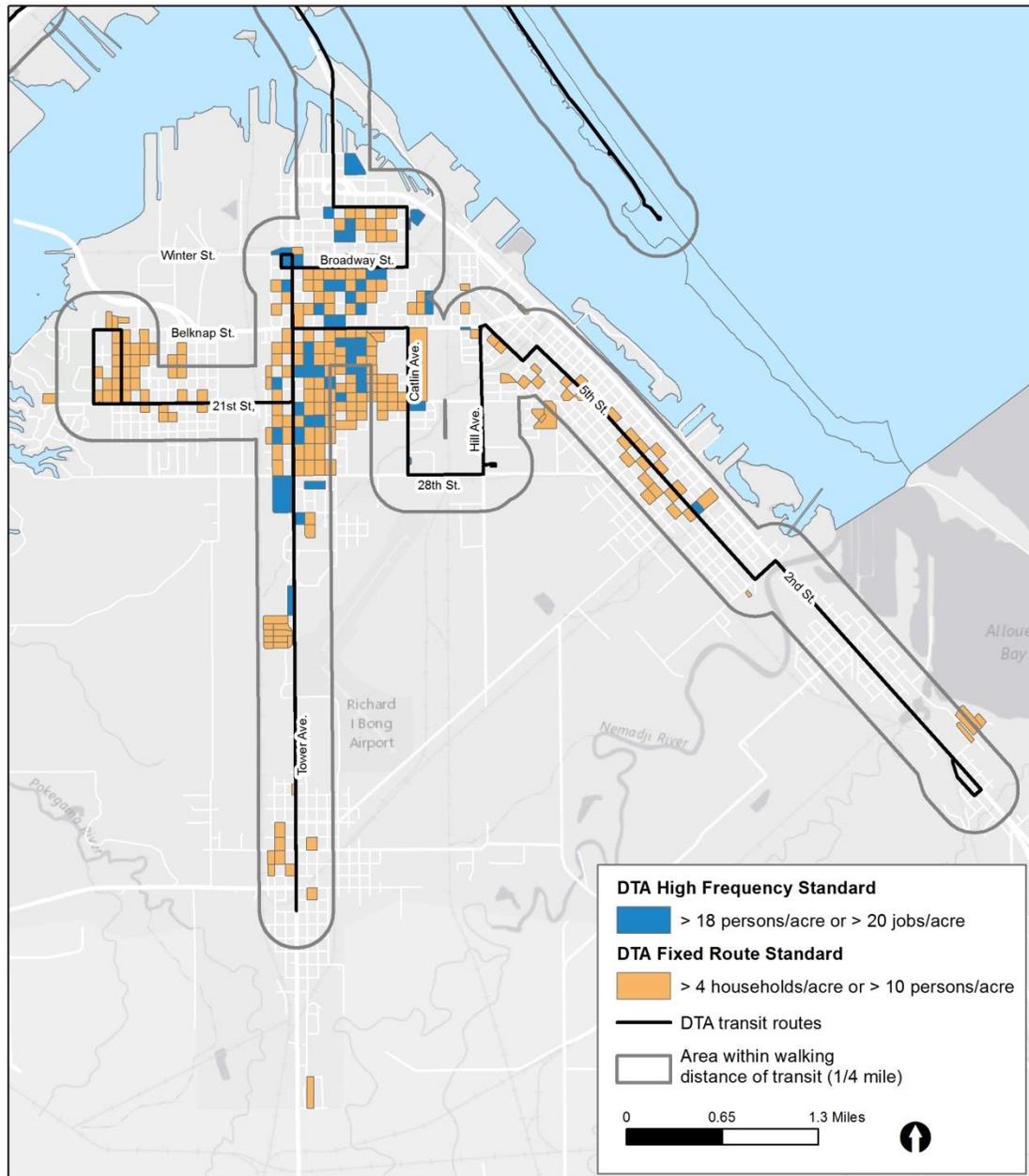
- Areas that support transit
- Vehicle ownership
- Population of older adults
- Households that fall below the poverty level
- Minority population
- Employment locations
- People with disabilities

## Transit Supportive Areas

Transit service, specifically fixed-route service, requires a minimum level of employment and population density to function effectively. Land use and employment in the City of Superior is assessed for the type and level of transit service it can support, as well as the current level of service coverage in the city. Service coverage measures the area within walking distance of transit stops. The more area covered by transit, the greater the geographic availability of transit.

DTA has several guidelines for service standards that are related to population and employment density. These standards are documented in the 2009 DTA Vision Report. Two selected standards include thresholds for moderate density areas that can support a mix of high capacity, regular route services that are operated hourly and supplemented with community circulators, along with density requirements for higher frequency service (15-30 minutes). Areas that meet these requirements are mapped in Figure 3.

**Figure 3. DTA Transit Supportive Density Standards**



Observing the areas that are supportive of high-frequency service by DTA standards, they are focused in the central parts of Superior. Areas that support fixed-route standards are concentrated on corridors that are already served by transit, with the exception of the coverage gap in the vicinity of Hammond Park, and a few places on the outskirts of the city. In general, Superior’s most dense areas are well served by transit.

## Market Indicators

Identifying transit supportive areas shows where service should be distributed to make it the most productive. However, there also may be areas of critical need in low density areas.

Transit service in these areas provides a return on investment in terms of improving the regional quality of life. Bus routes can, in some cases, be configured to serve these areas along with highly productive segments in a balanced approach to service development. The following section outlines the existing conditions of several markets that typically rely on transit.

## Senior Population

The senior population is a core component of a transit market. According to the US Census, approximately 13.1 percent of Superior’s population is over 65 years of age. This is very close to the average for the State of Wisconsin and the Duluth-Superior Urbanized Area, of which 13.8 percent of the population is over 65 years of age. In Figure 4, the distribution of the senior population in Superior is shown at the census block level.

## Automobile Ownership

Automobile ownership is indicative of transit reliance. In this section, each portion of the DTA service area is compared by two measures: households with zero vehicles and households with one vehicle. Households that have no automobiles rely on transit, walking, ridesharing, or bicycling to meet mobility needs. Residents of these households are often the core of a transit market in an urban. Additionally, households with only one vehicle benefit from the flexibility that transit offers. Transit can allow a household with multiple members to save money by only paying to own and maintain one car, and allow for people to have meaningful job access if commute patterns change. In Table 1 a summary of vehicle ownership in Superior, compared to state and regional averages is presented.

**Table 1. Vehicle Ownership**

Location	Percent of Household with Zero Vehicles	Percent of Households with One Vehicle
City of Superior	11.0%	37.4%
Duluth-Superior Region	11.8%	36.5%
State of Wisconsin	7.0%	32.2%

In Figure 5 the spatial distribution of zero-vehicle households is presented. Concentrations of zero-vehicle households are located in central Superior and South Superior. The census tract with the lowest automobile access is north of U.S. Highway 2 and east of Catlin Avenue.

**Figure 4. Senior Population in Superior**

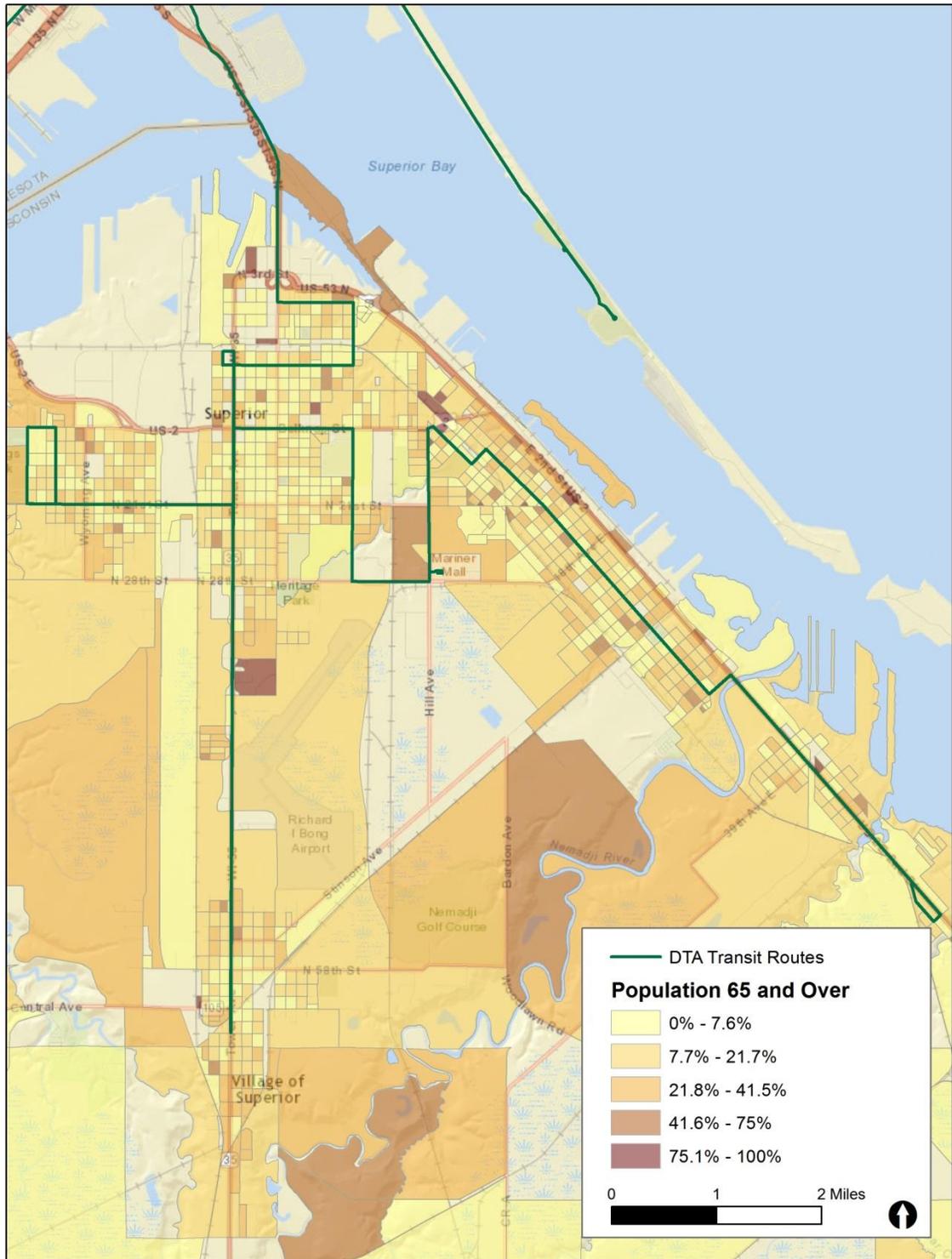
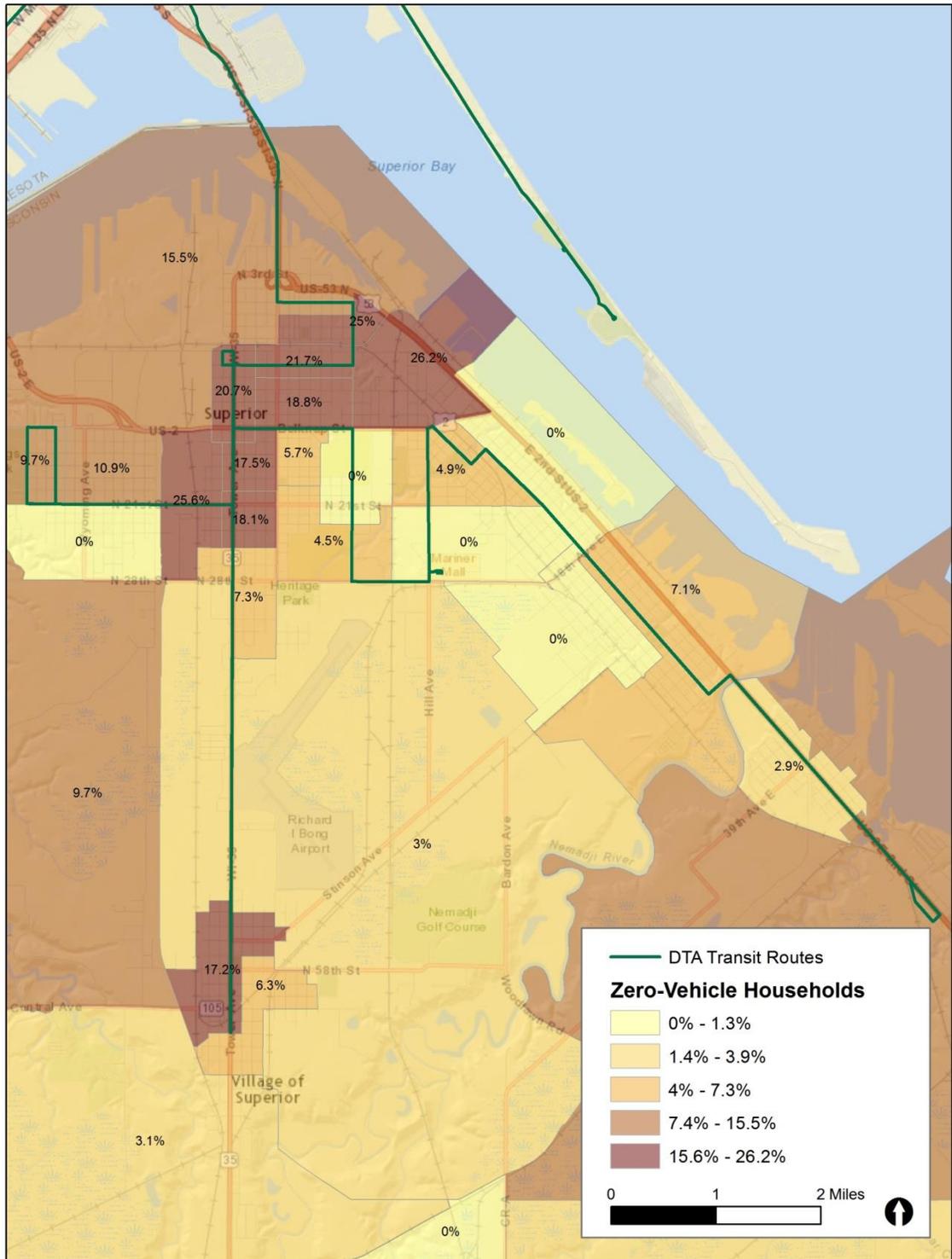


Figure 5. Zero Vehicle Households



## Income

Income and poverty status are also indicators of transit use. People with low incomes are more likely to rely on transit for mobility, and may not have access to a personal vehicle. In Table 2, income characteristics of the region are shown. This includes median household income and the percentage of households whose incomes fall below poverty level.

**Table 2. Income Levels**

Location	Median Income	Percent of Households in Poverty
City of Superior	\$41,144	15.0%
Duluth-Superior Region	\$41,999	12.0%
State of Wisconsin	\$51,059	12.5%

The geographic distribution of households in poverty status is shown in Figure 6.

## Disability Status

Disability status is also an indicator for transit use, as people with disabilities often rely on public and specialized transit for mobility. Also, having a clear understanding of where people with disabilities reside can better inform a transit agency when designing route patterns that affect the ADA paratransit service area. In the State of Wisconsin approximately 10.9 percent of the population has a disability. In the City of Superior and the Duluth-Superior Region, approximately 12.7 percent of the population has a disability. The spatial distribution of this population group is shown in Figure 7. Many people that have disabilities live along the major transit corridors in Superior.

## Employment

Employment density within Superior is shown, measured in jobs per square mile, in Figure 8. This shows where the concentrations of jobs are in the region. Typically the most common trip purpose for transit is commuting, so having an understanding of job concentrations is a key component of understanding the transit market.

**Figure 6. Households in Poverty Status**

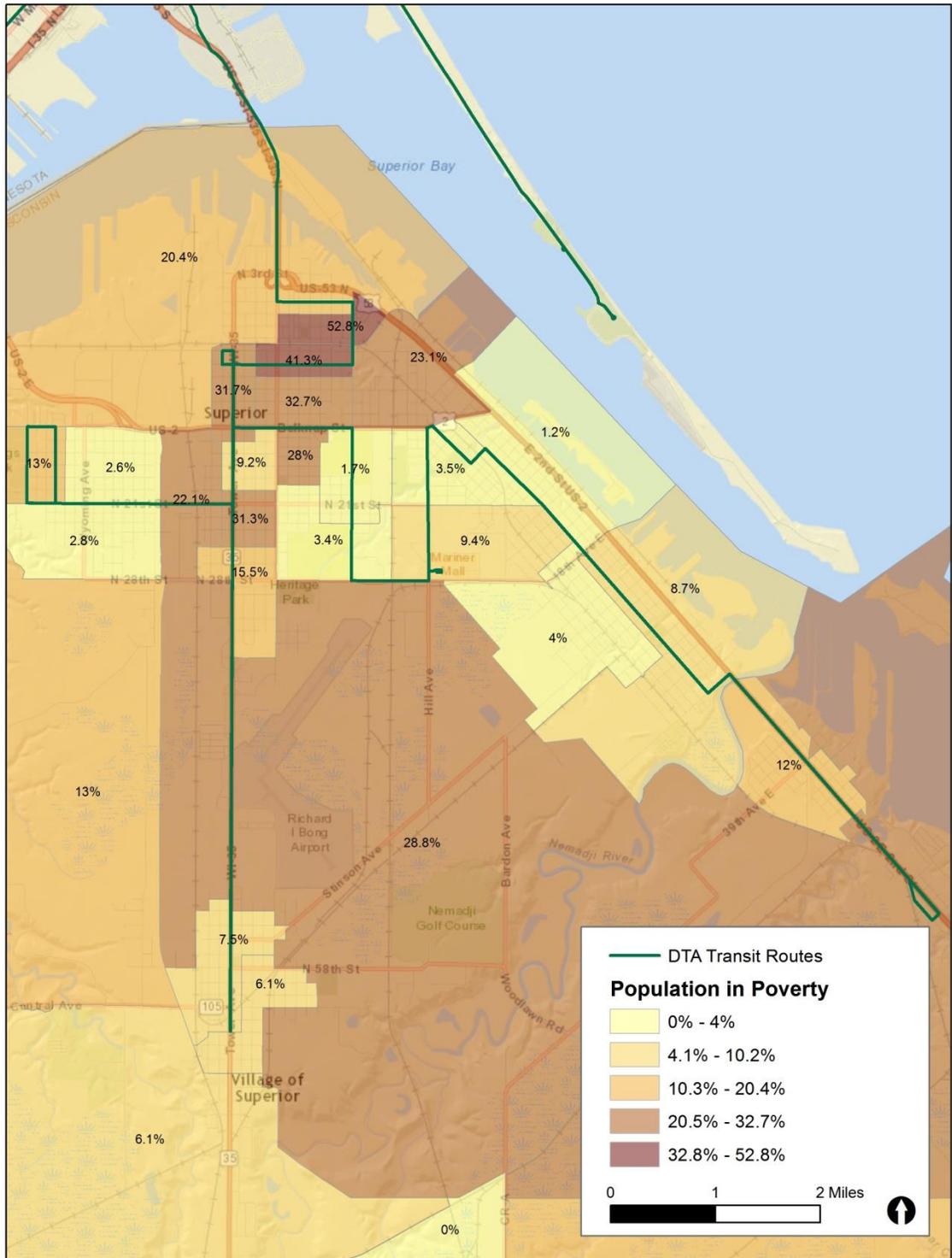
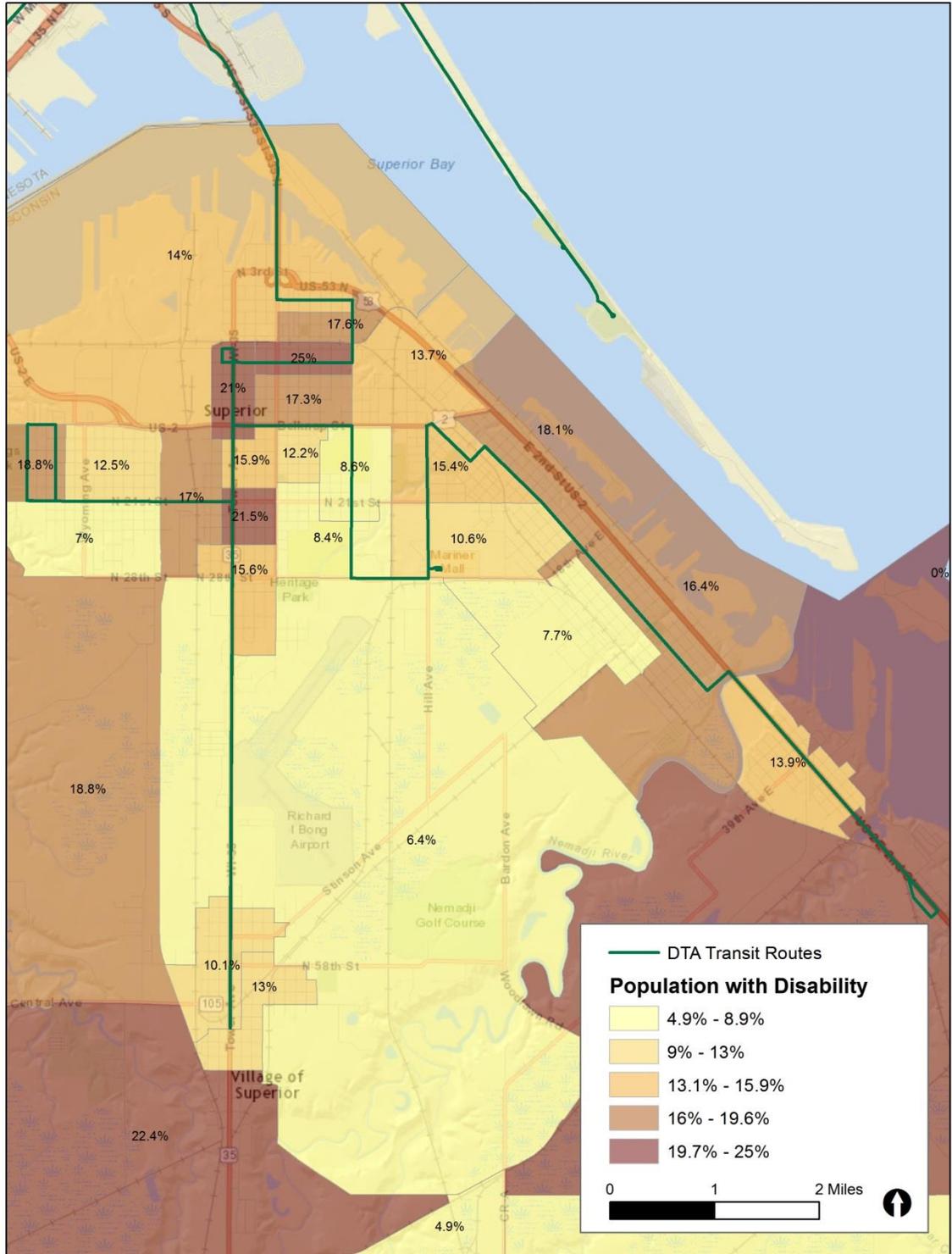
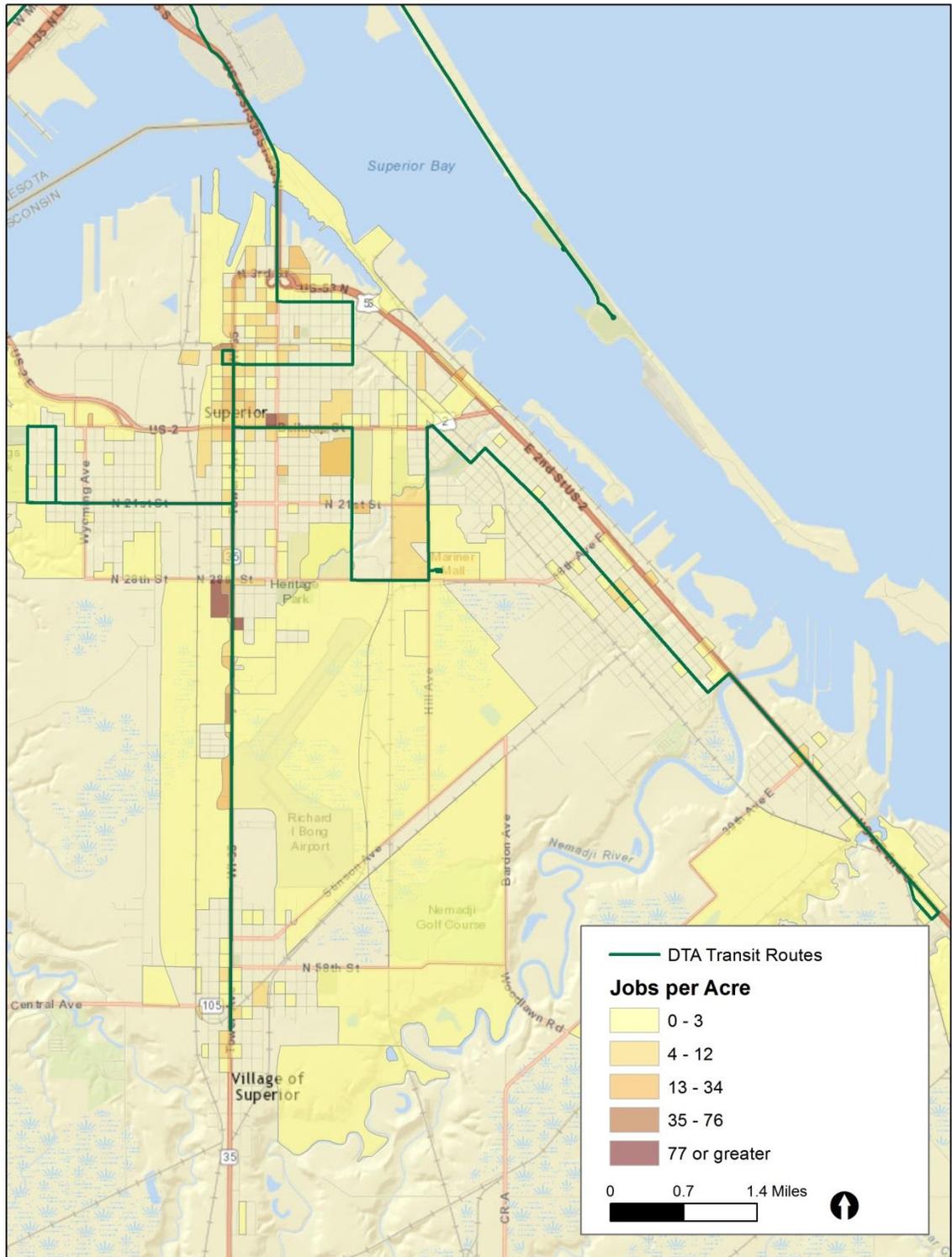


