

Duluth-Superior Area Transit Vision - 1998

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INTRODUCTION

PREFACE

The Metropolitan Interstate Committee (MIC) initiated development of a comprehensive transit plan for the Duluth-Superior metropolitan area beginning in mid-1996. The MIC is the designated transportation planning agency conducting studies in the urbanized area of Duluth and Superior. The project is being conducted in cooperation with the Duluth Transit Authority (DTA) and other transit providers in the area. This document culminates the efforts of all the staff within the Transportation Division of Arrowhead Regional Development Commission (ARDC), DTA staff and Board members, technical advisors from local government bodies, as well as many individuals from the general public that were an integral part of this study via focus group meetings and surveys.



DTA bus on Superior Street in Duluth.

PURPOSE OF THE STUDY

The Duluth-Superior area has experienced significant changes since the Duluth Transit Authority (DTA) bus system was put into operation years ago. Some of the more notable changes include the expanding commercial growth in Duluth's Miller Hill corridor and the Tower Avenue corridor in Superior. The metropolitan area has shifted from a highly industrial one to an area that is more focused on tourism and the service industries. Population has shifted from the central city areas to the outer fringes of each community. These changes have created a more widespread residential population covering large expanses of land. Density is lower in the surrounding areas than in the central city, which stretches the feasibility and increases the cost of transit service.

In response to these issues, provision of public transportation in the Twin Ports area has been thoroughly examined in order to meet current demands and to best serve the general public. Meeting the transportation needs of senior citizens, people with disabilities, and students as well as other demographic groups that rely on transit are all key aspects studied within the scope of this project.

Staff at the Metropolitan Interstate Committee (MIC) and DTA have conducted a comprehensive study to examine the condition of bus service in

the metropolitan area to address the changing needs of the community. The focus of this study is to provide the DTA with short and long range recommendations that will allow the bus system to maintain its vital role in transportation of individuals now and in the future. Results of the study will include recommendations to make transit usage more attractive to those who currently use the DTA and those currently not using public transportation to meet their travel needs. The plan will involve matching service needs to service types (size of bus, frequency of service, location of service), and it will examine DTA's financial position as well as explore innovative ways to continue financing operating and capital costs.

PROJECT OBJECTIVES

- Develop and/or update DTA route standards and policies. This will provide the DTA with a system evaluation and enable the bus service to operate at maximum effectiveness.
- Develop a Market Plan that addresses the existing demographic make-up of the metropolitan area in terms of successfully exploiting niches in both new and mature markets.
- Plan for meeting the needs of those individuals with disabilities.
- Provide major employers and businesses in the metropolitan area with enhanced transit opportunities to allow their employees a better choice between transit and the private automobile for meeting their transportation needs.
- Strengthen the link between transit planning and community planning by inclusion of land use and urban design policies that support the use of transit.
- Develop innovative solutions in the provision of transit service for the Twin Ports that includes practices never applied to the DTA in the past. These options will include optimizing the latest in technological advances used in the transit industry today, to make transit more attractive to the public.

PROJECT OVERVIEW

The following provides a listing of the key components analyzed and discussed within the Duluth - Superior Vision for Transit study.

- Review existing bus service and performance measures,
- Review impacts of current and future trends which affect transit use,
- Review changes in commuting patterns,
- Identify current and future major travel destinations,
- Identify future capital needs that may better serve the riding public while also cost effective for the DTA,
- Identify needs and options for suburban service,
- Develop performance standards for different service types to ensure that the services are provided cost effectively,
- Discuss Travel Demand Management (TDM) strategies for the downtown, UMD and Miller Hill Corridor,
- Develop a marketing plan, (conduct market research and develop market strategies)
- Develop link between transit and community planning,
- Compare DTA service to similar services operating elsewhere in the Midwest,
- Identify technological innovations for the DTA to examine and implement,
- Examine security and service quality issues and needs,

- Develop financial plan,
- Develop priorities for transit service delivery, and
- Develop recommendations for service improvements.



DTA bus traveling across the Bong Bridge to Superior.

DTA MISSION, GOALS, OBJECTIVES & STANDARDS

The Mission of the DTA shall be to provide public transit service that is safe, convenient, efficient, and affordable.

GOAL I: Maximize the use of public transit by area residents by promoting a strong customer focus throughout the organization that ensures their needs and travel patterns are understood and consistently met or exceeded.

SERVICE DELIVERY OBJECTIVE:

Objective: On-Time Performance

The DTA will increase on-time performance at all route time points and maintain scheduled trip service reliability.