Figure 7. Disability Status



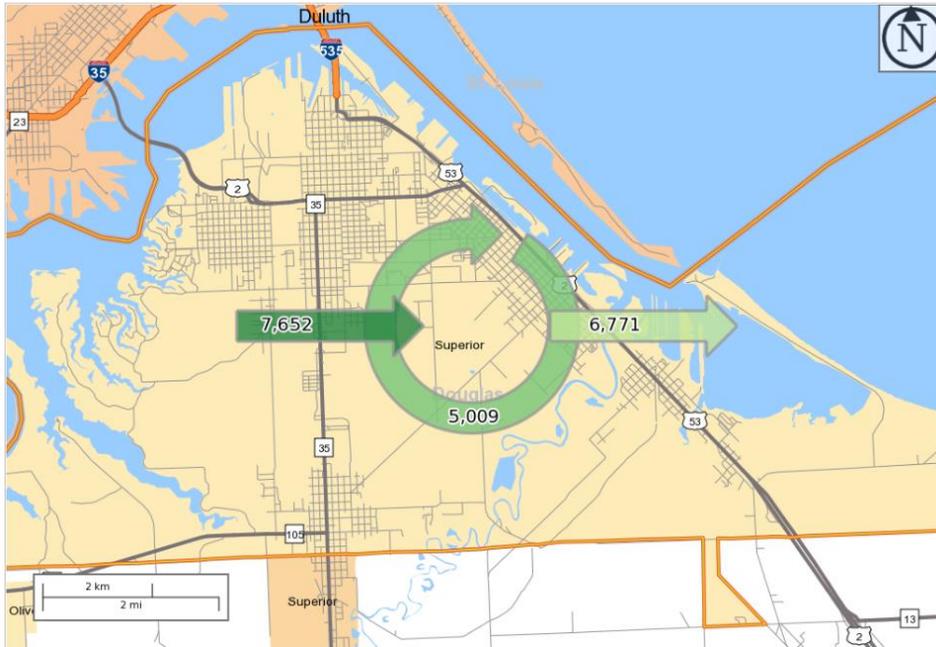
**Figure 8. Employment Density in Superior**



## Workforce Travel Patterns

In the Duluth-Superior Region, approximately 3.9 percent of the population commutes to work using public transit. There are currently approximately 12,661 jobs located within the City of Superior. Of these jobs, approximately 5,009 are occupied by residents of the City of Superior. The remaining workers (7,652) commute to Superior from other communities. About 6,771 people commute from Superior to another community. This is visually represented in Figure 9.

**Figure 9. Workflows in the City of Superior**



DTA provides connectivity between Duluth and Superior, supporting commute trips that are made via transit. Approximately 14 percent of all workers that live in Superior commute to Duluth. Conversely, approximately 7 percent of workers that live in Duluth commute to Superior. A summary of these patterns is provided in Table 3.

**Table 3. Commute Patterns**

Workers that commute from Superior to Duluth	1,798
Workers that commute from Duluth to Superior	3,710
Regional Transit Mode Share	3.9%

## Key Destinations

In addition to assessing the demographic and travel patterns in the previous section one can review key destinations in the City of Superior. In Figure 10, the 25 employers with the most full time employees are mapped, along with the major retail employers in Superior. This includes workplaces that are in the hospitality industry, grocery stores, convenience stores and department stores. All of the mapped employers are listed in Table 4.

**Table 4. List of Major Employers and Number of Full-Time Employees**

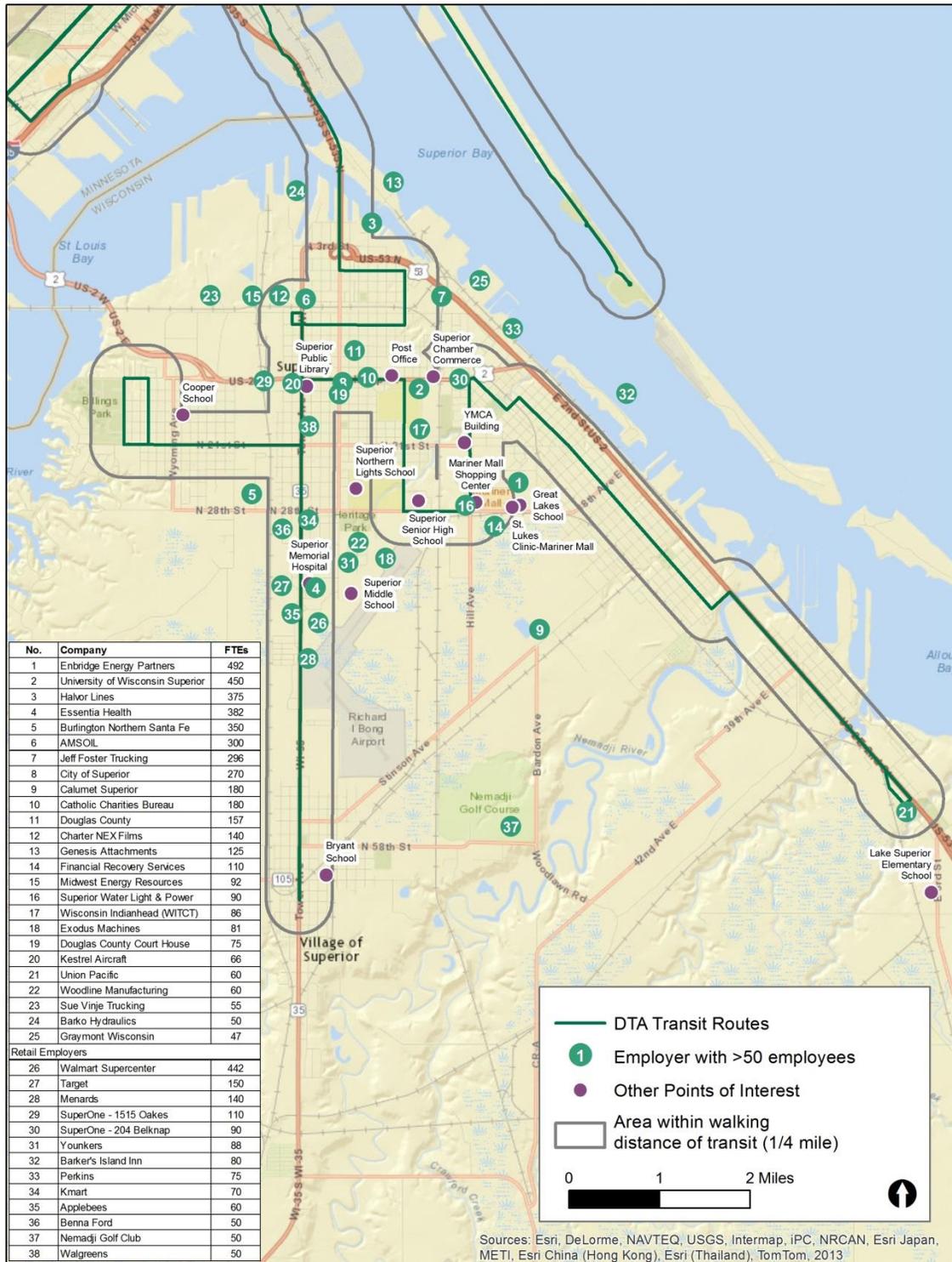
No.	Company	FTEs
1	Enbridge Energy Partners	492
2	University of Wisconsin Superior	450
3	Halvor Lines	375
4	Essentia Health	382
5	Burlington Northern Santa Fe	350
6	AMSOIL	300
7	Jeff Foster Trucking	296
8	City of Superior	270
9	Calumet Superior	180
10	Catholic Charities Bureau	180
11	Douglas County	157
12	Charter NEX Films	140
13	Genesis Attachments	125
14	Financial Recovery Services	110
15	Midwest Energy Resources	92
16	Superior Water Light & Power	90
17	Wisconsin Indianhead (WITCT)	86
18	Exodus Machines	81
19	Douglas County Court House	75
20	Kestrel Aircraft	66
21	Union Pacific	60
22	Woodline Manufacturing	60
23	Sue Vinje Trucking	55
24	Barko Hydraulics	50
25	Graymont Wisconsin	47
Retail Employers		
26	Walmart Supercenter	442
27	Target	150
28	Menards	140
29	SuperOne - 1515 Oakes	110
30	SuperOne - 204 Belknap	90
31	Younkers	88
32	Barker's Island Inn	80
33	Perkins	75
34	Kmart	70
35	Applebees	60
36	Benna Ford	50
37	Nemadji Golf Club	50
38	Walgreens	50

Additionally, major community and civic destinations are mapped in Figure 10. These include schools, city and county facilities, medical facilities, libraries, and post offices.

In general most key destinations in Superior are well served by transit. Superior Middle School and Lake Superior Elementary School both lie outside of the ¼ mile walking distance from a fixed transit route, but aside from these, most public facilities are served.

The majority of employers are also served by transit. The eastern portion of the city includes many docklands, marinas, and a resort that lie on Lake Superior. While this is an employment center, the location below grade or off the street grid poses a challenge for transit access. Additionally some large employers like oil refineries, trucking companies, and the Nemadji Golf Course are outside of the transit service area. Further market research is necessary to determine if the workforce at these locations would benefit from transit service, as most do not have transit supportive employment densities. All of these locations, along with the transit service area, are shown in Figure 10.

Figure 10. Key Destinations in Superior



# Public Transit Service Review

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This section summarizes the existing conditions of DTA operated service in Superior, Wisconsin. This includes the span and frequency of service, ridership patterns, and performance trends. Concurrently with the review of community conditions, this assessment will be used to develop recommendations for the transit system.

## History of Transit Service in Superior

Transit service has changed only slightly over the 38 year history of DTA operations. While various routings have been tried, the core concept has been a good connection to other routes in Duluth; service on Tower Av to South Superior; service through the eastern portions of the community to Itasca; and service to Billings Park. The level of service in terms of total hours and schedule has remained steady.

In 1976 the system was similar to the current system with an additional leg to UWS and Superior High School route variations were identified by a letter suffix to the route name. Route numbers were not used. Service to Itasca was faster with a direct route to downtown via Belknap to the central transfer point at Belknap and Tower. Headways were similar to the current 30 minute peak and 60 minute midday service. There was no evening or Sunday service.

In 1977 there were minor modifications of the routing to UWS and Superior High School. By 1988, Routes 16 and 17 had distinct identities. A circuitous routing variation was introduced to serve Mariner Mall on Route 16. The leg to UWS and Superior H.S. was operated as part of Route 17.

In 2001, the current route structure was adopted and Sunday service was added. Intervals and span of service remained the same. The northern portion of the community was served with its current pattern of Route 16 that goes east to Broadway and Catlin, then west to downtown, then east and south to UWS, then north and east to Itasca. The Route 17 service to UWS was dropped and the area picked up by the new Route 16.

The 2003 COA examined the Superior network and developed a concept where Route 16 was essentially unchanged and Route 17 consisted of three loop routes. It was determined that this route structure might be more effective for internal circulation, but each loop would operate at 60 minute intervals. It was the consensus of those involved in this planning process that the changes would be difficult for many passengers to understand and accept if additional financial support was not supplied to maintain a 30 minute peak service on the new route structure. As a result, the recommended changes were not implemented.

## Review of Transit Services

### Route 16

Route 16 connects the central, east, and southeast portions of Superior with Downtown Superior and Duluth. It is a very busy route on its northern portion between University of Wisconsin – Superior (UW-S) and downtown Duluth. Travel is bi-directional, with peak direction travel to Duluth and reverse commuters to Superior. It also serves a local intra-Superior travel function for trips with origins and destinations in Superior. Route 16 connects conveniently with Route 17 for local trips within Superior. The route is often through-routed with Route 12 in Duluth, which provides a direct, no-transfer service to University of Minnesota – Duluth (UMD).

The round-trip route mileage for Route 16 is 28.5 miles, and each trip is allocated 96 minutes in the morning, 105 minutes in the midday, and 107 minutes in the afternoon for a round trip. This includes recovery time at the south end, and no recovery in downtown Duluth. Approximately 7.65 miles is considered high-speed service, from Downtown Duluth to 5th Street in Superior. There is schedule variation by time of day, which indicates a “best practices” policy on scheduling that reflects actual travel times. However, the average speeds are relatively high. The table below (Table 6) shows the average scheduled speed at different times of day.

**Table 5. Route 16 Run Time and Speeds**

Time of Day	Round Trip Mileage	Cycle Time (min)	Average Speed (mph)
Morning	28.5	96	17.8
Midday	28.5	105	16.3
Afternoon	28.5	107	16.0

A common measure for bus stop spacing is  $\frac{1}{4}$  mile, or 1320 feet between bus stops in each direction. There are occasions where, due to physical barrier or areas of high demand, that bus stops are spaced closer together or farther apart. In general,  $\frac{1}{4}$  mile is an accepted measure for the distance people are willing to walk to reach transit. In Superior, average spacing of bus stops on Route 16 is 584 feet. Over 80 percent of the bus stops are less than 700 feet apart; approximately 15 percent of bus stops are between 700 and 1500 feet apart, and approximately 5 percent of bus stops are greater than 1,500 feet apart. Stop locations for Route 16 are shown in Figure 11.

Figure 11. Route 16 Stop Locations



## Route 17

Routes 17, 17B, and 17S connect the Tower Avenue corridor and Billings Park neighborhood with downtown where transfers can be made to Route 16. During peak periods, two buses are operated on the route. Route 17B and 17S operate during peak periods, and Route 17 operates during the midday on weekdays from approximately 9:15am to 2:38pm, at 60-minute intervals. On Saturdays and Sundays, Route 17 operates with a few variations to improve reliability.

Route 17 serves a combination of residential and commercial areas and the 16.9 mph speed is high. The longer distance and higher average speed on Route 17 occurs because the route makes two passes through Billings Park, both northbound and southbound. This includes stretches of the route that passes over rail yards and industrial areas with little pedestrian access, and therefore no bus stops. Route 17B and 17S have an average combined speed of 15.2 mph. Route 17B has an average speed of 12.3 mph as it travels through many residential areas with lower speed limits and more stop signs and intersection. While the 18.0 mph speed on Route 17S may seem reasonable because it is primarily arterial, the time distribution between the timepoints may not be optimized. Travel speeds are summarized in Table 6.

**Table 6. Route 17 Run Time And Speeds**

Route	Round Trip Mileage	Cycle Time (min)	Average Speed (mph)
17	16.91	60	16.9
17S	8.98	30	18.0
17B	6.16	30	12.3

During the middle of the day only one bus is on Route 17, and it operates as a combination of both peak routes. Ridership is highest during the day when there is only one bus providing 60-minute headway service, and the route is longer than the sum of Route 17S and Route 17B, due to serving Billings Park in both directions and a midday routing to Walmart and Target. The service deployed right now has a higher supply of transit during traditional morning and afternoon peak periods, however the ridership peaks midday.

In Superior, average spacing of bus stops on Route 17 is 604 feet. Over 80 percent of the bus stops are less than 700 feet apart; approximately 15 percent of bus stops are between 700 and 1500 feet apart, and approximately 5 percent of bus stops are greater than 1,500 feet apart. Stop locations for Route 17 are shown in Figure 12.

Figure 12. Route 17 Bus Stops



## Route Utilization

Alighting passengers (passengers disembarking vehicles) is a good indicator of ridership patterns. The following figures (see Figures 13-24) show ridership patterns on Route 16 and Route 17 as the service progresses throughout the day. Most trips occur in the morning and midday. This is typical of traditional work trips, as well as part-time work trips and social service trips. Many jobs in retail, hospitality, and service industry have start times that are midday and closing times that are in the evening. It is also indicative of university and school-related travel where peak travel times reflect class start times that are mid-morning and early afternoon. The afternoon ridership level (after 4:00pm) does not correspond with traditional peak travel, which is another indicator of part-time workers, social service trips, medical trips, and university-related travel.

Figure 13. Route 16 Weekday Inbound Ridership by Time of Day

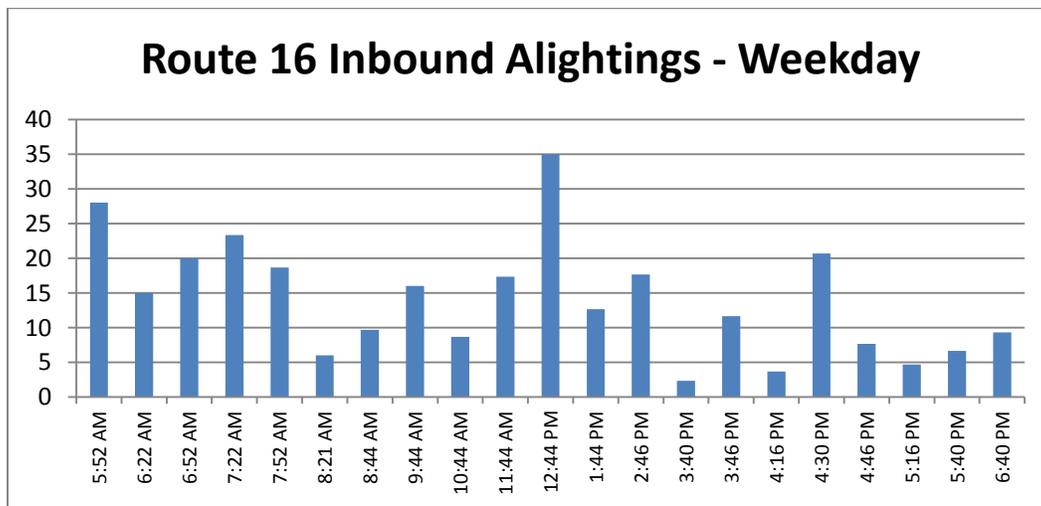


Figure 14. Route 16 Weekday Outbound Ridership by Time of Day

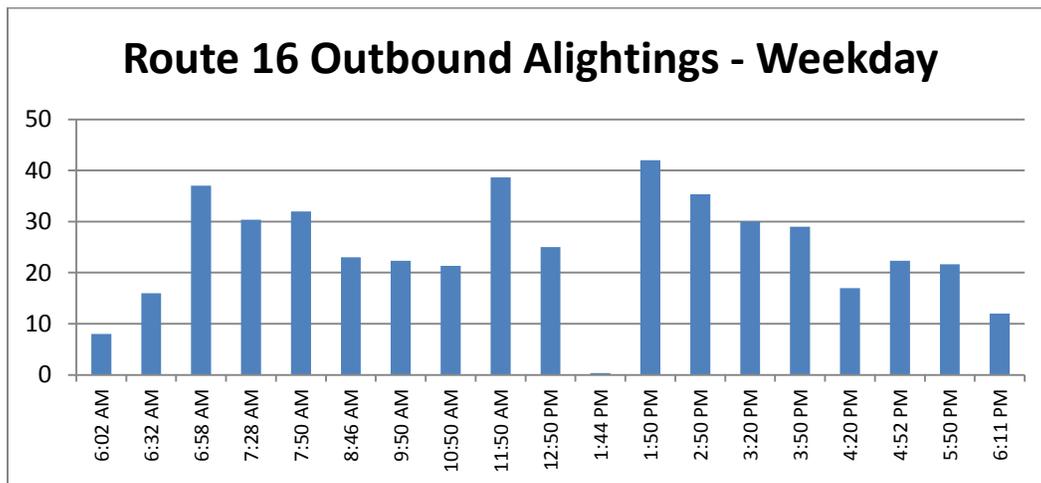


Figure 15. Route 16 Saturday Inbound Ridership by Time of Day

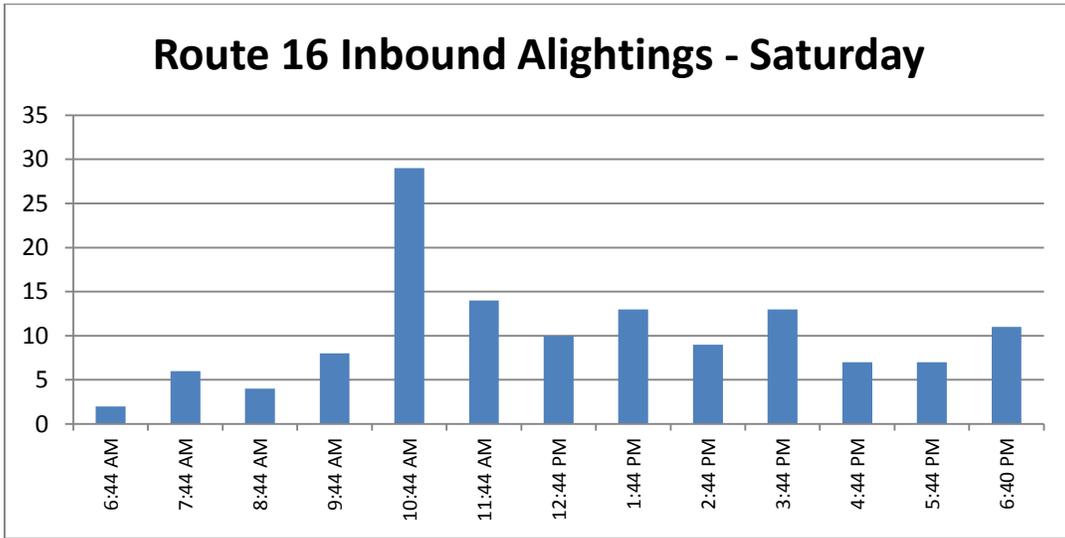


Figure 16. Route 16 Saturday Inbound Ridership by Time of Day

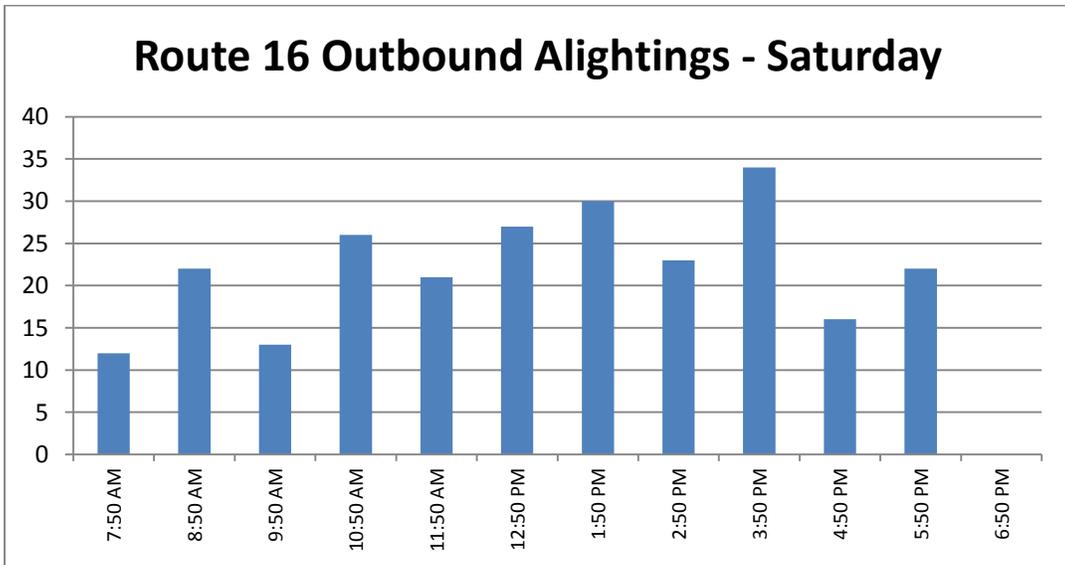


Figure 17. Route 16 Sunday Inbound Ridership by Time of Day

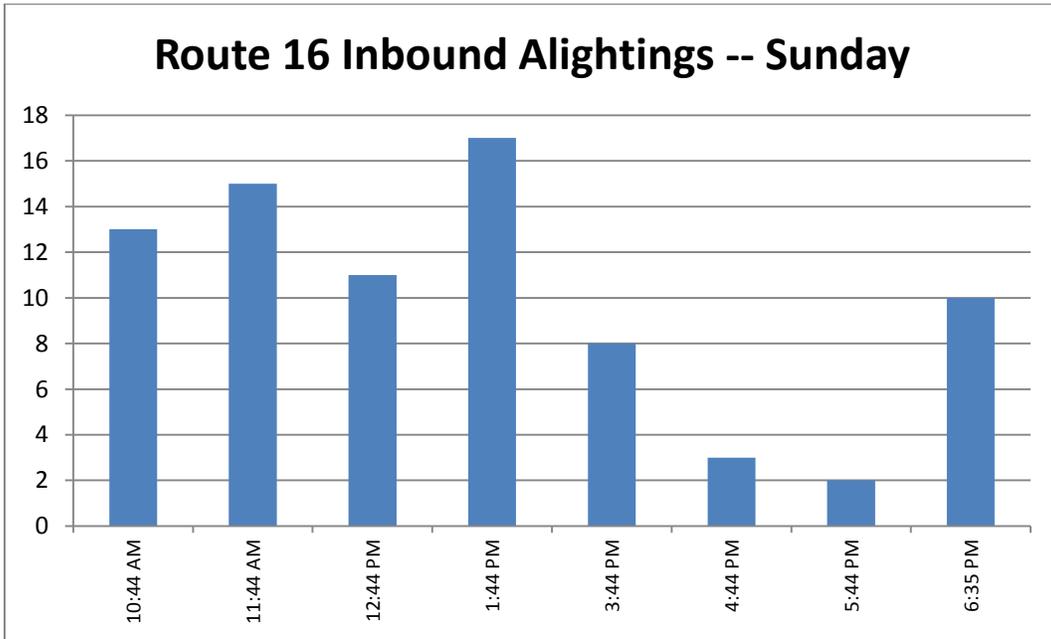


Figure 18. Route 16 Sunday Outbound Ridership by Time of Day

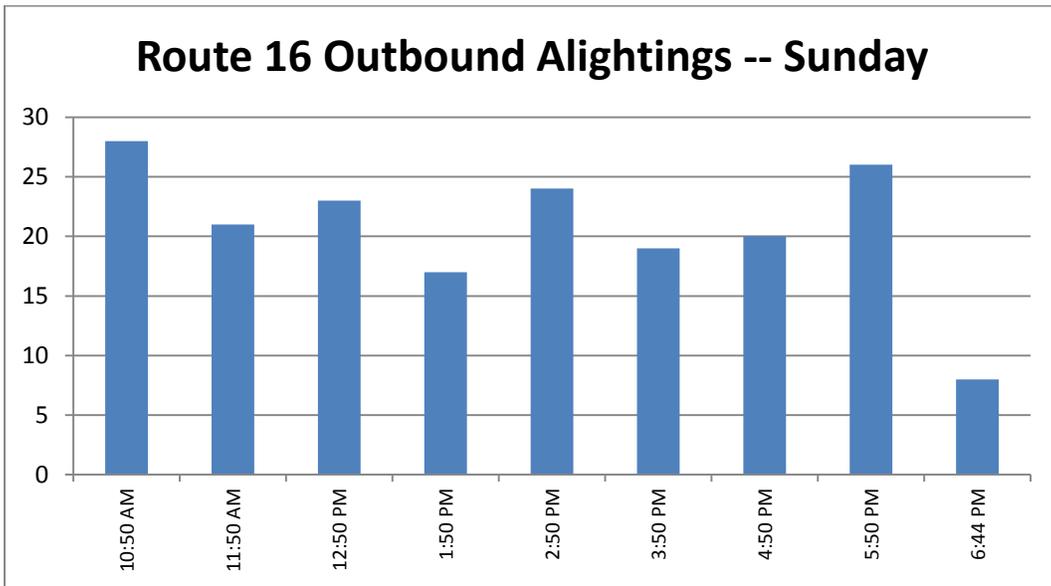


Figure 19. Route 17 Weekday Inbound Ridership by Time of Day

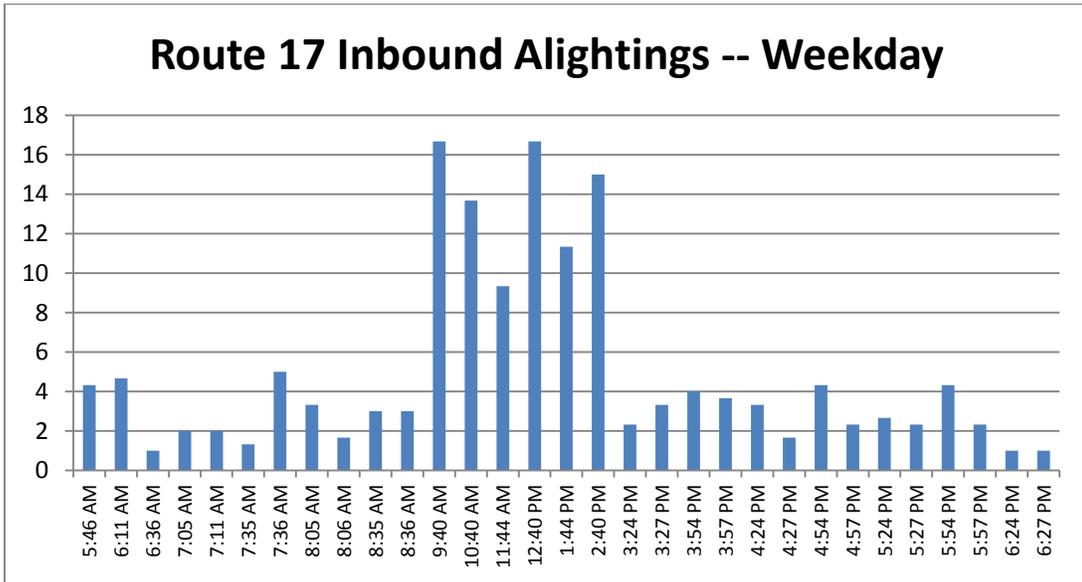


Figure 20. : Route 17 Weekday Outbound Ridership by Time of Day

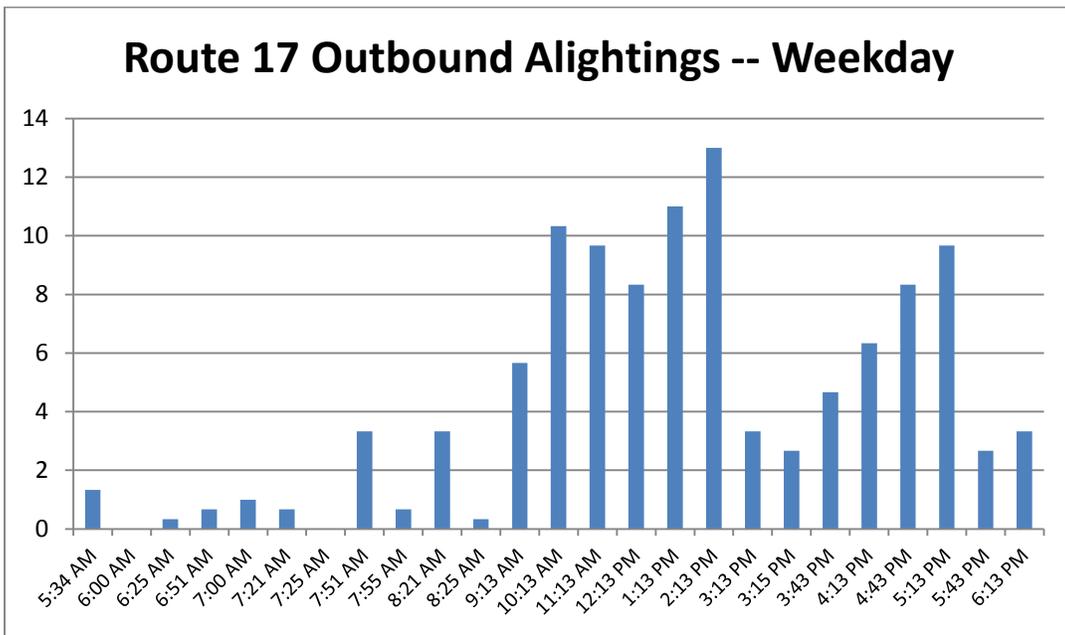


Figure 21. Route 17 Saturday Inbound Ridership by Time of Day

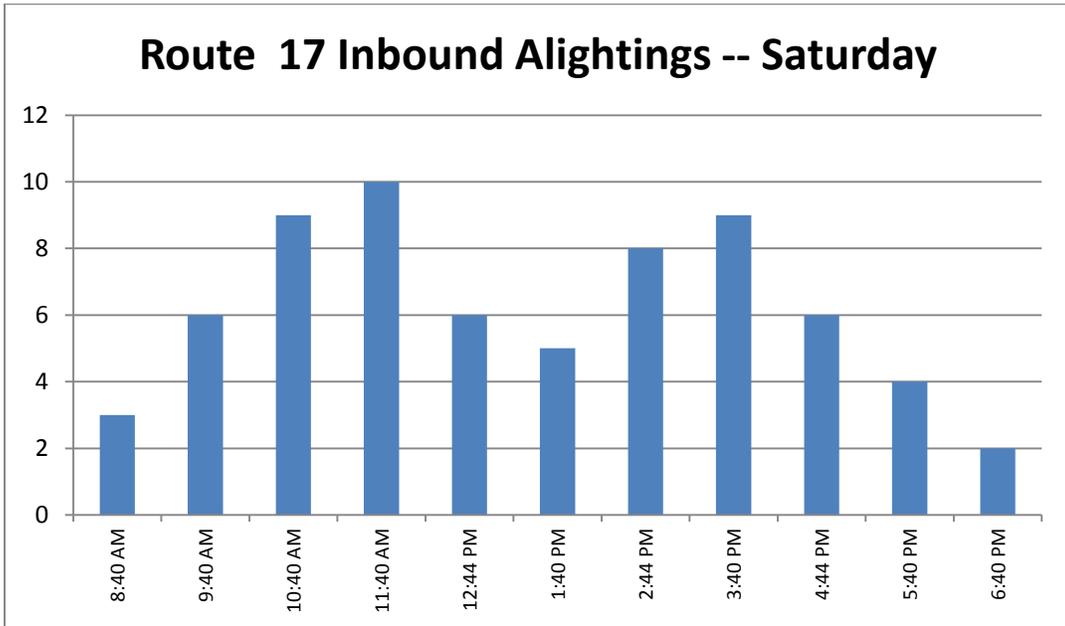
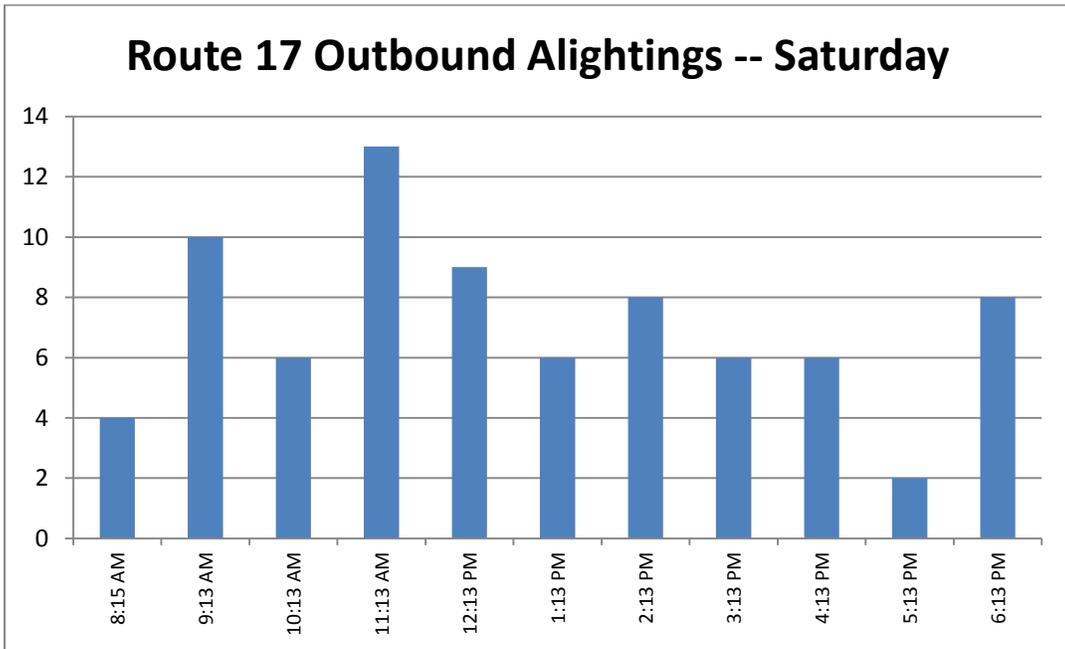
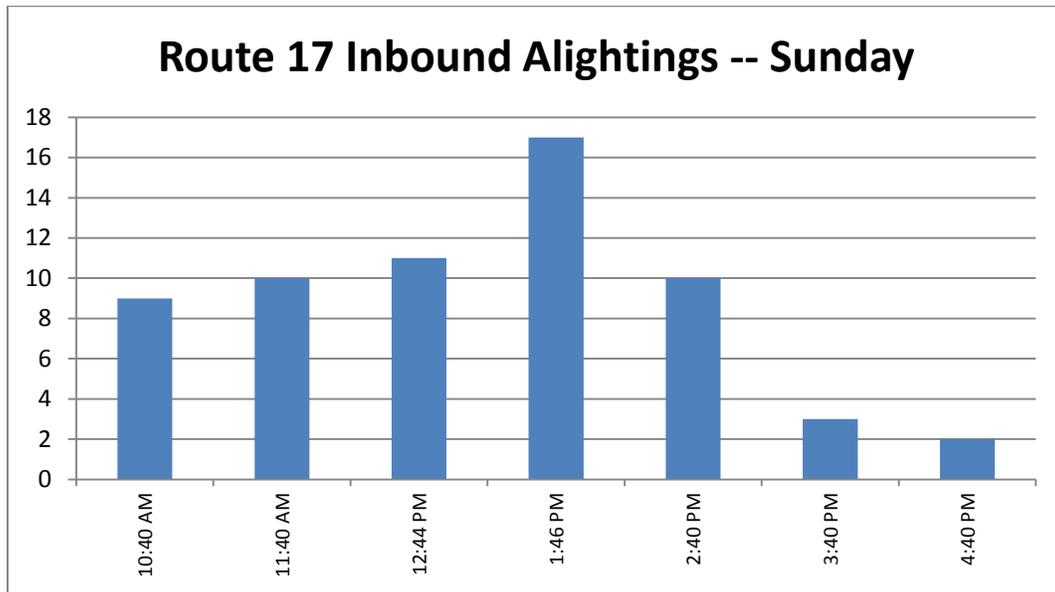


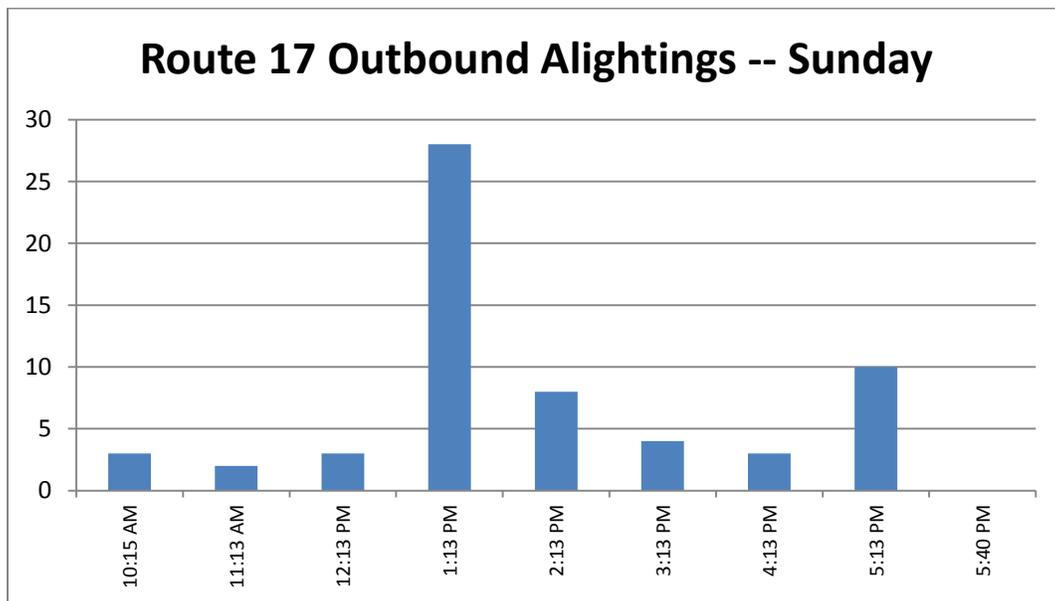
Figure 22. Route 17 Saturday Outbound Ridership by Time of Day



**Figure 23. Route 17 Sunday Inbound Ridership by Time of Day**



**Figure 24. Route 17 Sunday Outbound Ridership by Time of Day**



On Route 16, ridership data shows 203 alightings per weekday between Mariner Mall and Duluth, and only 29 alightings between Mariner Mall and Itasca. The portion of the route with the highest ridership is between Mariner Mall and Duluth, which carries 90.1% of all passengers. Less than 10% of route ridership occurs between Mariner Mall and Itasca.

Ridership levels reflect the transit supportive densities and demographics of northern Superior. These indicators are less apparent south of Mariner Mall. Route 16 is a well-designed route that connects jobs, educational facilities, and commercial areas with residential areas. Its current ridership is appropriate for the demographic factors that

generate transit ridership. Its weakness in terms of rider generation is the south end of the route where there are fewer key transit destinations and lower population densities. A map showing the geographic distribution of ridership is shown in Figure 25

Route 17 is characterized by its high midday ridership. The combined route provides direct service from Billings Park to the Walmart, Target, St. Mary's Hospital commercial area (near South Superior) on South Tower. During the peak period, passengers must ride north on Route 17B to 10th and Tower and then ride south on Route 17S to reach their destination. The midday Route 17 provides direct access from Billings Park to the main commercial area on near South Superior. Geographic distribution of ridership on Route 17 is shown in Figure 26.

Figure 25. Route 16 Ridership Patterns

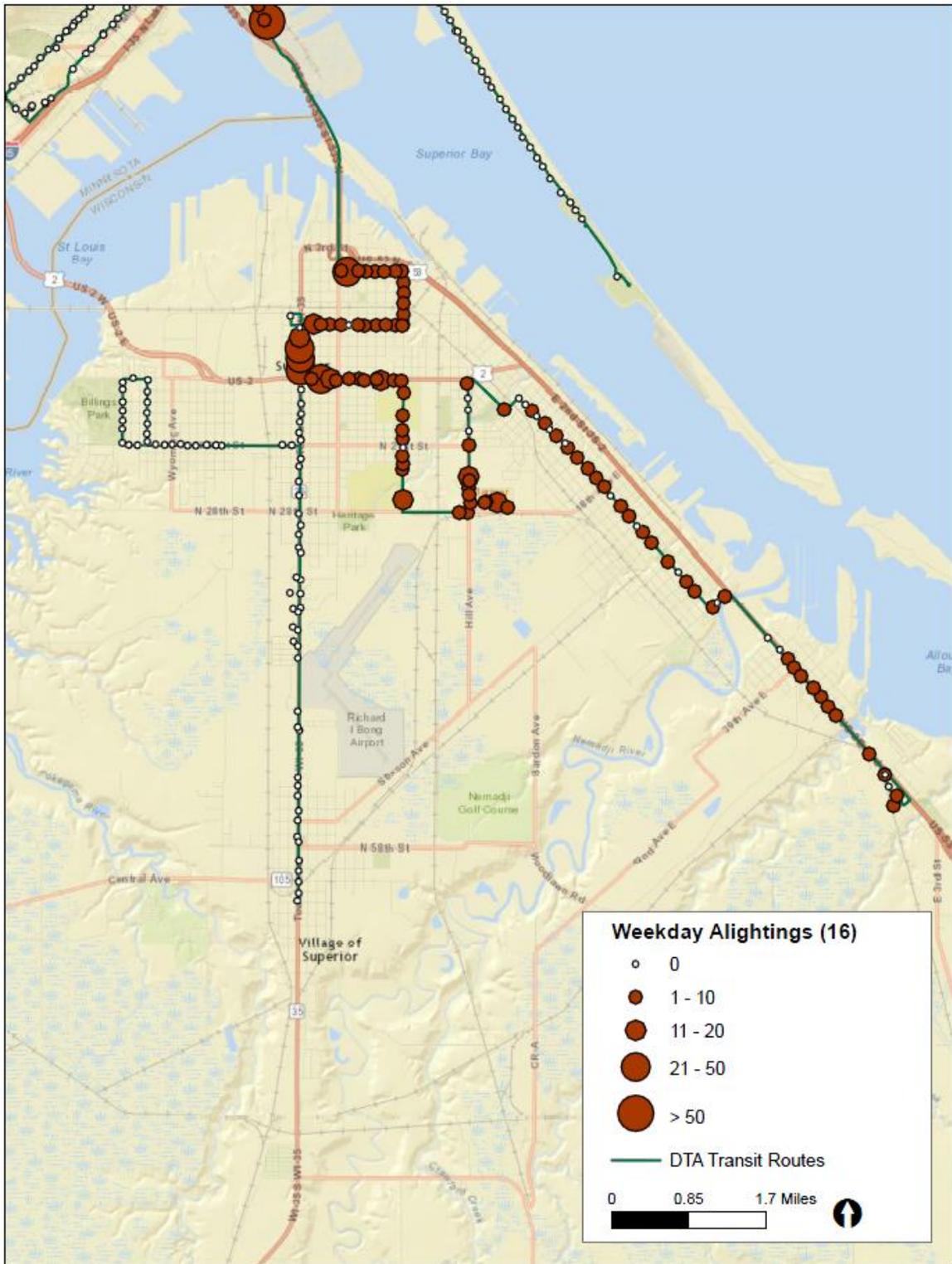
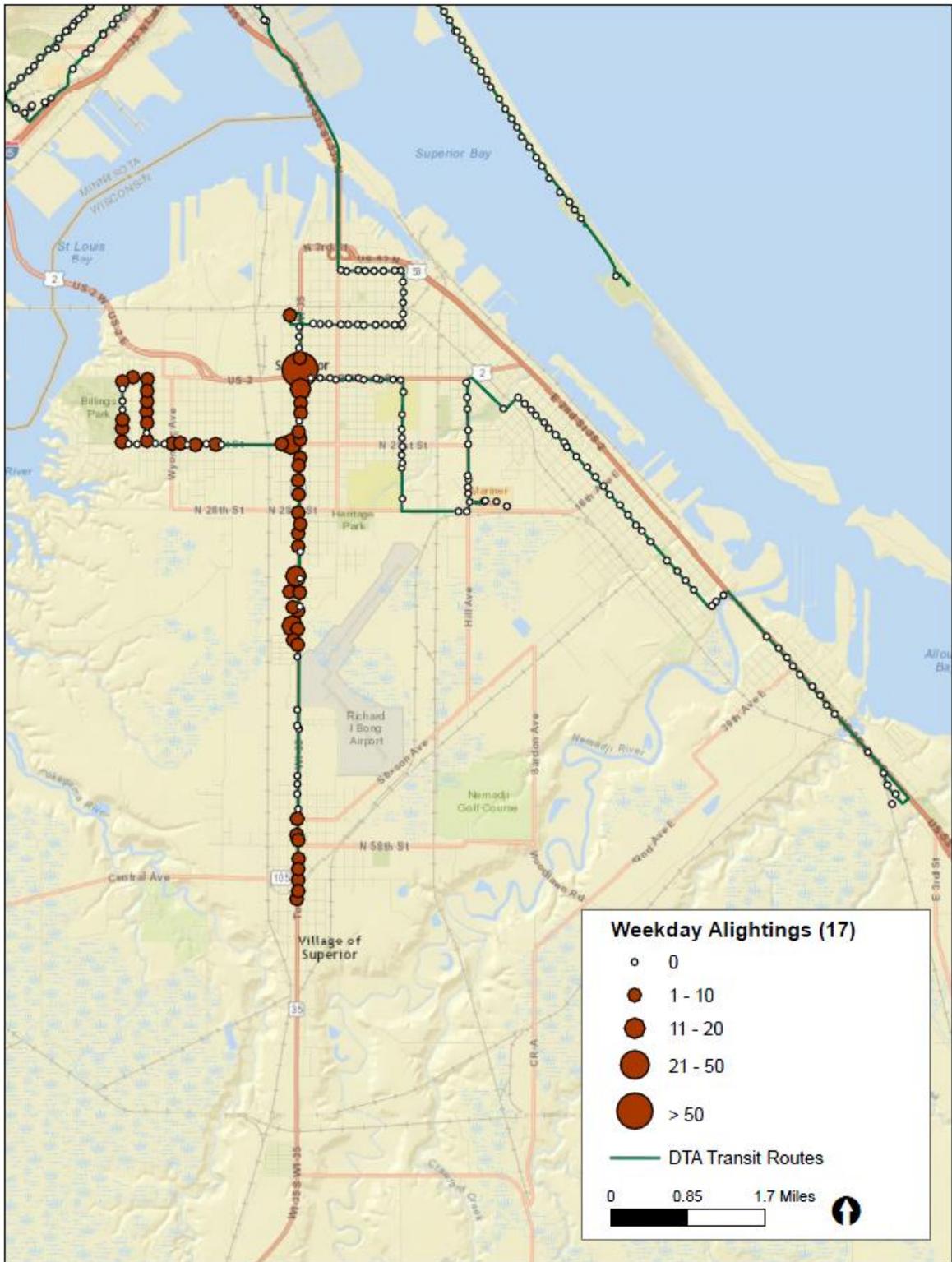