Standard

Schedule Adherence - The DTA defines "On-Time" Operation as zero minutes ahead of schedule to no more than three minutes behind schedule. Behind schedule operation can develop from a number of uncontrollable circumstances, but ahead of schedule operation is avoidable and should never occur. During peak periods, bus service shall maintain or surpass 90 percent of "on-time" service and 95 percent during all other operating periods. The on-time standard shall be measured for the system and for individual routes quarterly and apply to all scheduled time points. (Measurement = percent on-time trips for peak and non peak periods).

Standard

Service Reliability - The DTA will strive for 99 percent of all scheduled trips to be operated and will maintain a minimum of 4,500 vehicle miles between road calls. (Measurement = percent missed trips and miles per road failure).

The DTA will increase on-time performance at all route time points.

The DTA will attempt to improve customer satisfaction each year.

PASSENGER COMFORT/SATISFACTION OBJECTIVE:

Objective: Customer Satisfaction

The DTA will attempt to improve customer satisfaction each year and strive to minimize unsatisfied customers by monitoring customer complaints and offering corrective action when possible/appropriate.



Customers boarding DTA on Tower Ave. in Superior.

Standard

___ percent* of on-board survey respondents reporting being satisfied with DTA service. The DTA will establish an on-board survey question measuring customer satisfaction.

Standard

All customer complaints will be investigated and monitored. Summaries of complaints will be evaluated by route and classified as operational, service, or equipment.

ROUTE DESIGN OBJECTIVES:

Objective: Route network

Route network changes in spacing and layout will consider both the transit user and the transit operation in an attempt to reach compatible solutions for both to enhance service.

Standard

The following variables will be considered in determining route spacing and layout:

- Population density (current and projected).
- Employment density (current and projected).
- Service area characteristics (age, income, auto's per household, etc.).
- Street patterns and physical characteristics (e.g., parking, traffic control devices).
- Load capacity of service provided.
- Enhancement of timed transfers.

Standard

Directness of Service - To keep travel time to a minimum for bus patrons. The miles traveled by bus between major destinations should not exceed 1.3 times the distance possible by automobile (with the exception of cross-

* Upon receiving annual on-board survey results, an appropriate percentage satisfaction rate will be determined.

town routes and large loop designed routes).

Objective: Travel Time

The travel time required from boarding point to destination within the service area shall be maintained as low as possible. However, travel time is dependent on the type of service provided and the nature of the destination desired.

Standard

Major Destinations and Express Service - The travel time required for a bus user shall not exceed a multiple of 1-1/2 the travel time required by automobile. Major destinations are limited to downtown Duluth, the medical complex and Miller Hill Mall.

Regular Route Destinations (Non-Major) - The travel time required for a bus user shall not exceed a multiple of two times the travel time required by automobile for non-major destinations.

Cross-town Service - The travel time required for a bus user shall not exceed a multiple of three times the travel time required by automobile.

ADA and Non-Regular Route Service - The travel time required for any user shall not exceed 60 minutes.

These standards will aid in maintaining the competitive advantage gained through private economics of mass transit, especially for long travel distances. Travel time is measured from terminal to terminal and based on following an identical route alignment versus the private automobile.

Objective: Transit Facilities and Rolling Stock

All facilities and equipment encountered by a patron during the transit trip such as, shelters, signs, vehicles, transit information, etc. shall be well maintained and enhance the experience of DTA customers. Measurable standards have been identified only for buses and the location of bus shelters.

Standard

Rolling Stock - The total number of vehicles needed to service an area shall be related to the changing demand consistent with operating and replacement standards. The DTA will strive to maintain a fleet of different vehicle styles and sizes to address the changing needs of the riding public. Driver suitability and comfort as well as passenger comfort will be considered for vehicle purchases. In addition, all vehicles shall comply with current Americans with Disabilities Act (ADA) standards and meet all mandated bus testing measures as specified by the Federal Transit Administration (FTA). Changes to the rolling stock may be

All facilities and equipment encountered by patrons during the transit trip shall be well maintained and enhance the experience of customers.

The DTA will strive to maintain a fleet of different vehicle styles and sizes to address the changing needs of the riding public.



warranted due to service changes or cost efficiency standards.

Average Fleet Age - Average fleet age for each vehicle type shall be half of the maximum life cycle age as determined by the Federal Transit Administration (FTA). Buses that have been rehabilitated as currently planned should have 10-year and 19-year useful life for gasoline and diesel vehicles, respectively. This standard relates to a combination of safety, comfort, maintenance, marketing, and cost factors.

Vehicle Usage - The number of buses under six years of age should be sufficient to satisfy off-peak service levels, allowing older buses which are more expensive to maintain to be held in reserve. Rehabilitated buses under three years of age should be considered new.

Standard

Shelters - The Duluth-Superior area is subject to a wide range of weather conditions to which ridership is sensitive. Shelters are needed to provide comfort for waiting passengers during inclement weather. Shelters will provide clear vision in all directions, seats, lighting, and schedule and route information.