Figure 26. Route 17 Ridership Patterns



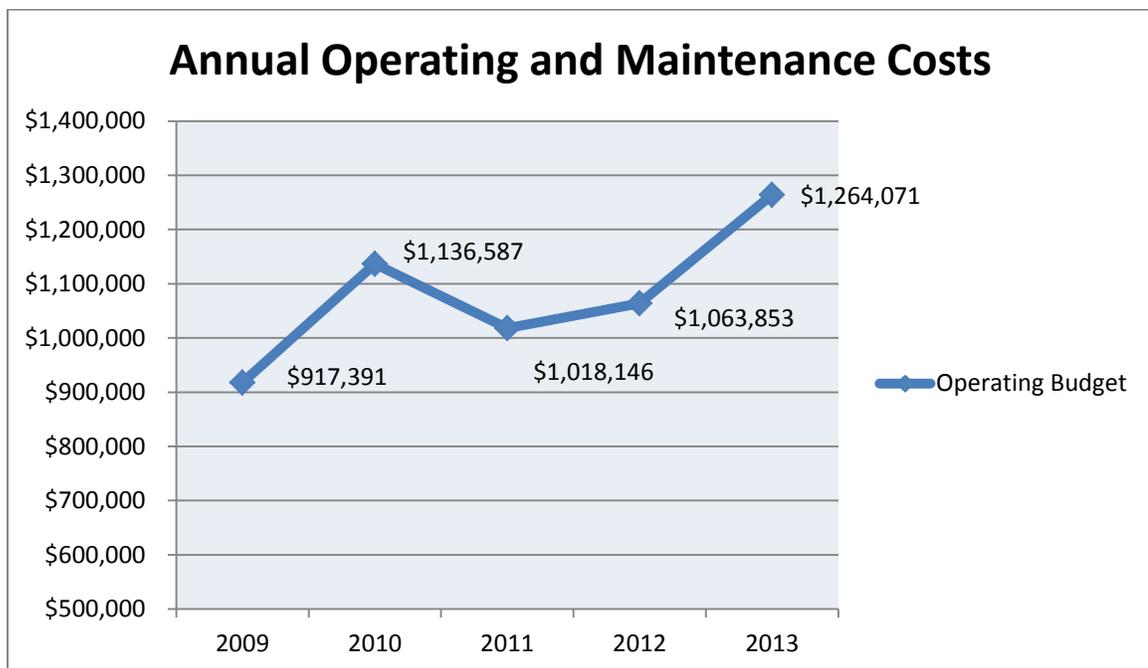
## Performance Assessment

In this section recent performance data for DTA service in Superior is summarized. Trends will be reviewed in the following areas:

- Operating Costs
- Ridership
- Passenger Revenue
- Route Mileage (Revenue Miles)
- Service Hours

Data in this section was collected from City of Superior applications for WisDOT public transit operating assistance. In 2013 operating costs for Superior transit service was approximately \$1.27 million. Since 2009, operating costs have increased approximately 38 percent. The five-year trend is shown in Figure 27.

**Figure 27. DTA Superior Service Operating Costs**



In 2013 annual ridership on Superior bus routes was 136,473. This represents a decline from the 2009 ridership total of 172,470 trips, a 21 percent reduction in ridership (see Figure 28). While ridership has declined steadily, passenger revenue has been quite inconsistent over the past five years. Revenue is shown in total dollars (see Figure 29) and as the operating ratio (see Figure 30). The operating ratio is the percentage of total operating expenses that is covered by fare revenue. 2013 presented an all-time low for operating ratio of approximately 9 percent. Although, this is presented as aggregated passenger revenue for Superior service, and might not account for passes, agency fares, or other types of fare media.

Figure 28. Year-to-year Superior Transit Ridership

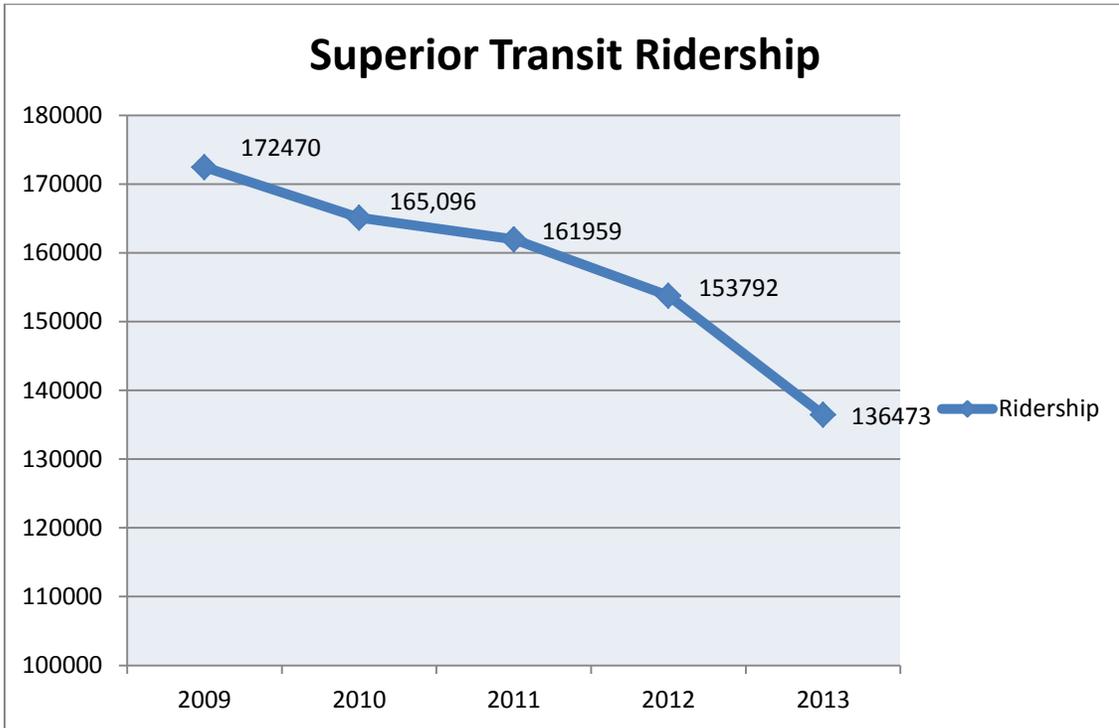
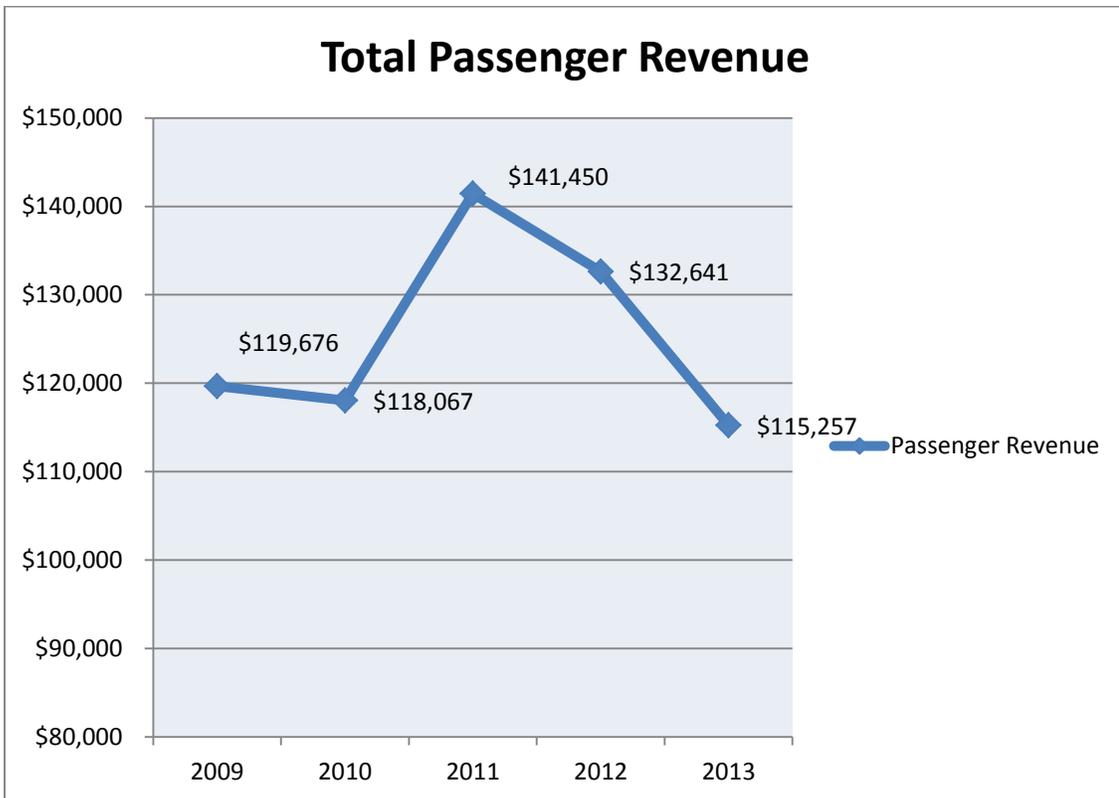
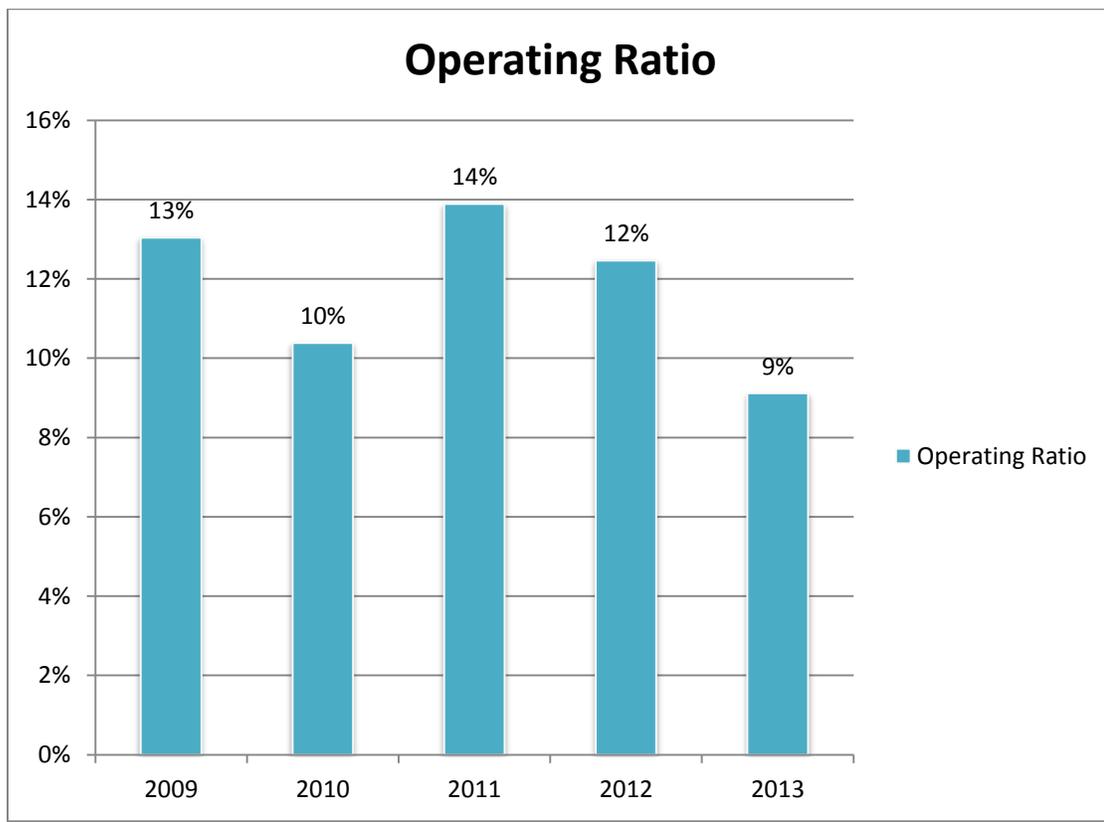


Figure 29. Superior Transit Passenger Revenue



**Figure 30. Superior Transit Operating Ratio (Farebox Return)**



The amount of transit service that is deployed in Superior is described in terms of revenue miles and revenue hours. The measure of revenue miles addresses both geographic coverage and intensity of service, and revenue hours generally indicates frequency and span of service. In 2013, DTA provided 273,348 miles of service on behalf of the City of Superior and approximately 16,000 revenue hours. Year-to-year trends for these measures are shown in Figures 31 and 32.

Market penetration measures how well the current transit operations serve the transit consumers in Superior. Passengers per capita and revenue hours per capita are measures of market penetration. The measure of passengers per capita assesses at how well a market is being served from the perspective of consumption, and revenue hours assesses service in terms of production. In 2011 DTA carried 6.3 passengers per capita. In other words, the average citizen of Superior boarded DTA 6.3 times. The State of Wisconsin average for small urban bus systems is 9.8 passengers per capita, and the City of Superior is below this average, but within one standard deviation (an acceptable range). In Superior, DTA provides 0.57 hours of service per person. This is slightly above the State of Wisconsin average of 0.54 hours of service per person. Subsequent sections of the report include adjustments to service span that may improve performance.

Figure 31. Annual Transit Revenue Miles



Figure 32. Superior Annual Revenue Hours

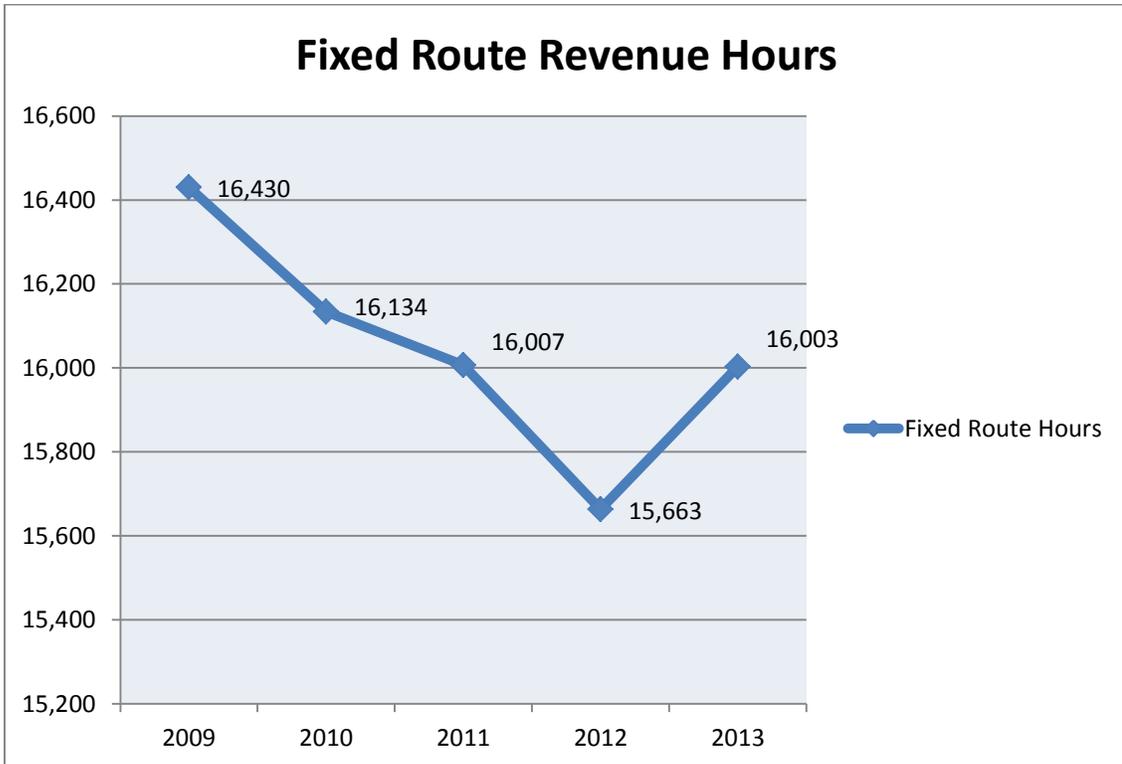


Figure 33. Market Penetration, Revenue Hours per Capita

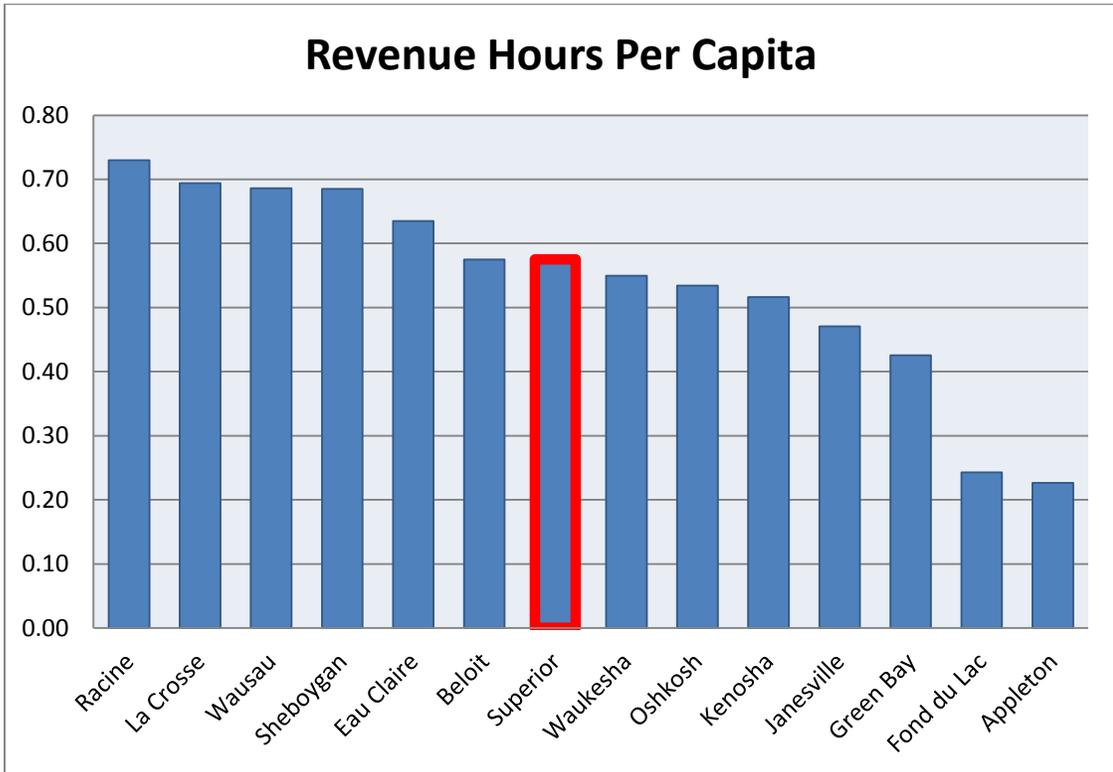
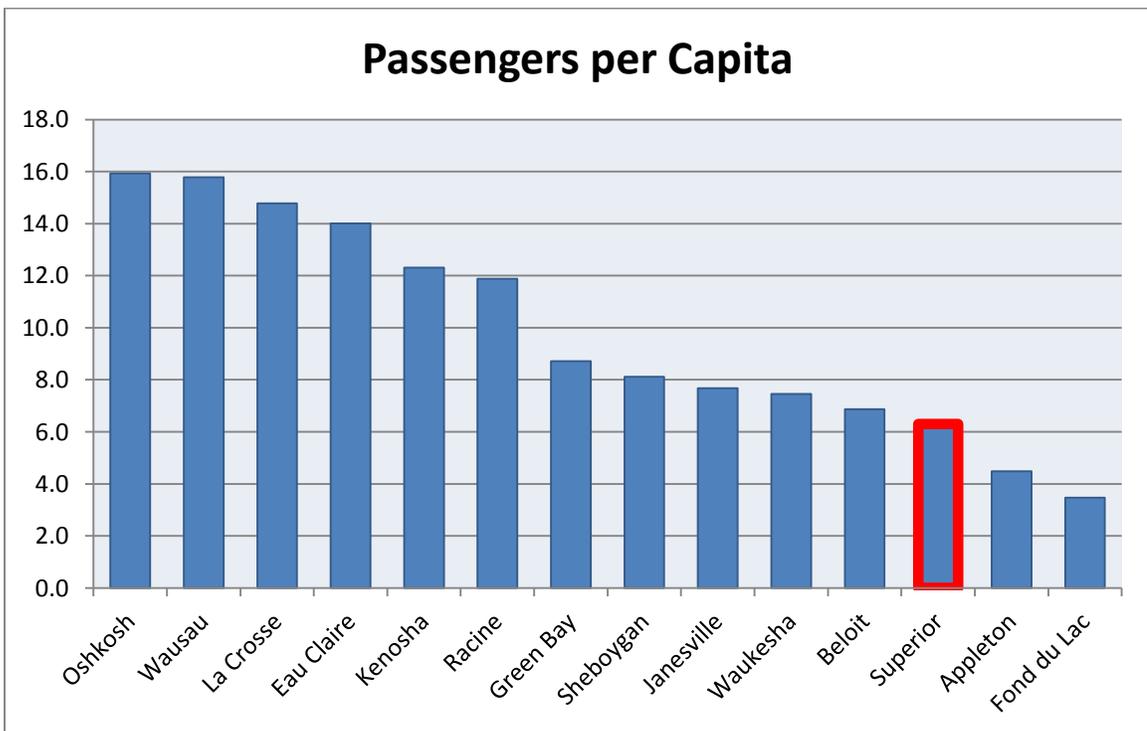


Figure 34. Market Penetration: Passengers per Capita



## Level of Service Assessment

The Transit Cooperative Research Program (TCRP) has developed a grading system for Levels of Service (LOS) for transit service in TCRP Report #100. It is similar to the LOS standards commonly used in evaluating highway performance. Four of the standards reflect the service provided by the City of Superior and two reflect the delivery of service by DTA. Service frequency; hours of service; travel time comparison; and area coverage are established by the design of the system as it is currently funded. On-time percentage is directly related to the performance of the system by DTA and indirectly by the schedule/route design. Load factor can be adjusted by the size of the bus used and indirectly by the frequency of service.