DTA Shelter on Corner of Superior St. & Lake Ave.

Criteria for locating shelters

- All stops where 25 or more people board on the average weekday, with seniors and disabled passengers counting as two.
- Every neighborhood will have at least one shelter as will every route.
- Complete DTA schedule information shall be posted at all bus shelters and shall meet ADA requirements for use by the disabled population.

SCHEDULE ADHERENCE OBJECTIVES:

Objective: Passenger Loading

Loading standards must be related to operating costs, revenues produced passenger comfort. Loading standards are expressed as the capacity of the vehicle. For example, a load factor of 100 percent implies that the number of seats and passengers are equal, while a load factor of 150 percent implies there are three passengers for every two seats.

Although it is desirable to provide a seat for each passenger at all times, it is usually not economically feasible. Since rider characteristics for the system and each route vary by time of day, loading standards shall likewise vary in this manner. In establishing these standards,

consideration shall be given to the length of time passengers are required to stand during the interchange of passengers along the route.

Standard

System-Wide - An absolute maximum load standard of 150 percent shall be established.

Peak Hours - 120 percent load factor will be the maximum standard for the period of maximum vehicle requirements. DTA will adhere to this standard in 95 percent of all scheduled trips.

Off-Peak Hours - 90 percent load factor will be the maximum standard for the period of minimum vehicle requirements. DTA will adhere to this standard in 95 percent of all scheduled trips.

Freeway operation - Maximum allowable load factor will be 100 percent. Load factors will be monitored by drivers and customer complaints; upon which a more systematic measurement will be determined.

Objective: Fixed Route Headways

The scheduled time between buses passing a given point shall be determined primarily by time of day, passenger loads and also by service area characteristics such as population density, income and auto ownership. Headways shall be at their maximum when minimum service is provided during off-peak periods.

Standard

Where economically feasible, peak headways shall not be over 30 minutes while off-peak headways shall not be over 60 minutes.

ECONOMIC AND PRODUCTIVITY OBJECTIVES:

Objective: Effectiveness

Increase transit ridership by three percent each year.

Performance Measures

Ridership will be measured by total revenue passengers.

Objective: Economic Efficiency

Increase transit service efficiency each year.

Performance Measures:

- Total cost per passenger
- Revenue per passenger

Increase transit ridership by three percent each year & increase transit service efficiency.



- Subsidy per passenger = decrease by 0.5 percent per year

Objective: Route Efficiency and Effectiveness

In order to utilize transit resources to the greatest extent, route level performance will be analyzed to determine where corrective action is warranted. (Route analysis is discussed in greater detail in Section Five.)

Standard*

Subsidy per passenger

- 20 percent-35 percent subsidy above the system average would be considered for extra marketing efforts and/or minor modifications.
- 36 percent-50 percent subsidy per passenger above the systems average would warrant more significant route changes.
- > 50 percent subsidy per passenger above the systems average would require major restructuring or possible elimination.

Passenger per revenue hour

- 20 percent-35 percent passenger per revenue hour below the system average would be considered for extra marketing efforts and/or minor modifications.
- 36 percent-50 percent passenger per revenue hour below the system average would warrant more significant route changes.
- > 50 percent passenger per revenue hour below the system average would require major restructuring or possible elimination.

Maximum safety and security for all patrons.

All new bus purchases will specify that video monitoring equipment be mandatory.

Goal II: Provide a secure and safe environment that includes operationally safe equipment and facilities as well as personal security and property protection.

Objective: Safety and Security

Maximum safety and security for all patrons and parties affected by the system.

Standard

Passenger Safety - The DTA will strive for zero passenger accidents to be measured by the number of passenger accidents per 100,000 passengers. The DTA will strive to keep vehicle only accidents at the lowest level possible to be measured by vehicle collisions per 100,000 miles.

Standard

Passenger Security - The DTA will track, monitor and report security related incidents on buses and at transit facilities. All new bus purchases

* For Regular Routes whose transfers do not exceed 15 percent of ridership



will specify that video monitoring equipment be mandatory.

Standard

Passenger Security Perceptions - The DTA will strive for all transit riders reporting feeling secure using the transit system measured by periodic on-board passenger surveys. A security perception question will be established for the annual on-board survey.

Objective: Bus Stop Spacing

The number of bus stops along transit routes demand an appropriate balance between trip speed (as measured by riding time) and passenger access convenience (as measured by walking distance to bus stops). Stops at every intersection lead to short walking distances but result in lower average vehicle speeds and greater total trip time.

Standard

Residential Areas - In residential areas, bus stops will be spaced between 700 and 1,500 feet apart, except where the route is operating on steep hills (six percent slope or greater) or where two major boarding points (as determined by the route studies) exist one block apart.