The grades for Routes 16 and 17 are shown in the tables below (see Tables 7 and 8). Service frequency and the span of service reflect the attractiveness to the system and whether passengers can spend a reasonable amount of time to access the service. Long intervals are not attractive to people making work trips as it may require up to a 55 minute wait before or after their work shift. The “hours of service” limitations affect whether there is a bus available for shifts outside of the traditional daytime work hours. Currently frequencies on the Superior routes are 30 minutes during traditional commute times and 60 minutes during other parts of the day. TCRP would indicate this to be an LOS in the D-E range. DTA does offer some service outside of normal business hours in Superior, but no late night service. TCRP would indicate this to be an LOS in the C-D range.

**Table 7. Level of Service: Frequency and Span**

Service Frequency			Hours of Service		
LOS	Interval (min)	Comments	LOS	Hours of Service	Comments
A	<10	Passengers don't need Schedules	A	19-24	Night or “owl” service
B	10-14	Frequent service, passengers consult schedules	B	17-18	Late evening service
C	15-20	Max. wait time if bus is missed	C	14-16	Early evening service
D	21-30	Service unattractive to choice riders	D	12-13	Daytime service
E	31-60	Service is available	E	4-11	Peak hour service only or limited service
F	>60	Service is unattractive	F	0-3	Very limited service
<b>C-E</b>	<b>Route 16 LOS</b>		<b>C</b>	<b>Superior LOS</b>	
<b>E</b>	<b>Route 17 LOS</b>				

The travel time difference between bus and auto is another factor affecting people making a decision between transit and other modes. Linear routes generally have a higher grade while circular routes or routes with many variations often have lower scores. In this report, travel times listed in DTA schedules were compared with the travel time indicated for the routes on Google Maps. Route 16 achieves an LOS of B, as the northern portions of the route is fairly direct and offers travel times that make it reasonable competitive with an automobile. Route 17 is a more circuitous route with several deviations, and achieves an LOS of E when compared with auto travel times.

Service area coverage measures how much of the community has convenient transit service available, and if major origins and destinations have service. Well over 90 percent of the transit supportive areas in Superior are located within ¼ mile of public transit. Coverage is therefore graded as excellent, and receives the grade of LOS A

**Table 8. Level of Service: Travel Time and Coverage.**

Bus Vs. Auto Travel Time Difference			Service Area Coverage		
LOS	Travel Time Difference	Comments	LOS	Hours of Service	Comments
A	<0	Faster by transit than by automobile	A	90-100%	Virtually all destinations served
B	1-15	About as fast by transit as by automobile	B	80-89.9%	Most destinations served
C	16-30	Tolerable for choice riders	C	70-79.9%	¾ of higher density areas served
D	31-45	Round trip at least an hour longer by transit	D	60-69.9%	2/3 of higher density areas served
E	46-60	Tedious for all riders	E	50-59.9%	½ of higher density areas served
F	>60	Unacceptable for most riders	F	<50%	Less than ½ of higher density areas served
<b>B-E</b>	<b>Superior LOS (varies by origin location)</b>		<b>A</b>	<b>Superior LOS</b>	

## DTA Performance Standards

DTA uses a set of performance measures to evaluate the efficiency and effectiveness of its transit service. These measures are used to make future transit development decisions, and to manage the financial resources associated with each route. The performance measures are as follows:

- Average ridership per day
- Average ridership per trip

- Percent of the elderly population served by route
- Percent transit dependent population served by route (zero vehicle households, poverty status)
- Operating deficit per passenger
- Revenue efficiency

The intent of these measures is to balance cost efficiency with areas of critical need. Each DTA route is ranked in each category. These rankings are then aggregated to produce an overall ranking. In 2012 Route 16 was ranked second in terms of overall performance, and Route 17 was ranked thirteenth. This represents a decline on one ranking for each route since 2008. Of note is that Route 17 has the greatest ridership per trip, and Route 16 has the highest percentage of older adults and transit dependent individuals served. Route 16 ranks comparatively low in the efficiency measures, whereas Route 17 is consistently in the top half. In Tables 9 and 10 a comparison of DTA performance rankings for 2008 and 2012 are summarized.

**Table 9. DTA Performance Rankings (2008)**

	<b>2008 TDP RANK</b>	<b>TRIPS</b>	<b>Average Ridership Per Day</b>	<b>Average Ridership Per Trip</b>	<b>Percent Elderly</b>	<b>Percent Transit Dependent</b>	<b>Deficit Per Passenger</b>	<b>Revenue Efficiency Ratio</b>
<b>Dul./Superior-Itasca</b>	1	21.0	976	1	10	8	3	3
Woodland - East 4th	2	34.0	1,438	4	11	14	1	1
East 8th - UMD	3	36.0	1,164	5	12	12	2	2
Dul. Hts.	4	30.5	943	8	8	4	7	7
West to the Mall	5	11.0	343	7	4	2	12	12
Mainline UMD	6	30.0	1,352	3	16	13	4	4
Kenwood	7	22.5	807	6	13	11	5	5
Piedmont	8	23.0	353	11	2	6	11	11
#14 -W 4th Blvd.-Eklund	9	12.0	160	13	3	17	6	6
West Mainline	10	54.0	2,449	2	14	9	10	10
Ramsey-Ral	11	18.5	260	12	5	3	13	13
<b>Billings-South Combo</b>	12	32.0	211	14	1	1	15	15
Lakeside Park	13	26.0	728	10	17	7	9	9
#18 - Campus Park	14	16.5	499	9	18	18	8	8
Proctor*	15	22.0	120	16	9	5	16	16
Fitzgers	16	13.0	32	18	7	15	14	14
#15 - Park Point	17	29.0	113	17	6	16	17	17
Fond Du Lac*	18	4.0	6	19	15	10	18	18
#20 Cirrus - UHC	19	9.0	52	15	19	19	19	19

Table 10. DTA Overall Performance Rankings (2012)

**2012  
TDP  
RANK**

- 
- 1 Woodland - East 4th
  - 2 **Dul./Superior-Itasca**
  - 3 Kenwood
  - 4 East 8th - UMD
  - 5 West to the Mall
  - 6 Dul. Hts.
  - 7 West Mainline
  - 8 Mainline UMD
  - 9 Lakeside
  - 10 Ramsey-Ral
  - 11 #14 -W 4th Blvd.-Eklund
  - 12 Piedmont
  - 13 **Billings-South Combo**
  - 14 #18 - Campus Park
  - 15 Proctor\*
  - 16 #15 - Park Point
  - 17 Fond Du Lac\*
  - 18 #20 Cirrus - UHC

## Field Observations

### Bus Stops and Pedestrian Access

The built transit environment in Superior is adequate and supportive of the existing operations. As mentioned in an earlier section, bus stop locations are spaced fairly close together. DTA standards require a minimum spacing of 700 feet, and 80% of stops in Superior are below the recommended spacing. Usage at many of the stops consists of less than five passengers per day. Many of these users are people with disabilities or people who may find it difficult to walk long distances to the nearest bus stop. The close stop spacing is acceptable due to low ridership numbers at each stop, but should be addressed gradually by eliminating stops where there are no passengers. Research on the transit market in Superior should aid in understanding where to balance critical needs with service efficiency.

Pedestrian access to most bus stops is good. There is a well-developed sidewalk network near most of the bus routes. There are no sidewalks in a few areas of the community: Route 17 on Belknap and New York; Route 16 in the industrial area along Hill, 31st Street, and portions of 2nd Street. Bus shelters and most bus stops have a hard surface pad that is

connected to the sidewalk network. Locations where passengers have to make difficult or dangerous pedestrian movements are few.

**Figure 35. A Bus Stop in Superior**



All bus stops are marked with a bus stop sign and there were no missing or vandalized signs observed. Passengers made comments about difficulty getting to shelters and stops in the winter due to lack of timely snow removal on sidewalks.

### **Interaction with Automobile Traffic**

The bus routes appear to be on streets with moderate traffic volumes. Passenger load factor did not appear to be a cause of delay or missed connections. Some congestion occurs on Tower at Belknap and at 21st; however buses were able to pass through the intersection in one traffic signal cycle.

At the intersection of Hammond and Broadway there seems to be a regular delay. The traffic signal had been relocated from Broadway to Winter. The single lane of traffic and new traffic signal location caused northbound backups at several times of day. However, bus drivers did not have difficulty crossing backed up northbound traffic as motorists repeatedly allow the bus to cross and did not block the intersection.

Tower in downtown has bus pullouts in the parking lane. Traffic volumes are relatively light and buses did not have trouble entering the traffic flow. The downtown transfer location at Tower and 14th is a good location for transfers between the two routes. Buses are not scheduled to arrive here simultaneously as a pulse, but there were several times where a bus

would wait for a late connection and both buses would be in the bus stop zone at the same time.

South of 21st on Route 17, the traffic flow is higher speed and higher volume, but buses generally do not have significant delay problems entering the traffic flow.

## **Reliability**

Route 16 has chronically late buses as well as incident-related lateness. The chronic lateness is caused by inadequate running and recovery time in the current schedule. Factors that affect this include traffic congestion and the overall length of the route. Additional time is needed to improve daily reliability. There are several railroad crossings and occasional traffic delays (accidents, signal malfunctions, emergency events, etc.) which contribute to the incident-related lateness. Service reliability has been identified as a significant problem on this route. If no changes are made, reliability will continue to deteriorate, making the service less attractive to current and potential passengers.

## **System Strengths**

### **Operational Strengths: Through Routing**

Buses are through-routed between two routes. An example is a bus will complete a round trip on Route 16, then complete a round trip on Route 12 in Duluth. This practice minimizes the cost of operation by reducing layover time at the downtown transfer center and it also guarantees the connection for passengers traveling between these two routes.

### **Customer Information**

Bus stops are marked with signs or shelters which reduces confusion between passengers and drivers as to where a safe boarding location is located. Bus stop signs are easy to identify.

### **Use of Technology**

DTA uses various technological applications in its deployment of transit service. The Trip Planner section on the website is easy to use and implements Google Transit's platform. Real time arrival information is provided via Web Watch. E-mail notifications are available and social media is used in a responsible and effective manner. These are all customer-focused products that make the service easy-to-use and automate many customer service functions. The user interfaces of these products are show in in Figures 36 and 37.

**Figure 36. Planning a Trip from Duluth to Superior Using Google Transit**

7:46 AM–8:30 AM (44 min)

- 7:46 AM ○ Duluth Entertainment Convention Center  
350 Harbor Drive, Duluth, MN 55802
- Walk to Superior St & 04 AW  
About 8 min, 0.4 mi
- 7:54 AM ○ Superior St & 04 AW
- Bus **16** towards 04 St & 53 St - Itasca  
18 min (38 stops) - Stop ID: 2-6683
- 8:12 AM ○ Tower Ave & 14 St
- 8:23 AM ○ Tower Ave & 14 St
- Bus **17S** towards Tower Ave & 63 St - Layov  
6 min (18 stops) - Stop ID: 2-7458
- 8:29 AM ○ Tower Ave & 41 St
- Walk to Tower Ave  
About 1 min, 190 ft
- 8:30 AM ● Tower Ave  
Superior, WI 54880

Duluth Transit Authority - 1 218-722-7283

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

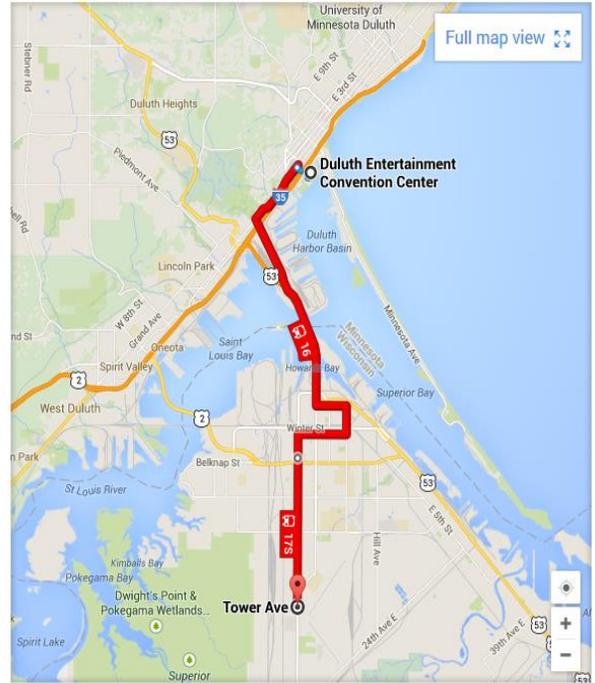


Figure 37. Live Bus Information via WebWatch

Vehicles

 On  Off

Major Stops

 On  Off

Minor Stops

 On  Off

Map  Satellite

**Vehicle Number 298**

---

**Direction:** to\_duluth  
**Next stop:** Catlin Ave & 16 St  
**Adherence:** 5 minutes late  
**Features:**

Map data ©2014 Google

2 km

Terms of Use [Report a map error](#)

## **Scheduling**

The scheduled time between timepoints varies during the day and reflects the differences in traffic and passenger volumes during the day. Many cities use a fixed time between timepoints all day. Despite the variation in time, the drivers have difficulty staying close to schedule at all timepoints. Several passengers commented on the variability of the schedule and their inability to make transfer connections in downtown Superior consistently. This study addresses offers several solutions that can improve timepoint reliability and improve the connections between Routes 16 and 17.

## **Service Delivery**

The passenger/driver interaction is very good with drivers who know the names of many of their passengers. Drivers were generally sociable and helpful. Text messages to the mobile data terminals in the buses from the dispatcher alerted drivers to unusual traffic conditions or group passenger movements. All buses observed were clean in the interior and appeared to be well maintained. Only one bus was observed with minor exterior body damage.

## **Knowing the Transit User: Passenger Vignettes**

Passenger vignettes provide an opportunity to illustrate some of the typical trips that are taken on the bus system and provide informal comments about the service. Informal conversations were facilitated among transit users in Superior during a typical weekday.

### **Kim**

Kim was taking 17 children from the YMCA at 21st and Hill to the Planetarium in Duluth. Last year the summer activity coordinator did not use the bus service and they did not use DTA for transportation. In previous years, the coordinators had often used Route 16 for summer activities. This year Kim checked into charter bus prices and found they were very expensive for these short trips. There were also concerns about having parents drive with regard to liability and insurance.

Kim used the on-line trip planner to figure out how to use DTA and she was very pleased with how easy it was for someone “her age” to figure out the bus system. She felt the fare was very reasonable. Drivers have been very helpful and have waited for transfers when their first bus is late. She is an enthusiastic supporter of DTA. The driver received a text message on his MDT about this group movement which allowed him to arrive at the YMCA with adequate time to board all passengers.

### **David**

David is a retired railroad electrician. He was going to the VA Clinic today. He is a regular rider and appreciates the service. He would like later buses on Route 17 and a discount fare for veterans and disabled people at all times, not just the middle of the day.

**Figure 38. David is a Regular Rider of DTA Service in Superior**



### **Michael**

Michael rides Route 17 about three times per week. He has been riding for about 10 years. Today he was riding from New York and 20th to Walgreen's to fill a prescription. He would like the city to fix the boarding area on New York. The road has been under construction for a long time and there is no easy way for him to maneuver on the soft ground to board the bus. He appreciates the assistance that the drivers provide, especially Glenn. He would like the sidewalks cleared better in the winter, similar to the way that the sidewalks are cleared in Duluth.

**Figure 39. Michael using DTA in Superior**





## Customer Profile

DTA conducted a survey of passengers in Superior in August 2014. The intent of this survey was to understand some of the characteristics of DTA passengers in Superior, assess travel patterns, and receive input on unmet transportation needs. In total 239 responses to the survey were received.

### Transit Rider Characteristics

Survey respondents indicated that they used transit approximately 7.85 times per week. On Route 16, this number was slightly higher at 8.03 times per week, and on Route 17 the number was lower at 6.85 times per week.

Participants were then asked how long they have been DTA bus riders. On all routes, less than 15 percent of passengers stated that they have been riding for less than one year. Typically, in communities with a substantial student population there is a higher proportion of new riders, as incoming students, faculty, and staff make up a significant portion of the market. Conversely, there is a pool of well-established riders on all of the routes. Nearly half of Route 17 riders have been passengers for over five years. A summary of survey responses to this question is shown below (see Table 11)

**Table 11. How long have you been a DTA bus rider?**

How long have you been a DTA bus rider?	All Routes	Route 16	Route 17
Less than 1 year	14%	14%	15%
1 to 2 years	21%	21%	23%
3 to 5 years	24%	26%	15%
Over 5 years	41%	39%	48%

Vehicle ownership is a key indicator of a market for transit service, particularly in mid-sized communities where travel is automobile-oriented. Survey participants were asked about whether they have an automobile available for use (see Table 12). Most participants (57 percent) indicated that they did not have a vehicle available at any time. An additional 22 percent of participants indicated that they only had a vehicle available during select times. The core ridership of transit in Superior is reliant on modes other than private automobiles for transportation.

**Table 12. Vehicle Availability**

Do you normally have a vehicle available for your use?	All Routes	Route 16	Route 17
Yes	21%	23%	13%
No	57%	56%	61%
Sometimes	22%	21%	26%

Another indicator of transit propensity is age. Older adults, youths, and young adults are less likely to drive or own a car. An overview of survey participants' age is shown in Table 13. The high proportion of riders in the 19-25 age group on Route 16 correlates with a concentration of the student population that is served by the route. Across all routes there is a low percentage of riders that are older adults. They may be using transit service that is operated by Douglas County or coordinated by North-Country Independent Living. If riders in lower age groups are retained, this could be a growth market for DTA service in Superior.

**Table 13. Age**

In what year were you born	All Routes	Route 16	Route 17
Age 65 +	4%	4%	5%
Age 46-64	21%	17%	57%
Age 26-46	25%	25%	30%
Age 19-25	45%	49%	3%
Age 18 and Under	5%	5%	5%

Additionally passengers were requested to indicate household income. Over 59 percent of survey respondents indicated that they had annual household incomes that were less than \$20,000, and 26 percent of passengers had incomes that were between \$20,000 and \$30,000. The ridership in Superior is predominantly low-income. Providing transit connectivity to jobs that are of a lower wage may be an unmet need in the community.

## Travel Patterns

In the survey, DTA asked riders about the places they go via transit, and those from which they originate. Participants were able to select from a list of all of DTA's routes. The majority of participants (77 percent) made transfers to or from one of the Superior routes. Since Route 16 makes connections to downtown Duluth it had the most respondents indicate that they made a connection to routes service Duluth. Even so, it only represented 22 percent of the transfers. The remaining transfers were made to Superior-oriented service. While many key employment and educational destinations exist in Duluth, the survey indicates that the core market of Superior travelers is intra-city travel, and connectivity to the downtowns of Duluth and Superior.

When survey participants were asked about key destinations, they were asked to select the top three areas in which they ride the bus in the Twin Ports region. The top three responses were Downtown Superior, Downtown Duluth, and the Tower Avenue commercial area. However, the majority of responses were within Superior (See Table 14). The list of options was as follows:

- Superior
  - Downtown Superior
  - Mariner Mall
  - Itasca/East End
  - South Tower Avenue
  - Billings Park
  - UW-Superior
  - North End Superior
  
- Duluth
  - Downtown Duluth
  - Miller Mall
  - Duluth Hospital Area
  - Other
  - Piedmont
  - West Duluth
  - UMD
  - Park Point
  - Lakeside
  - Goodwill
  - Morgan Park
  - Gary New/Duluth
  - Spirit Mountain

**Table 14. Major Transit Destinations**

To which area of the Twin Ports do you most often take the bus?	All Routes	Route 16	Route 17
Superior Destinations	58%	55%	70%
Duluth Destinations	42%	45%	30%

In addition to destinations, the survey asked participants about their trip origins. In this case passengers were asked where they lived using the same list of places in the previous question. The responses are summarized in Table 15.

**Table 15. Passenger Origins**

In what part of town do you live?	All Routes	Route 16	Route 17
Superior Origins	75%	73%	87%
Duluth Origins	25%	17%	13%

The survey results indicate that the greatest demand for transit service exists for those traveling within the City of Superior. Downtown Superior is both the most common origin and destination of transit travel on Route 16 and Route 17.

## Transit Service Assessment

Transit users were asked about the existing strengths and weaknesses of the DTA system. An extensive list of options was offered to survey participants, and riders were asked to select three choices in each category. When asked what the greatest strengths of DTA are, the top 5 responses are as follows:

- Reliability – Transit service always there (26 percent of responses)
- Convenience (16 percent of responses)
- Inexpensive (16 percent of responses)
- Good drivers (16 percent of responses)
- Takes me where I want to go (11 percent of responses)

When asked what the greatest weaknesses are, the top 5 responses are as follows:

- More service needed in Superior (23 percent of responses)
- Lateness (14 percent of responses)
- Drivers (10 percent of responses)
- Other passengers (10 percent of responses)
- Service should run later (8 percent of responses)

Reliability is listed as both a strength and a weakness of the existing service. This suggests that service quality is inconsistent throughout the day. The survey indicates that additional service (in terms of span, coverage, or frequency) may be needed within the City of Superior.

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# Transit Needs Review

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The assessment of transit service in Superior showed that there are a series of needs that are unmet related to transit in Superior. Moreover, ridership and on-time performance are both in a declining trend. Recommendations in this report will address the following needs.

## Lack of Midday Frequency

Most midday frequencies on the transit network are at an hourly level. While this may meet basic public transportation needs, they leave transit as a less competitive mode than others. If an individual has a work schedule that does not meet conventional peak commuting hours, or must reach a medical appointment, social function, or public agency through the course of the day, doing so occupies much of the transit rider's time.

## On-Time Performance

Due to changes in traffic patterns, freight trains, changes in ridership, and geography the Superior routes have challenges in terms of on-time performance. Often there is insufficient run time allotted to complete a full cycle, which makes an effective timed-transfer system difficult to manage. Recommendations should address opportunities to adjust schedules in a manner that assures adequate running time and accurate schedules.

## Improvement to Intra-city Market

The key market among current transit users is travel that occurs within the City of Superior. Recommendations should address producing direct and convenient service for Superior trips. Historic changes have reduced the number of individual routes in Superior from five to two. This has produced excellent coverage, but not necessarily direct or convenient travel patterns. Adjustments within the existing resources to build the market in Superior will be reviewed.

In addition to reviewing transit performance data and conducting field observations of transit operations, the consultant team met with various community leaders that represent transit user groups, including Northwest Wisconsin Community Services Agency (NWCSA), North Country Independent Living (NCIL), and the Douglas County Transportation Network Team. All stakeholder groups identified strengths, such as the positive public perception of the transit system, and that leaders in the City of Superior are committed to providing transit options for its citizens. However, there was also a common sentiment that Duluth Transit Authority's (DTA) Superior service could be more convenient and frequent, and that people could be made more aware of transit.

The regional CAP has indicated four primary destinations (two family shelters, a domestic violence shelter, and a men's shelter) in the general Superior area. In this document the locations will not be identified to protect the anonymity of their users.

One family shelter is within one block of a bus stop and the other is two blocks from a bus stop. The Domestic Violence Shelter is within two blocks of a bus stop; and the Men's Shelter is one block from a bus stop. The limitation in the span of service allows only daytime travel to and from these locations. Trips to and from these facilities are high social value/low transportation volume trips that need a variety of resources to meet the travel needs of clients. Bus service provides only a portion of the travel needs of clients.

Private sector transportation typically will meet the travel needs of people using these facilities when the bus service is not operating. Additionally, faith based organizations and private individuals often provide transportation for clients of these facilities during hours when the bus service operates.

Changes recommended in this document do not affect service levels or access to these critical destinations.

## **Goals**

The project technical team set early objectives that recommendations focus on service concepts that could be implemented using existing financial resources, or that provide the opportunity to reinvest existing resources. A review of historic route patterns to assess possible restoration of service, and the evaluation of incorporating transit modes is also included in this report. Analysis of possible route changes to improve reliability will include the impact on existing passengers.

# Route 16 Options

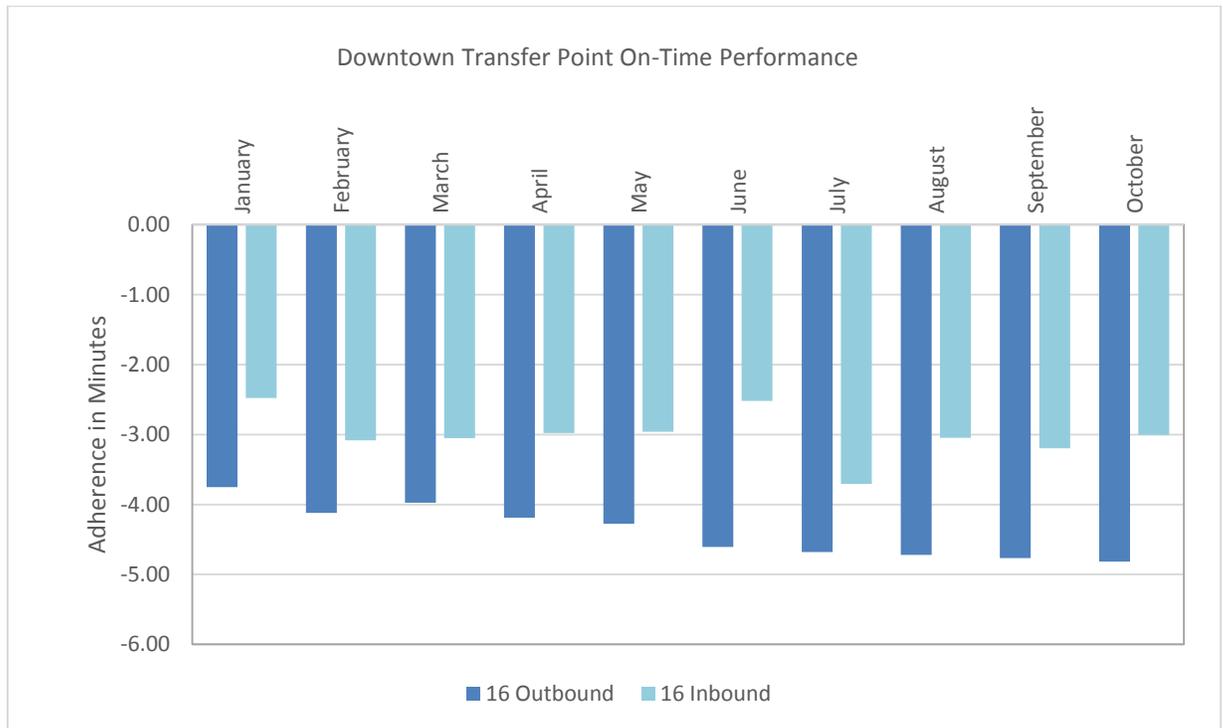
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## Issue Identification

Route 16 has chronically late buses as well as incident-related lateness. The chronic lateness is caused by inadequate running and recovery time in the current schedule, due to the length of the route and traffic congestion along the route. In 2014, outbound trips on Route 16 were an average of 4.39 minutes late to its arrival at the 14th and Tower Avenue transfer point. Inbound trips were an average of 3.00 minutes late. These are averages, and many trips were beyond the schedule adherence necessary to make a timed transfer. Multiple times a week outbound trips are in excess of 10 minutes behind schedule. A summary of Route 16 on time performance at the downtown transfer point is shown in Figure 42. Additional time is needed to improve daily reliability. There are several railroad crossings and occasional traffic delays (accidents, signal malfunctions, emergency events, etc.) which contribute to the incident-related lateness. Service reliability has been identified as a significant problem on this route. Four potential solutions to improve reliability are:

- Add a vehicle into the schedule
- Eliminate some bus stops
- Reduce round-trip mileage
- Reduce service frequency

**Figure 40. Route 16 On-Time Performance (2014)**



### **Solution 1: Additional Fleet Resources to Improve Reliability**

One way to address issues related to on time performance would be to add a vehicle to the fleet, and add running time to the schedule. DTA fixed-route operating costs are approximately \$97.00 per revenue hour. The cost of adding a peak-hour vehicle for eight revenue hours in the morning and afternoon peak period is approximately \$776 per weekday, or approximately \$195,000 per year. Congestion in the afternoons on Saturday and Sunday would also require an additional vehicle for approximately five hours per day. Cost of an additional weekend vehicle would be approximately \$50,000 per year. Wisconsin DOT would pay approximately 55 percent of the cost, and small urban transit systems typically contribute to about 30 percent of the operating costs or \$73,500 annually.

### **Solution 2: Eliminate Bus Stops**

Combining bus stop locations is often used to speed up average vehicle travel times. It will produce a minor benefit that is difficult to predict. Bus stop elimination typically is very unpopular with existing passengers, except at stops where there are no passengers. In Superior, data shows almost every stop has at least one boarding or exiting passenger per day. Many elderly or disabled passengers rely on specific stops and rearranging the stops will be difficult.

Stop removal should be pursued gradually over several years where there are few passengers and should correspond with their replacement cycle or street and sidewalk improvements.

Stop spacing should remain at least five stops per mile in residential areas of Superior. Current stop spacing is less than 600 feet between stops.

### **Solution 3: Reduce Round-Trip Mileage**

The through routing of Route 16 with Route 12 and other routes in Duluth provides the most cost-efficient use of vehicle scheduling and service delivery and is a “best practice” in the transit industry. It also eliminates the possibility of a no-cost/low-cost change by using all available recovery time at the north end of the route in Duluth. The only choices that are available for route mileage changes are to reduce lightly used segments of the route or to eliminate service on the south end of the route. These possible adjustments are outlined below.

#### **North and Central Route Changes**

Several route options in the northern portion of the route between 5th and Catlin and UWS were considered to reduce travel times, but each would have a negative impact on a significant number of customers. The northern part of the route is the highest traffic-generating portion of the route, consistent with the transit propensity presented earlier. It is recommended that no significant route changes be made on the north end of the route. Consolidation of some bus stops where there are no boardings or alightings would provide a minor improvement in travel time.

#### **Southern Route Changes**

The south end of the route (south and east of UWS) has sporadic, low-volume ridership. There are no major traffic generators and most of the users are comprised of people traveling to and from home. There are several options to save time with minimal inconvenience to current passengers between Mariner Mall and the south end of the route in Itasca. Reducing mileage in this area will save time. There are two options.

##### **Option 1) 21st Street Route Pattern from Hill to 5th**

The inbound route would continue to use the current alignment, but outbound service would shift to using 21st Street during the morning period. The estimated mileage savings is .77 miles. At current scheduled speed, the time savings would be approximately three to four minutes. A map of the proposed improvement is shown in Figure 43.

There would be some inconvenience to some passengers boarding or alighting in this area. All passengers would still have one directional service during the time periods. In the morning outbound boarding passengers north of 21st going southbound to Itasca would have to ride an inbound bus to Mariner Mall and then transfer to an outbound bus. Passengers desiring to alight on this section would ride to the end of the route in Itasca and then ride inbound to their stop. There are sidewalks along the entire route and some passengers may choose to walk to the nearest operating stop instead of riding to the end of the route or transferring at Mariner Mall.

In the afternoon, the route change would be reversed. Inbound buses would use 21st while outbound buses would continue to use the current route. Passengers inconvenienced by this change could ride to Mariner Mall, Itasca, or could walk where it is convenient. An “on demand” option could be added on certain trips where the bus would operate on the current outbound route only when there are passengers who will exit on that portion of the route.

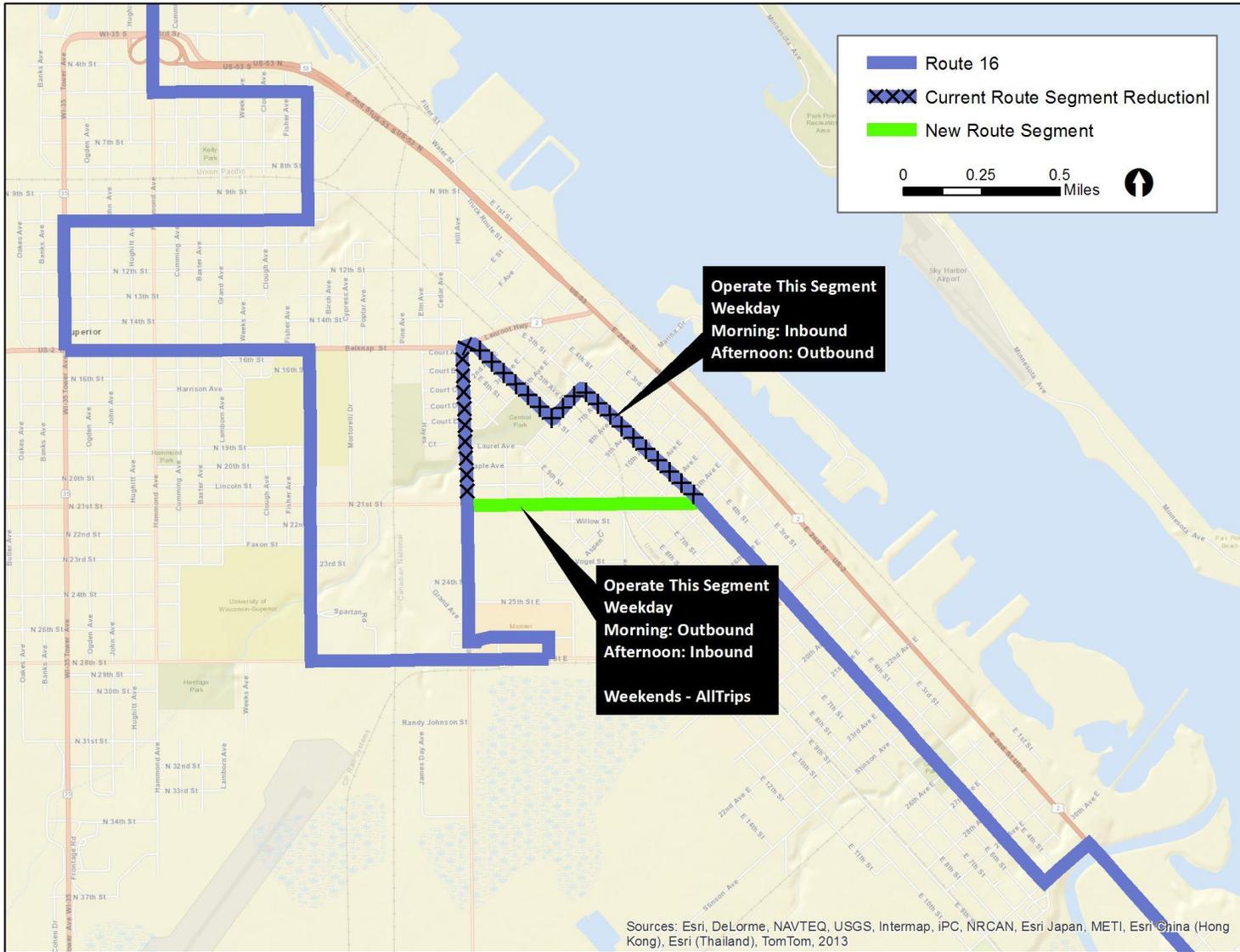
DTA passenger counts show that there are four morning alightings in this segment of the route, and no boardings. In the afternoon there are about three daily boardings.

Saturday and Sunday reliability is also an issue. The 21st option could be used in both directions on Saturday and Sunday to improve reliability. On Saturdays this segment has six inbound boardings, and two inbound alightings; in the outbound direction there are 10 alightings and one boarding. On Sundays there are no inbound alightings and three inbound boardings; in the outbound direction there are two alightings and one boarding.

**Summary:**

- 3-4 minutes time savings
- 7 weekday trips affected
- 14 weekend trips affected
- High priority change

Figure 41. Route 16 Option 1



## **Option 2) 28th Street route pattern from Mariner Mall to 18th Avenue – East 5th Street**

Similar to Option 1, outbound service in the morning would shift to 28th Street and during the afternoons the inbound service would shift to 28th Street. This option would save more time by reducing mileage 1.32 miles, and the estimated time savings would be approximately six to seven minutes. A map of the proposed change is shown in Figure 44. There would be more stops that would be affected compared to the 21st Street option. DTA data indicates that 29 outbound passengers would be affected when combining boardings and alightings. On inbound trips, there would be a maximum of 23 passengers affected. On Saturday there would be 18 inbound passengers affected and 21 outbound passengers affected; on Sundays 15 inbound, and 8 outbound passengers would be affected. As with the 21st Street option, passengers can ride to Itasca or transfer at Mariner Mall or walk to their destination.

The result of either change will be a more predictable recovery time at the south end of the route (Itasca). The departure time could be moved up two or three minutes with the extra time distributed through the schedule where schedule adherence is difficult. This option would affect more passengers and is not recommended at this time. If congestion causes additional delays in the future, this option should be reconsidered.

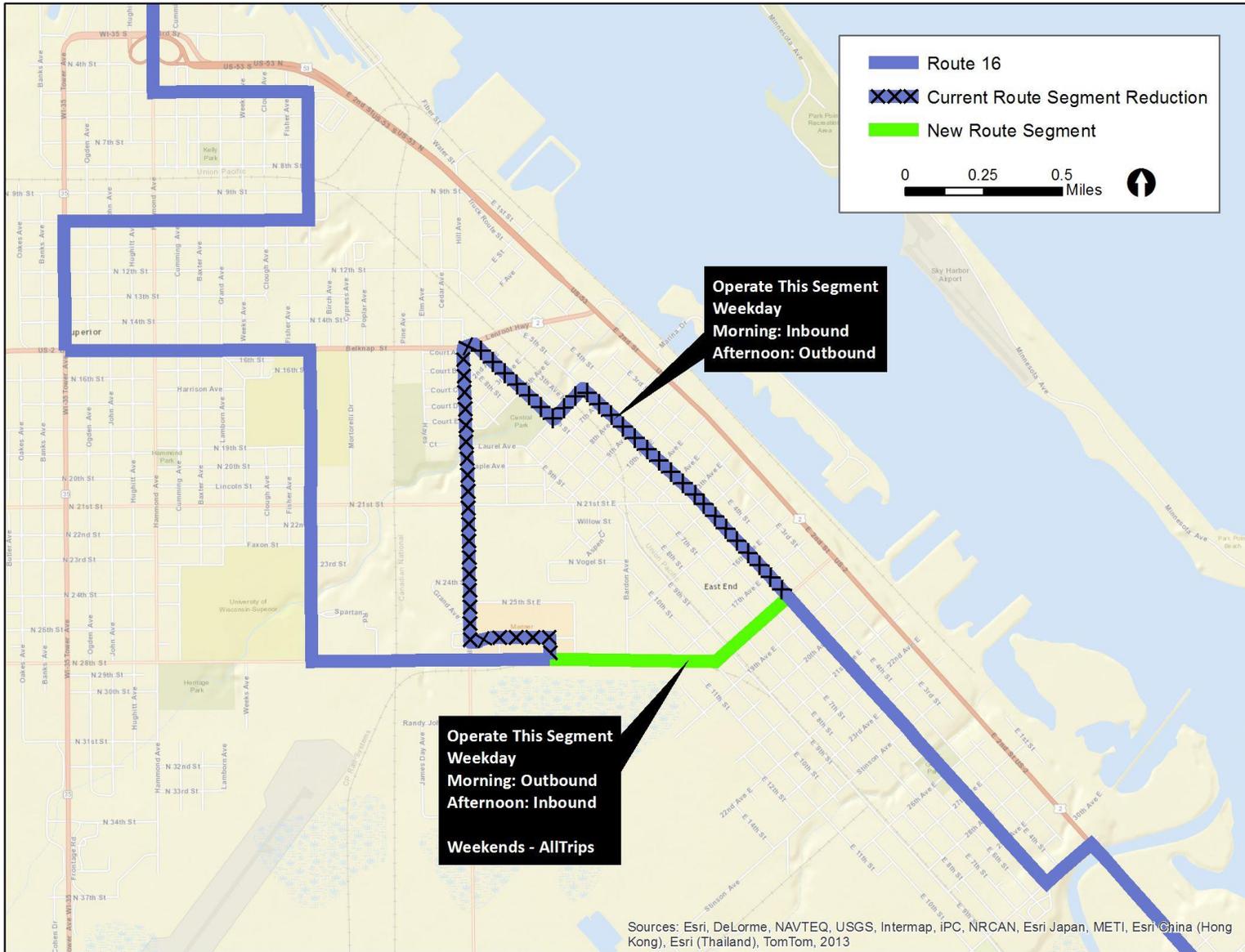
### **Summary:**

- 6-7 minute time savings
- 52 weekday trips affected
- 62 weekend trips affected
- Implement only if congestion levels and lateness continues to increase after implementing Option 1

## **Option 3) Shorten Route on South End**

The other possible change to the route to improve reliability will have a far greater negative impact on existing passengers. This difficult choice would be to shorten the end of the route and completely eliminate service for current passengers. This option is to terminate the Route 16 and operate via 37th Ave East to East 1st Street to 38th Ave East and then return north. This would save approximately 1.30 miles and produce a savings of approximately five to six minutes. There would be no service south of 38th Ave East/E. 2nd Street. This option would eliminate all service for approximately 64 weekday trips; 41 Saturday trips; and 22 Sunday trips. A map of this option is shown in Figure 45.

Figure 42. Route 16 Option 2



**Figure 43. Route 16 Option 3**



#### **Option 4) Reduce Service Frequency; Split Route at Mariner Mall**

Changing the frequency on the south end of the route (south of Mariner Mall) would provide the greatest reliability benefit. This option will provide less frequent service on the south end of the route and use the time savings to improve reliability on the entire route.

Creating a terminal for Route 16 at Mariner Mall would improve reliability on the entire route by splitting the route. Route 16 north of Mariner Mall would operate on its current schedule, and the new route 16A would operate at 60-minute intervals all day. The current schedule shows a nine-minute scheduled recovery at Mariner Mall if buses terminated there. Observation indicates that this would be more realistically scheduled as a four- to six-minute recovery, and the savings in recovery time could be distributed to the inbound schedule.

Service south of Mariner Mall would be provided by one bus during peak periods, and all passengers would be required to transfer between buses during the peak periods. This strategy improves reliability north of Mariner Mall on Route 16 but reduces service south of Mariner Mall to 60-minute intervals all day. The cycle time for Route 16A would be 41 to 45 minutes, which allows a 15- to 19-minute scheduled recovery time. Adjustments to running time would likely reduce the recovery time to 12 to 15 minutes. The current route would be operated in both directions at all times, and there would be no variation via 21st or 28th. If the Route 16 was operated via 21st at all times, additional study and experience would determine if there was adequate time to extend Route 16A to Walmart.

During the middle of the day, this route plan of two routes is not possible with a 60-minute interval Route 16A. In the midday, Route 16 would operate on its current schedule. For passenger information, drivers would be required to use a Route 16A destination sign in the midday south of Mariner Mall. There would be no change in the current Route 16 routing, but there would be a negative change in frequency south of Mariner Mall.

This change would be inconvenient for those passengers who are going to or from work and live south of Mariner Mall. There would be no net savings in revenue hours. It would be cost neutral and provide less service, but would improve schedule reliability. There would be a minor savings in fuel consumption. This option is recommended if the 21st Street option discussed above does not provide adequate reliability improvements. This is the best option to improve reliability in the peak period.

#### **Summary:**

- Adds 12-19 minutes of recovery time depending on the trip
- Inconveniences riders on south end of route by adding transfers and reducing frequency, but adds reliability.
- Not recommended for near term implementation.

## **Option 5) Eliminate Early Morning Segments on South End**

It is an efficient practice to start the early morning buses at the first location where passengers are normally picked up. Some of the early morning trips may have no passengers on portions of the far south end of the route. Buses could start at either 38th Avenue, 31st Avenue, 24th Avenue or any arterial cross street before the first boarding passenger on the first two inbound trips. South of 31st there are about six boardings per day, and there are an additional two boardings when you add the segment between 24th and 31st. There are no alightings on these early morning trips. The first outbound trip that turns back to start the third inbound trip can also be adjusted to eliminate low ridership route segments. The annual cost savings would be about \$12,000 in operating costs, \$3,600 of which would be local share from the City of Superior.

### **Summary:**

- Eliminates low ridership route segments at select times of day
- \$12,000 annual cost savings
- Affects 6-8 weekday trips
- Recommended

## **Route 16 Service Modifications to Address Operational Issues**

Each of the outlined changes can be implemented in an incremental manner. Small changes are expected with each recommendation, but time should be allowed for the changes to be effectively evaluated. The overall goal is to minimize inconvenience while producing positive effects for the overall route.

The recommended initial implementation schedule for Route 16 is:

- Implement Option 1:
  - Weekdays: Operate on 21st Street outbound before 12:00 noon; inbound after 12:00 noon
  - Saturday/Sunday: Operate all trips via 21st St in both directions
- Implement Option 5:
  - Move inbound start location on morning trips to timepoint closest to first passenger pick up location

If these changes do not produce the necessary time savings to improve reliability, the next step will be to operate on 21st St in both directions at all times. If that is inadequate to improve reliability, then the next step is to split the route at Mariner Mall and reduce frequency to 60 minutes from Mariner Mall to Itasca. A summary of potential service changes is listed in the table below (see Table 16).

**Table 16. Route 16 Summary of Options to Address Operational Issues**

	Route	Service Change	Service Improvement	Weekday Trips Affected	Add'l Cost
<b>*Solution 1:</b>	16	Add Vehicle	All on-time	0	\$195,000
<b>*Solution 2:</b>	16	Eliminate Bus Stops	1-2 minutes per trip	0	\$0
<b>*Solution 3, Option 1:</b>	16	21st Street	3 - 4 Minutes	7	\$0
<b>Solution 3, Option 2:</b>	16	28th Street	6-7 Minutes	52	\$0
<b>Solution 3, Option 3:</b>	16	End at 38th Avenue	5 -6 Minutes	64	\$0
<b>Solution 3, Option 4:</b>	16	Split Route	All on-time	29	\$0
<b>*Solution 3, Option 5:</b>	16	Eliminate Zero Rider Segments	All on-time	0	\$0

*\*Shaded rows indicate changes that should be implemented first*

## Route 16 Service Expansion Options

A request from passengers gathered in surveys and personal interviews was to establish later evening service on Route 16. Anecdotal conversations indicated that some passengers have had to turn down employment in Duluth because they could not get back to Superior after the last full-route weekday departure at 5:50p.m. The last departure to 14th and Tower from Duluth leaves at 7:12p.m. Three hours of additional evening service are required to meet the schedules of service industry or other shift-work employees. After 6:15p.m., Route 16 would only operate between Duluth and Mariner Mall.

Additional midday service is also needed to expand the 30-minute interval. Many part-time jobs have an earlier finish time than the current 3:20pm start of the 30-minute interval. UWS students will also benefit from two hours of earlier afternoon service, as many students do not have a full day of classes until the peak time starts. Often they may have one or two afternoon classes, and current hourly midday service does not connect with class times well.

The student market is one that should be targeted for growth in Superior. Class start times at UWS are at :00 and end at :50. Outbound Route 16 buses arrive on campus at :13 during midday and at :13 and :43 in peak. Students who have early afternoon classes have to arrive on campus 47 minutes before classes start. Inbound buses leave campus at :04 and :34 in peak which provides a good after-class connection. Adding 30-minute intervals would greatly improve bus and class coordination.

Funding for improving the midday service could come from a combination of state, city, and university (student fees) sources. Six additional daily revenue hours would cost approximately \$580 per day, and would operate on UWS schooldays only. For 160 class

days, the cost would be \$92,800. WisDOT operating assistance would typically provide approximately 55 percent, or \$51,000. The remainder could be evenly split between the City of Superior and University. Each share would be approximately \$21,000 before non-student passenger revenue is counted.

Similarly, an additional three revenue hours of evening service between Duluth and Mariner Mall (6:15p.m. to 9:15p.m.) would cost the city \$10,900 and the University \$10,900. Additionally, WisDOT would be expected to contribute about \$40,000 through the State Transit Assistance formula. Passenger revenue is assumed to cover the funding gap.

**Summary:**

- Add service to accommodate student population
- Add evening service
- Total local share to City of Superior/funding partners: \$68,000
- Recommended

# Route 17 Options

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## Issue Identification

Average route speeds on Route 17 are relatively high. The longer distance and higher average speed on Route 17 occurs because the route makes two passes through Billings Park, both northbound and southbound. There are long stretches of the route with no stops due to the geography of the area, as well as inconsistent boarding locations. Some trips do not go to South Superior, which is the current method to allow on-time terminal departure on the south end of the route. However, the direct service between Billings Park and the South Tower Av. commercial area are directly correlated to the highest ridership patterns on the route. There is significant midday traffic to Target, Walmart, and St. Mary's Hospital. Ridership patterns are non-traditional, with the highest ridership trips during the midday and not during the peak periods.

During the middle of the day only one bus is on route 17, and it operates as a combination of both peak routes (17B and 17S). Ridership is highest during the day when there is only one bus providing 60-minute headway service, and the route is longer than the sum of Route 17S and Route 17B, due to serving Billings Park in both directions and a midday deviation to Walmart and Target.

One of the reasons that ridership is high on Route 17 may be the fare differential between peak and midday service. During the midday period when it runs as a single route, elderly and disabled passengers ride Route 17 for half fare (75 cents versus \$1.50 adult fare). The first two midday trips are the busiest, as many elderly passengers use this trip to start their travel day. A pricing change may have some effect on the distribution of trips during the day, but it would not be expected to generate significant new additional ridership.

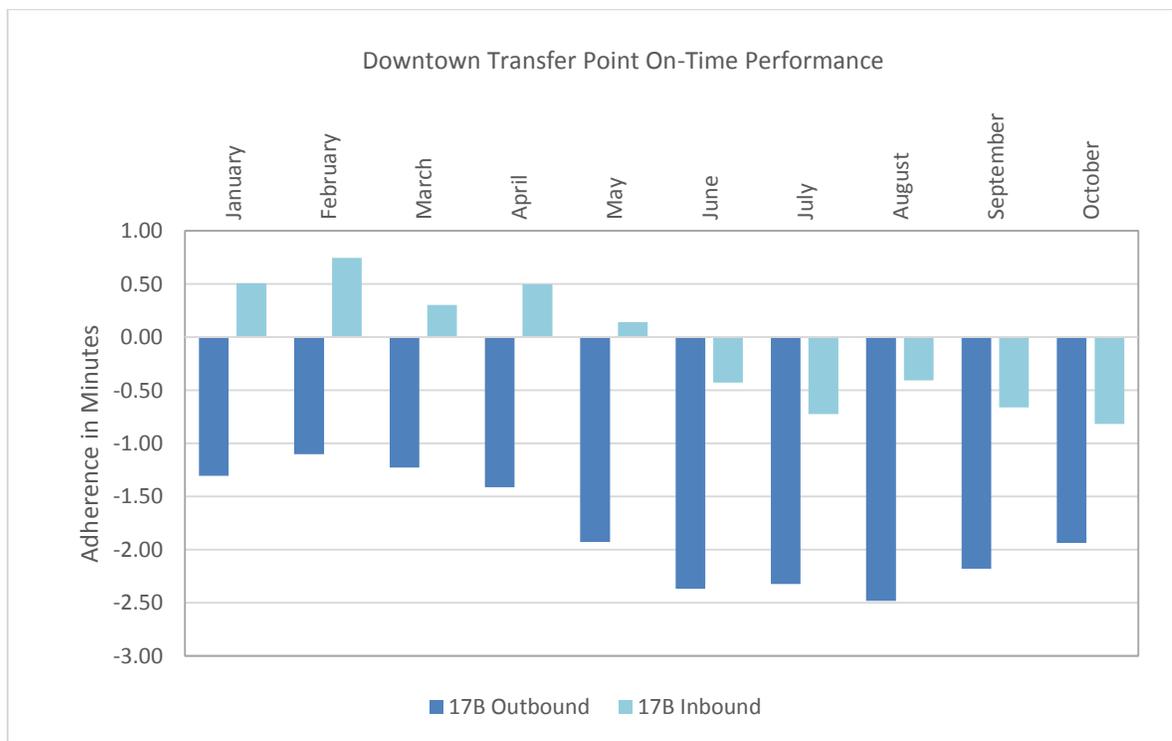
The other reason that ridership increases during the midday is that the combined route provides direct service from Billings Park to the Walmart/Target/St. Mary's Hospital commercial area on South Tower. During the peak period, passengers must ride north on Route 17B to 10th and Tower and then ride south on Route 17S to reach their destination. The midday route, 17, provides direct access from Billings Park to Wal-Mart/Target and St. Mary's Hospital. By waiting for the midday service, passengers who have trips that are not time sensitive (non-work trips) can save 20 minutes southbound and 12 minutes northbound which is a significant time savings per trip. The time savings allows for additional trips in the midday compared to peak period travel or a 32 minute time savings for other activities.

Routes 17, 17B, and 17S also have schedule reliability problems. The peak period service (17B/17S) generally has adequate cycle time, but buses often do not have the three- to eight-minute recovery time in the published schedule. Unpredictable incidents also affect reliability. Consistently late buses at intermediate timepoints are common. Route 17B is generally reliable. The average on time performance in 2014 indicates that it runs on time at

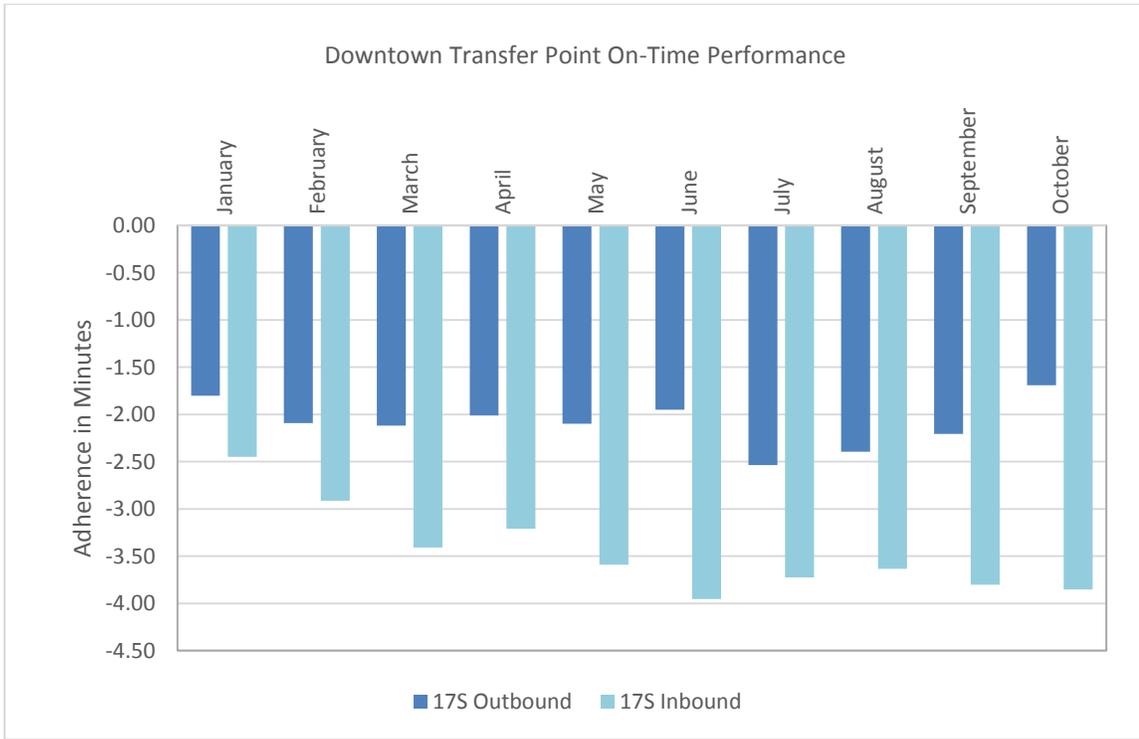
the 14th and Tower time point (see Figure 46). Buses run late on the 17S – outbound trips are an average of 2.09 minutes late, and inbound trips are an average of 3.5 minutes late (see Figure 47) -- but make up their time on the 17B through routing. Incidents such as train delays on 17S or assisting some passengers who use wheelchairs create occasional delays that make schedule adherence difficult. Downtown transfer point reliability on the midday routing (Route 17) is an average of 2.42 minutes late on outbound trips, and 3.54 minutes late on inbound trips (see Figure 48).

Reliability problems can be solved by minor changes that consume significant time and will have a minor impact on existing passengers. The improved reliability will have a minor effect on ridership.

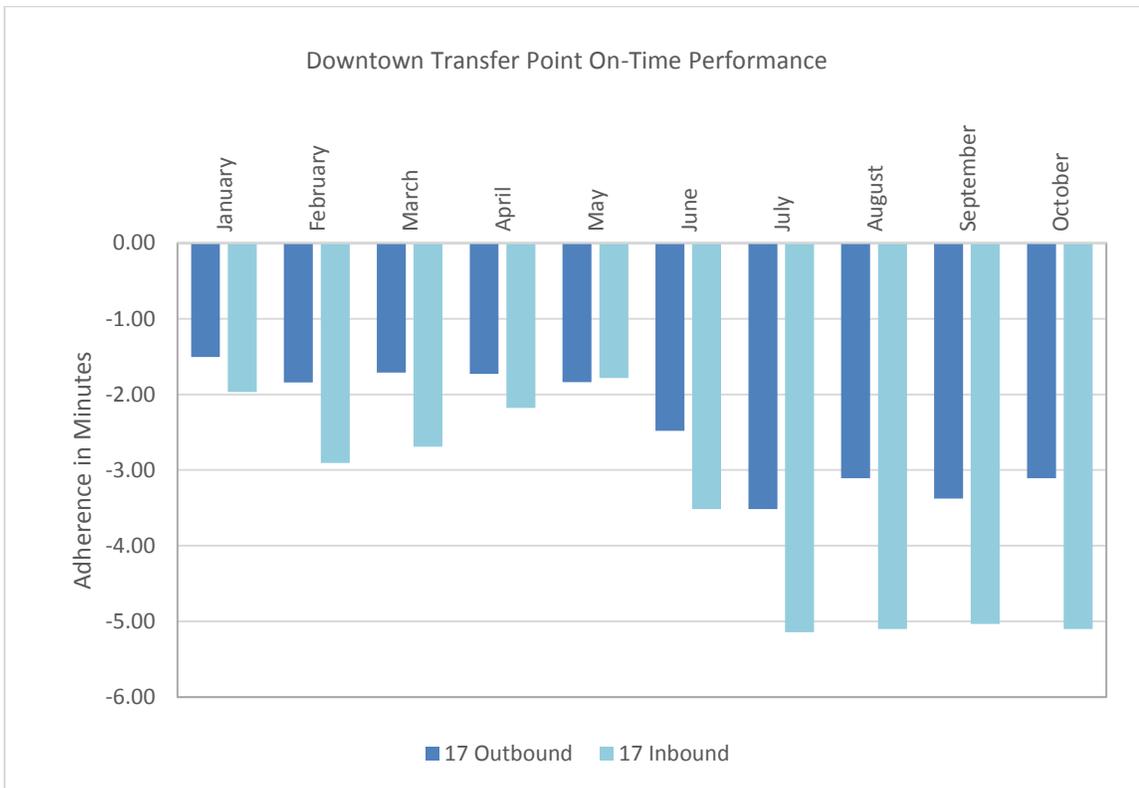
**Figure 44. Route 17B Schedule Adherence (2014)**



**Figure 45. Route 17S Schedule Adherence (2014)**



**Figure 46. Route 17 Schedule Adherence (2014)**



## Low-Impact Route Changes

The objective of these concepts is to reduce overall route mileage to improve schedule reliability.

### Relocate Northern Terminal

This change will reduce North End mileage and add available running time to the routes. Route 16 and all route 17 variations overlap from Belknap to 10th on Tower Avenue. The primary transfer location is at 14th and Tower. Changing the turnaround route to use 12<sup>th</sup> – Banks – 13<sup>th</sup> will save 0.5 miles. Route 17 bus stops would be eliminated at 11th/Tower and 12th/Tower. However these stops would continue to be served by Route 16. Review of the best routing should be conducted by DTA supervisors and drivers, as there may be local or seasonal conditions that affect this recommendation's implementation. A map of this concept is shown in Figure 49.

#### Summary:

- Savings of 1-2 minutes
- No passengers inconvenienced
- High priority recommendation

### Relocate Southern Terminal

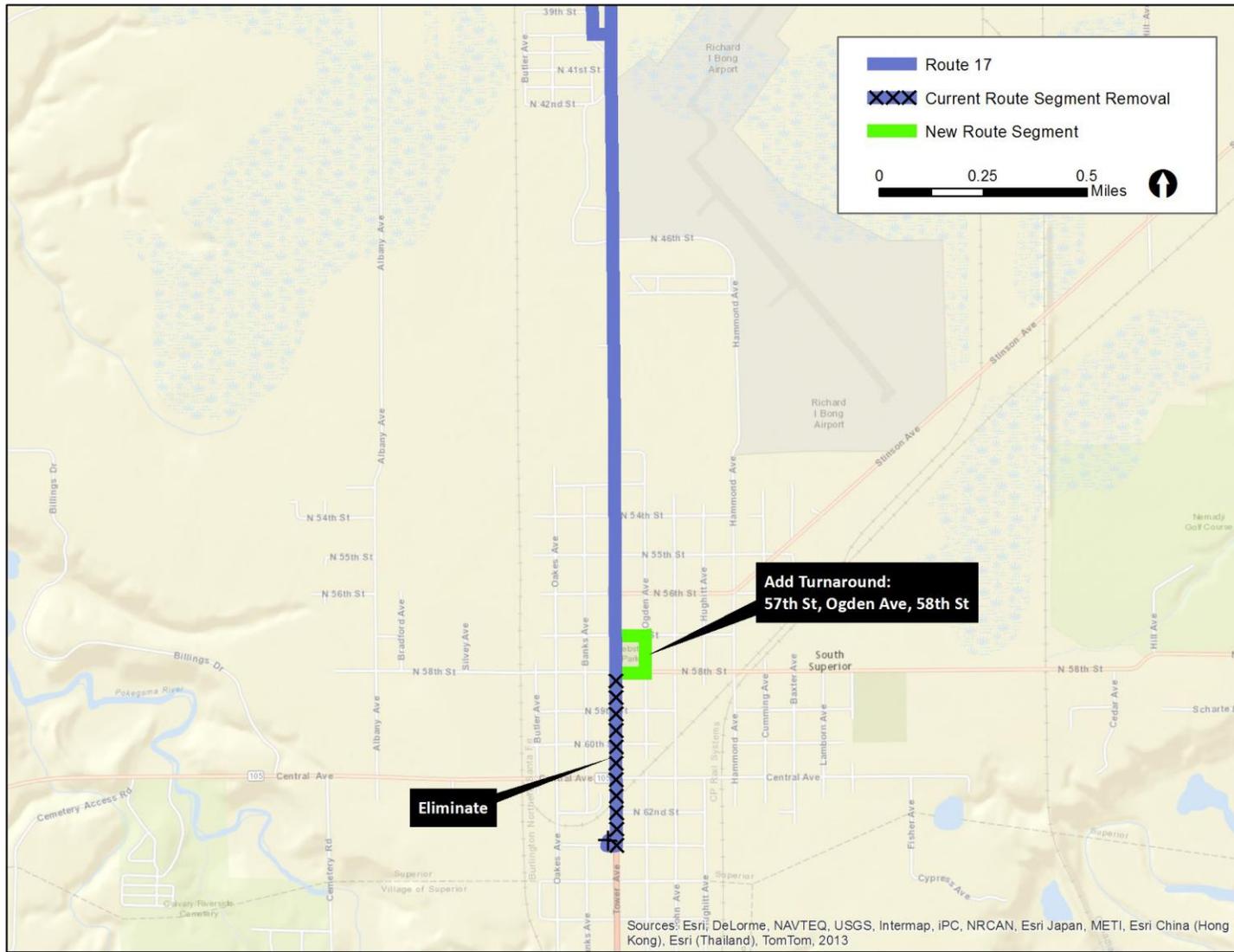
The current south terminal is an unpaved off-street turnaround at 63rd and Tower Avenue. Currently there are four midday trips to this location on Route 17. Shortening this route to use 57th to Ogden to 58th and then return via Tower will save 0.70 miles and approximately three minutes and eliminate one railroad crossing. There are two weekday trips and 21 weekend trips that are affected by this change. A map of this recommendation is shown in Figure 50.

#### Summary:

- Savings of three minutes
- Eliminates railroad crossing
- Impacts 23 trips
- Lower priority recommendation



Figure 48. Route 17 Southern Terminal Modification



## Eliminate Early Morning Segments on North End

As recommended for Route 16, it is reasonable to start the early morning buses at the first location where passengers are normally picked up. The first trip of the morning may have no passengers on portions of the far south end of the route. Buses on Route 17S could start at 58th, 40th, 28th or any arterial cross street before the first boarding passenger on the 5:46am trip. Route 17B starts at New York and 21st and there is no option to start it at any other location. The following is a summary of potential ridership impacts (see Table 17). Shifting the starting point of the second inbound trip has no impact on passengers, and the impact on shifting the first inbound trip would be on four to eight boardings.

**Table 17. Ridership Impact of Eliminating Route 17 Early Morning Segments**

Recommendation	1st trip inbound	2nd trip inbound
Eliminate 63rd-58th Segment	4.5 trips	0 trips
Eliminate 63rd - 40th Segment	2 additional trips	0 trips
Eliminate 63rd-34th Segment	1 additional trip	0 trips
Eliminate 63rd-29th Segment	1 additional trip	0 trips
TOTAL	8.5 max trips affected	No Impact

### Summary:

- Increases early transfer reliability
- Minimal passenger impact
- Recommended

## Route 17 Midday Service

The current midday service on Route 17 operates from downtown to Billings Park, to the front door of Target, Walmart, and then south on Tower to 63rd. The northbound route is longer, operating on Tower to 40th, then Walmart, then loops around Target to stop at the front door, then south to 37th, then north to Billings Park and Downtown. This provides front door service to Target in both directions and is inconsistent compared to the routing to other retail stores in Superior. It also consumes running time.

The southbound deviation via Henry Cohen Drive is approximately three minutes longer than if the bus remained on Tower as it does during the peak period. The northbound deviation is 0.8 miles longer than remaining on Tower and consumes approximately five to six minutes due to circulating through the Target parking lot.

Some passengers benefit from the service stop closer to Walmart and Target. There is a pedestrian path from Tower to Walmart, but no pathway from Tower to Target. If the southbound routing continued as it is currently, and the northbound routing was on Tower (as in peak periods), approximately five minutes would be saved. Passengers who do not want to cross Tower at 37th to get to the northbound bus can board a southbound bus and ride to 63rd and then return north. This would add approximately 11 to 12 minutes for a passenger traveling from Target, and approximately 9 to 10 minutes for passenger boarding at Walmart.

Another variation would be to eliminate the Target stop northbound, but continue the Walmart stop. Northbound passengers at Target could walk to Walmart or the nearest bus stop on Tower. A weekday average of 2.3 passengers board inbound buses at Target daily and 15.3 passengers board at Walmart. It is recommended to eliminate the northbound Target loop, but retain the Walmart stop at this time. If this change does not improve reliability, then elimination of the northbound Walmart stop in the future should be considered. Maps of these two service options are shown in Figure 51 and Figure 52.

The reliability improvement through eliminating the northbound Target routing will improve service for all midday passengers and give drivers adequate time when passengers in wheelchairs need additional assistance.

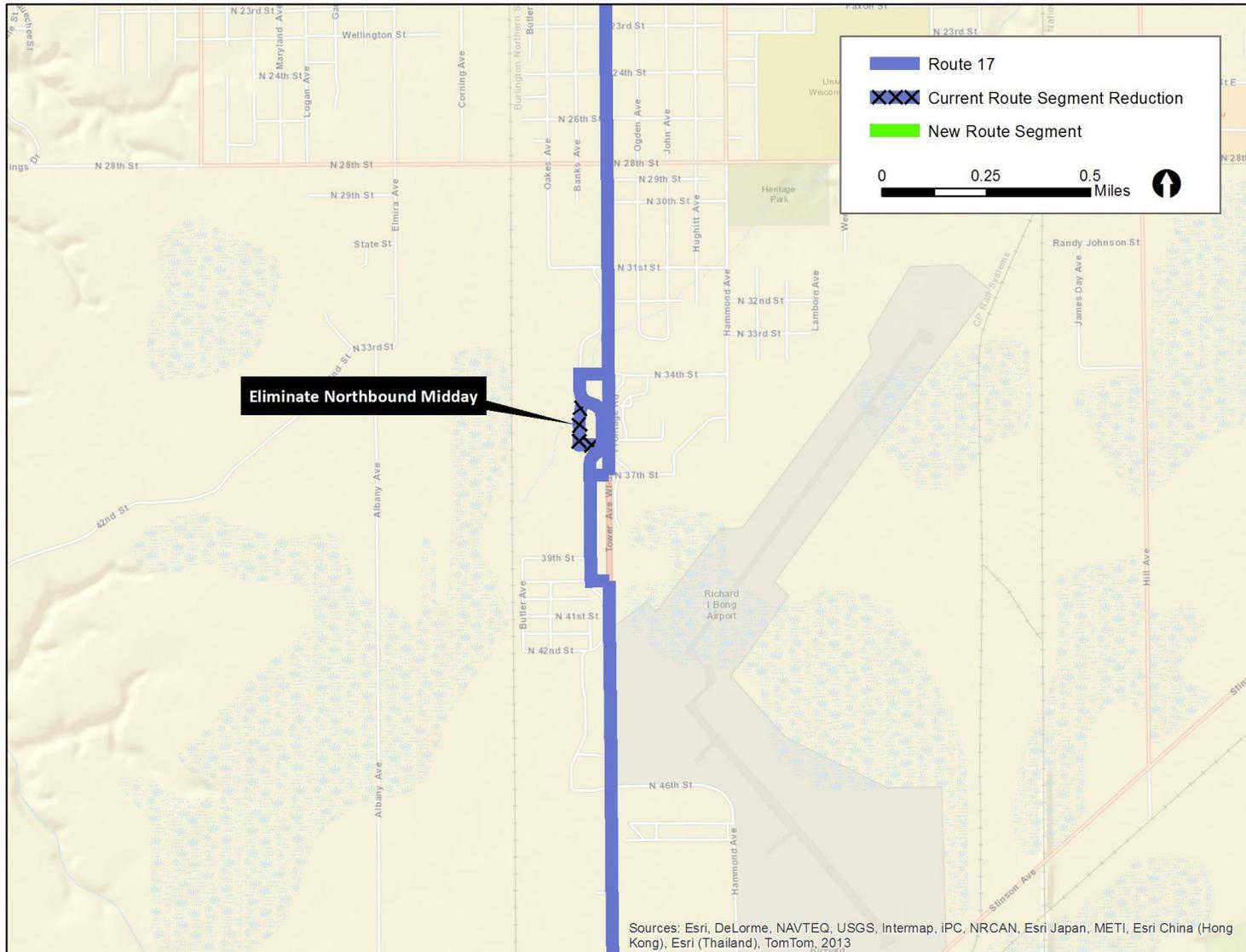
**Table 18. Route 17 Summary of Cost Neutral Options to Address Operational Issues**

Route	Service Change	Service Reliability	Weekly Trips Affected	Cost
17/17B/ 17S	North terminal at 13th Street	1 Minute	0	\$0
17/17S	No Target NB	3 - 5 Minutes	2	\$0
17/17S	No Walmart and Target NB	4 -6 Minutes	17	\$0
17/17S	South Terminal at 58th Avenue	2 Minutes	23	\$0

**Figure 49. Route 17 Midday Option 1**



**Figure 50. Route 17 Midday Option 2**



## Route 17 Expansion and Reconfiguration

The current ridership pattern, with a strong midday compared to peak, provides an opportunity to gradually modify the service in this area to reflect ridership preferences. This can be done gradually with one trip being changed each year and then evaluating the change. Ridership may or may not adjust, and reliability must also be evaluated because Route 17 is longer than the combination of Routes 17S and 17B.

Pricing is also a concern as cash passengers anecdotally wait for the lower cash price in the midday when Route 17 operates. A gradual expansion of Route 17 to replace Routes 17S and 17B will provide more convenient connectivity between Billings Park and the commercial area along Tower south of 28th and a pricing change will attract more passengers to these trips.

This can be done, initially, by operating one earlier trip and one later trip, as Route 17 to replace Routes 17S and 17B. There will be no operating cost savings. Expanding the midday fare to the extra Route 17 trips will also provide a more balanced ridership by spreading the existing ridership over more trips. There may also be some more trips made between Billings Park and the south Tower Avenue commercial area. The estimated loss of farebox revenue on the two trips that would be changed is \$4.00 to \$8.00 per day, or up to \$2,200 per year. However, the user experience and on-time performance will be improved so this may yield a cost-neutral result.

There may be added travel time for northbound passengers boarding Route 17S south of 28th on the two inbound trips. Their travel time will increase ten minutes, as Route 17 travel time is longer than Route 17S due to the routing through Billings Park.

### Summary:

- Convert last 17S and 17B morning trips and first afternoon trips to Route 17.
- Monitor ridership and operations for the following year.

## Other Transit Modes

There has been local discussion about the conversion of fixed-route bus operations to demand response or dial-a-ride service. Currently DTA service in Superior averages about 8-10 passengers per revenue hour depending on the time of day. There are times when ridership is well above this. Dial-a-ride service could not efficiently replace the fixed-route service that exists today in Superior. Dial-a-ride service typically carries about 5 passengers per hour, with that number reduced if some of these passengers require assistance with wheelchairs or other mobility devices. The existing STRIDE vehicle that is dedicated to Superior for ADA paratransit could be used to serve small segments of routes that have been cut, however replacement of the fixed route service to meet demand would require additional vehicles and drivers, and a higher subsidy per rider. It is not expected that any cost savings would be realized by changing transit modes.

## Summary

There are several minor changes that can be easily made to Routes 16 and 17 in Superior to improve operations. Some of the changes will have an insignificant effect on passengers and provide modest service improvements. The sum of several modest improvements will provide more time in the current schedule and will improve overall reliability. Based on discussion with passengers and DTA personnel, improved reliability should stabilize the loss in ridership. Already active transit markets will then ride DTA more often if services are made more convenient. Ridership will gradually build back to previous levels over the next five years with appropriate marketing and careful monitoring of service delivery.

Some of the options create inconveniences of walking a longer distance to the nearest bus stop for some passengers or the complete elimination of service segments. Others will have a longer interval between buses, which can affect their decision to use the bus or seek other transportation choices. Overall however, the level of recommended modifications is quite modest and should not present serious problems for a vast audience.

The options presented should be implemented gradually to determine if the most modest changes will provide the necessary improvements in reliability. The more severe changes can be implemented in the future if the modest changes are not adequate.

## 5-Year Vision for Transit

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This five year plan for improved transit services in Superior focuses on reliability, improved frequency, and eventually, an expanded route network. Service expansions can be expected to be financed through continued WisDOT state funding, increased student fees from UWS, and increased local property tax support. The increments listed below present an operationally logical manner of developing transit service in Superior. While the first year emphasizes changes to be made using existing resources, subsequent years provide a menu of options that can be exercised if additional funding becomes available.

### First Year

Reliability is the key issue for immediate service improvements. Decisions are required on minor route changes that will improve reliability. This document provides several options that will improve the reliability of the network. Ridership has decreased from 172,470 to 136,473 from 2009 to 2013, a 21% drop in the four years. When people can rely on the bus system to deliver them to their destinations in a timely manner for time sensitive trips, it can be expected that ridership will make progress in returning to its 2009 level. The cost of these changes is minimal. Some minor savings can be expected due to reduced mileage or scheduling changes.

### Second Year

After reliability is restored, service improvements can be programmed in subsequent years. Evening service on Route 16 between Duluth and Mariner Mall at 60 minute intervals should be implemented with the final departure from Duluth at approximately 9:15pm. This service has been requested by many passengers who work service jobs in Duluth and cannot get to downtown Duluth in time for the final full route departure at 5:50pm. Service would depart at 6:15, 7:15, 8:15, and 9:15pm to Mariner Mall. Inbound service would operate from Mariner Mall would be scheduled at 7:45, 8:45, and 9:45pm on weekdays.

### Third Year

In the third year, improvements to frequency of service should be programmed to make the midday service more attractive. Many passengers who use DTA service do not work traditional office hours. They are often traveling to part-time service jobs that may have a 10:00am or 11:00 start time or an early afternoon finish time. The hourly service does not conveniently connect with employment times. The class coordination time at UWS is poor during the midday which is typically a busy time for college students traveling to and from class.

A 30-minute all day schedule will require additional service from Duluth from 9:20am to 2:20pm and will meet many transportation needs that are poorly served with the current schedule.

## **Fourth Year**

The fourth year of the plan would be contingent on the successes of the first three years. A new route would be established linking Itasca with the South Tower commercial area (see Figure 53). Route 16 would be terminated at Mariner Mall allowing a 60 minute cycle time for efficient scheduling between Mariner Mall and Duluth. Timed connections would be designed for the Itasca portion of Route 16 which would now be served by Route 18. Route 17 would be analyzed and a determination would be made if additional 17 trips should be operated instead of the current 17S/17B combination. The midday 60 minute interval should be improved to a 30 minute interval in this year.

The new Route 18 from Itasca would operate over Route 16 (with recommended improvements from year one) to Mariner Mall, then via 28th to Tower to Walmart. The terminal operation would be via Henry Cohen (serving Target and Walmart) to 39th, then northbound on Tower to 28th to Mariner Mall and then outbound on current Route 16.

## **Fifth Year**

In the last year of the plan, 30 minute service on all routes would be operated for a seven hour period on Saturdays and Sundays. Many transit dependent passengers and part-time workers will benefit from 30 minute intervals from approximately 10:00am to 5:00pm. Holiday service would be added on the holidays when DTA is operating service in Duluth on Routes 16 and 17.

Service improvements that are gradually implemented will result in a more robust transit system in Superior that meets the needs of local citizens for trips within Superior as well as providing valuable connections for people traveling between Superior and Duluth. Increased WisDOT funding and increased student fees are unlikely at this time. However, a change in the political direction in Wisconsin in the future may increase state transit funding and also allow UWS to increase funding for a variety of programs including improved transit service. When that occurs, this plan will provide the guidance to service improvements.



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## 5-Year Transit Vision Summary

### Issues to Resolve

- Lack of midday frequency on Superior routes limits their usefulness
- On-time performance has steadily declined
- Ease travel within Superior while maintaining connection to Duluth
- Lack of awareness of transit system

### Implementation Plan Assumptions

- Top priority is to address issues in a cost-neutral manner
- One revenue hour of DTA service in Superior is \$97.00 per hour, local share approximately \$38.00 per hour
- Existing service has a number of strengths, including service delivery, through routing, and serving transit supportive areas
- Current levels of State and Federal transit operating and capital assistance

	Year 1-2: Transit Improvements Using Existing Resources	Year 2-3: Investments in Service Span, Frequency and Marketing	Year 4-5: Investments in Service Frequency and Route Redesign	Notes
Operational Strategies	Initial changes include adjusting the terminal locations of routes on selected trips, and changing bus routes to be more direct at times and places with low ridership. The focus in the first two years will be to improve service reliability.	Continue to make service changes that focus on improved reliability and convenience. The next phase would be to invest in additional evening service and more trips serving UWS.	Add midday frequency to existing Superior bus routes, explore restructure of service to include crosstown route.	First year changes will stabilize ridership decline.
Capital Cost Impact	N/A	No new vehicles required, however additional mileage may increase replacement rate.	One heavy duty transit bus (700 Series): \$450,000	
Operating Cost Impact	There may be a minor operating cost increase to update signage, maps, and customer information.	\$155,000/year total operating cost	Add 1 bus to full span of Superior Service: \$195,000/year	
Policy Changes	Local partners and DTA should continue to pursue funding partners to leverage additional investment into public transit. Also, DTA staff should continue market research and look to expand travel training program to Superior.	Service expansion requires additional funding sources.  Increase marketing resources/partner with social service agencies.	Requires additional funding sources.	

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# Northern Lights Express Coordination

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## Background

The Northern Lights Express (NLX) is a proposed train service connecting Duluth and Superior with Minneapolis and four other cities on the route. The proposed speed is 110mph and proposed travel time is 2 ¼ hours between the terminals. The service between Superior and Minneapolis will be time competitive with auto travel in the I-35 corridor. The slow speed between Superior and Duluth will negate the time advantage for trips originating and terminating in Duluth.

It can be expected that Superior will be the primary station on the north end of the route for commuters and business customers who are time sensitive in their travel needs. Most of these customers will drive and park at the Superior train station. Duluth will primarily serve customers who are not as time sensitive in their travel patterns. Approximately 22% of the projected 938,000 annual passengers will be commuters and business travelers. Ridership predictions for Superior in a 2007 study is estimated to be 100,000 passengers per year with a service level of 110mph and four trains per day. There will be approximately 300 to 350 trips per day to and from Superior.

## Rail Station Location

The proposed station location in Superior located northwest of the intersection of Belknap and Oakes. Routes 16 and 17 operate on Tower Avenue near the proposed location. The nearest bus stop is the primary transfer location in Superior at 14th and Tower. The current bus stop is approximately 800 feet from the edge of the proposed train station property.

## Route Modifications

One of the recommendations of the current bus route study is to shorten Route 17 to save time and improve reliability. Moving the north terminal of Route 17 to 14th and Tower will improve reliability on the current route and can also serve the new train station. Route 17 can use Banks or Oakes to turnaround from Belknap to 14th Street. Traffic engineering and site analysis is needed to determine the best option. A bus stop near the train station will serve inbound and outbound customers on Route 17. Ridership between Route 17 and NLX will be very low.

Route 16 is a primary trunk route serving many destinations in Superior and making timed connections in Duluth. The train schedule is unknown at this time, but typically there will be an early morning departure which may be before Route 16 service starts. Similarly, there will be an evening arrival that will arrive after service has ended for the day. Routing changes to Route 16 to serve train passengers may have a negative effect on existing bus passengers because additional time will be needed.

The edge of the train station property is approximately 800 feet from 14th and Tower bus stop for Route 16. Many airport transit stops often have 800 feet walk distance from the transit station to the terminal (O'Hare; Midway; Washington Reagan, etc.). Other rail stations have long walking distances from the transit station to the terminal (Washington Union Station, Chicago Union Station, etc.).

Northbound Route 16 can be modified to be closer to the station by operating on Belknap to Oakes to 14th to Tower and then resume the normal route (see Figure 54). This may require some traffic engineering modifications at 14th and Tower to accommodate the left turn from 14th to Tower. The current bus stop may also have to be moved to the north to accommodate the left turn movement of the bus.

Southbound Route 16 can be modified to use 13<sup>th</sup> to Oakes to 14th to Tower. The bus stop for the train station will be at 14th and Oakes on the southeast corner. Traffic engineering analysis is needed to determine if parking or other modifications are needed at 13<sup>th</sup> and Tower and 14th and Tower (see Figure 55).

The additional time for the added northbound and southbound mileage should be recovered by modifying the route in other locations so that the total travel time from Duluth to its southern terminal remains the same. Changing the route and adding mileage will have a negative effect on reliability unless there is an equivalent time savings in other locations on the route.

## **Pedestrian Access**

There is a very good sidewalk network from the 14th/Tower bus stop to the proposed train station. Adequate way-finding signage should be added to guide pedestrians traveling between the train station and the bus stop.

## **Private Sector Transportation**

It is likely that there will be private sector solutions for non-automotive train station access. There is bus service (Skyline Shuttle) from Duluth to MSP airport and it will probably continue after NLX service is implemented due to the time savings of a direct bus service to the airport from Duluth compared to the NLX and Metro Light Rail Blue Route. Existing private sector bus service can be modified to accommodate passengers traveling between the Superior train station and Duluth. Similarly, taxi service will be a significant source of access for train passengers as it is in many similar sized cities with train service.

Incentives for private sector transportation service should be included in the station design and traffic access to the station. Taxi, limousine, and express bus service lanes and pickup locations should be closer to the station/platform than the parking structure. Other incentives can include a comfortable and safe waiting area for arriving passengers near the taxi/limo/bus pick location; easy luggage maneuverability; and real time arrival information to taxi operators when the train is within 15 and 30 minutes of arrival.

Figure 52. NLX Route 16 Modifications

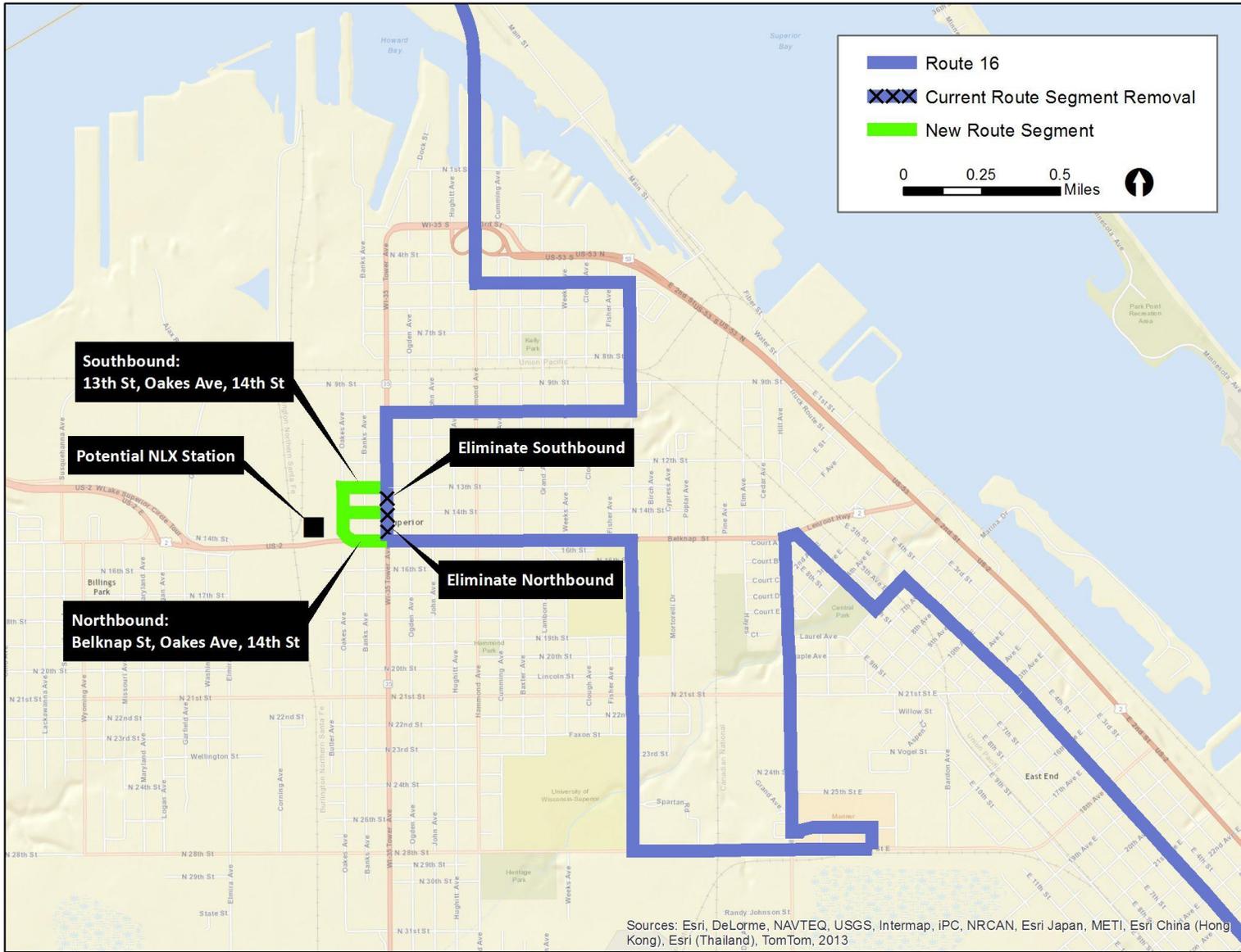
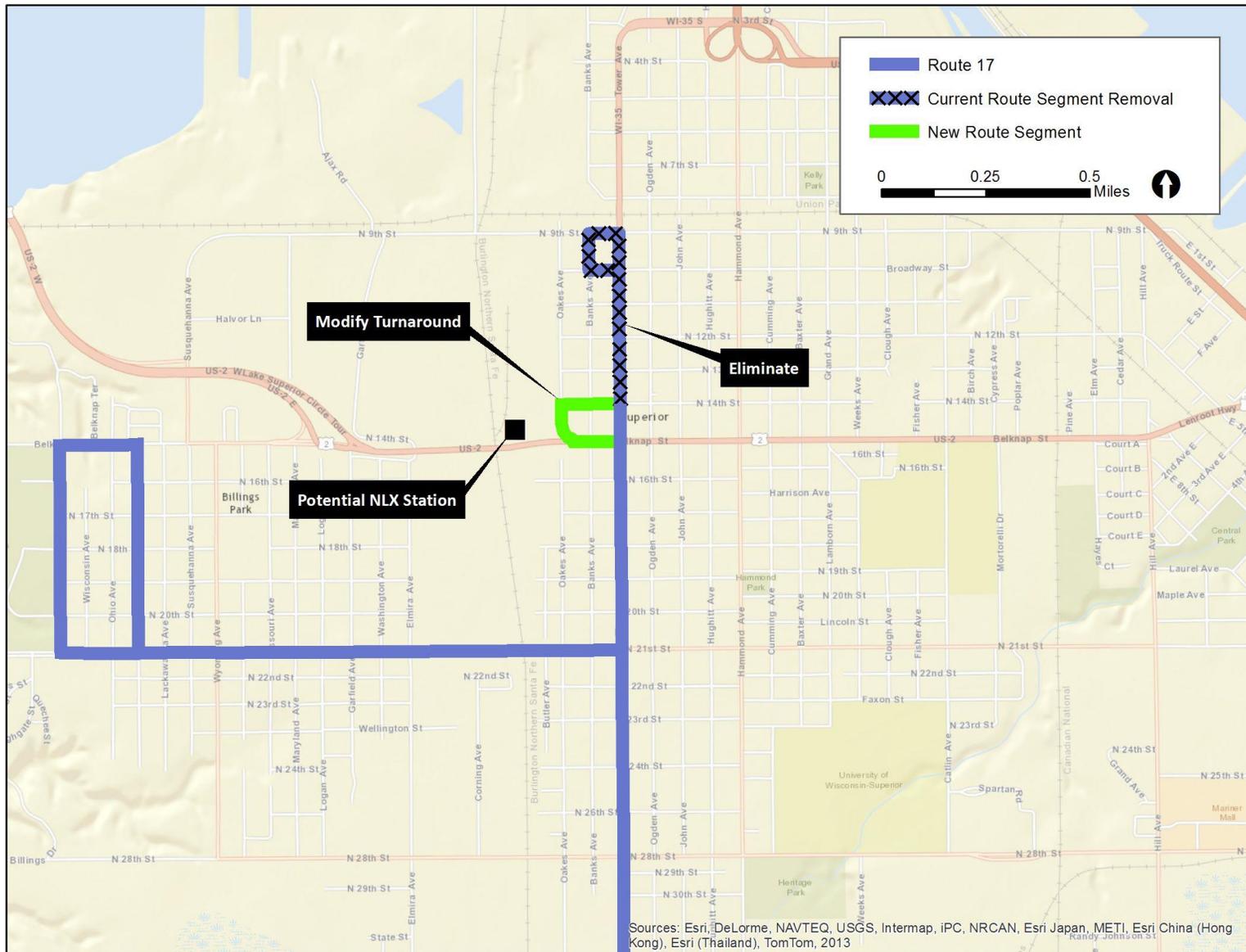


Figure 53. NLX Route 17 Modifications



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

# Policy/Administrative Recommendations

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The analysis presented in this plan recommends several operational changes to address declines in both ridership and on-time performance. Many of these improvements can be accomplished at a neutral cost to the transit system and the City of Superior. In addition to these operational changes, there are several administrative actions that can be taken to stabilize declines in ridership and performance. The City of Superior has a valuable partnership with DTA, as DTA has the technical capacity to complete various marketing and outreach strategies. Additionally, there is a network of transportation professionals in the Duluth-Superior region and Douglas County that meet regularly that have the ability to troubleshoot and collaborate on items that concern regional mobility. The following are recommendations related to transit system administration, funding policy, and public outreach that will aide in ridership growth and public engagement.

## Marketing and Outreach

Survey efforts undertaken at the time of the comprehensive operations analysis showed that there are segments of the transit market that are underserved. To better understand these market gaps, continued surveys and interaction with public and private agencies should be pursued.

## Senior Population and New Riders – Travel Training

Survey research indicates that people over the age of 65 represent a low percentage of Superior’s transit ridership. The same can be said of the cohort of individuals that have been using transit for less than five years. This is attributable to many factors. Older adults tend to stay more active and keep their driver’s licenses longer than those of previous generations. Additionally, Douglas County operates a transportation program for seniors, and there are numerous volunteer driver programs operating in Northwestern Wisconsin that connect older adults and military veterans to medical appointments. Still, fixed route transit can provide a level of independence beyond that of a demand response service, given regular schedules and ease of use.

Additionally, for people from predominantly rural areas, using public transit is not a common mode of transportation as the automobile is the most common means of mobility. A travel training program is a proven means of building ridership among these markets. DTA conducts outreach and travel training in house, and partners with agencies like North Country Independent Living to implement this program. Transit can be a new experience for people, and often there is anxiety about figuring out where the bus will go and getting stranded. Additionally, even the clearest schedules and maps can be confusing to those who are new to the concept of public transit. Elements of travel training programs include:

- Bringing a bus to schools, universities, and social service organizations for tours and demonstrating how to board, pay fares, ride, and disembark safely

- Establishing a “bus buddy” program for older adults and people with special needs where a staff person rides the bus with an individual to teach them how to use transit.
- Outreach sessions with local organizations, marketing presence at community events (job fairs, farmer’s markets, festivals, etc.)

Rural transit providers in Northwestern Wisconsin (Bay Area Rural Transit, Namekagon Transit) also have mobility managers that conduct travel training and outreach services. Similar services are provided by Arrowhead Transit’s Rural Ride programs in Northern Minnesota. There may be possibilities for future collaboration among regional transit providers.

## **Funding**

In the set of transit concepts proposed earlier in this report, one recommendation was to adjust schedules and add frequency to better accommodate students, staff, and faculty at UWS and WITC, the two largest higher education campuses in Superior. This would amount to an expansion of service and as of the completion of this report, this is not something that can be accomplished using the City of Superior’s present day resources. The same is true of all other expansion scenarios. In addition to adjusting fare revenue, these mechanisms have been used in other Wisconsin communities to leverage additional investment into public transit systems.

## **Educational Institutions**

In many communities that provide transit service in small urban communities, universities, technical colleges, and public and private school systems are funding partners for the public transit system. This local share of funding can be sourced from student activity fees, bus passes purchased in bulk quantities (tuition and fee based), or transportation income from parking utilities. It is common in Wisconsin for higher education institutions to contribute to approximately 5-10 percent of transit system operating expenses. Convenient public transit service is consistent with many educational institution goals, such as managing parking, congestion, and reducing dependence on fossil fuels, and they can be valuable partners.

## **Specialized Transportation Assistance for Counties**

The 85.21 program is a grant that is made to each county in the State of Wisconsin to support the mobility needs of the elderly and disabled. Generally, each county is allocated a share of the annual state 85.21 appropriation proportionate to its share of the total statewide population of elderly persons and persons with disabilities. However, these amounts are adjusted to ensure that each county receives not less than 0.5 percent of the total annual program appropriation. Each county must provide a 20 percent match of these funds. Up to \$80,000 of 85.21 funding can be held in a trust for future purposes such as capital purchases or future projects. Typical uses of 85.21 funding include providing transportation to medical activities, nutritional activities, and work-related activities. 85.21 funded projects can serve the general public on a space available basis. The funding can also be used to leverage FTA

funds as non-federal share. In Douglas County, 85.21 funding supports a senior bus service and some specialized rural transit services, but the flexibility of this funding source makes it a valuable method of leveraging state and federal funding to support public transit.

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