Commercial Areas - In commercial and industrial areas, stops should not be controlled by any general standard, but based on accessibility to major passenger generators.

Goal III: Maintain reliable service to the transit dependent and disabled population.

Objective: Assure on-time performance for STRIDE services.

Standard

On-time performance - Users of the ADA service (STRIDE) will be provided service within 15 minutes (before or after) of their requested scheduling time. STRIDE will maintain this ½ hour window in 99 percent of all operations.

Provide the highest possible level of paratransit service to citizens with transportation disabilities.



DTA Wheelchair Accessible Bus

Objective: Paratransit Service

Provide the highest possible level of paratransit service to citizens with transportation disabilities.

Objective: Transit Service Availability

Maximize transit service availability to congregate housing units with high concentrations of seniors, low income and disabled populations.

GOAL IV: Develop and maintain transit service marketing strategies for all segments of the community that will have a positive impact for the DTA.

Objective: Marketing Resources

An appropriate and effective amount of resources need to be targeted for marketing activities. The marketing budget should be divided into three separate marketing responsibilities; customer services, marketing research and advertising and promotions.

Standard

Industry standards suggest that an appropriate amount of funding for advertising and promotions (total advertising production and media costs) is one percent of total operational costs.

Objective: Commuter Pass Program

Work with employers to promote participation in commuter pass program.

Work with employers to promote participation in commuter pass program.

Goal V: Foster an environment which supports mutual respect and courtesy, ensures that all employees are treated fairly and strives to maintain and upgrade the professional/technical knowledge and competence of employees.

Objective: Employee Participation

Strengthen the employee participation process and enhance communication by continuing commitment to labor management

committee and expanding communication among employees and administration.

Objective: Job Performance

Develop and/or expand recognition program to reward excellence in the performance of job duties.

Objective: Employee Job Satisfaction

Maintain a high level of employee job satisfaction.

Standards

Annual grievances per employee minimized.

Percent of short term sick hours minimized, by department.

Minimize employee workplace injury exposure.

Objective: Employee Training / Professional Development

Encourage employee training and professional development and maximize training benefits by increasing effective job training opportunities for employees.

GOAL VI: Work closely with area communities, businesses and public agencies toward short and long range transit solutions.

Objective: Disadvantaged Populations

Better coordinate transit with human service needs by exploring ways of providing more responsive services to economically disadvantaged populations.

Objective: Land Use and Transportation Policies

Promote transit consideration in decision-making and the development of plans and policies affecting land use and transportation as an alternative to the construction of additional roadways and parking facilities.

Objective: Transit Education

Educate the community about the importance and benefits of public transit as a solution to parking and traffic congestion and as a way to conserve energy and to preserve the environment.

Objective: Working with the Community

Continue to work with the Chamber of Commerce, Greater Downtown Council, area businesses, institutions, and the Duluth Visitors and Convention Bureau to determine their needs as they relate to the services that the Duluth Transit Authority can provide.

Objective: Communities outside Duluth

Provide service outside the Duluth City limits when the municipality, area business or institution served provides the local share of the operating subsidy for the service and guarantees the farebox revenue.

Objective: Service Extension

Community Cooperation - New services or route extensions will be initiated in cooperation with the community or communities involved and will include a publicity campaign with local area support.

Trial Period - At least a minimum six month trial basis will be given to new services. At that time route data will be gathered and an evaluation made concerning route performance and modification to recommendations.

Street System - Any street used for a new or extended service shall be capable of accommodating the new service and be readily accessible to potential bus patrons. The new service will be located with consideration to the present and future growth of the area in question.

GOAL VII: Promote the development of transit facilities and services that meet the needs of the community that are linked to land use planning and design that encourages pedestrian/bicycle access.

Objective: Development Patterns

Encourage development patterns within Duluth and the surrounding metropolitan area that can be efficiently served by transit.

Objective: Coordination of Transit Needs

Promote coordination of transit needs in the design and development of roadway construction with special attention directed toward proper access at large commercial developments and senior citizen housing sites.

Goal VIII: Increase and improve public transportation effectiveness through research and adoption of technology, management practices and service innovation.

Objective: Data and Research

Utilize data and research effectively to analyze current and future opportunities for increasing transit effectiveness.

Objective: Service Operations

Actively study options to become more proficient in service operations, especially with respect to improving passenger ridership and service effectiveness.

Objective: Alternative Fuels

Evaluate the feasibility of using alternative fuels in the delivery of transit service for the Duluth-Superior metropolitan area.



DTA Driver and Bus

DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

The purpose of this analysis is to provide decision-makers with demographic information that relates to transit ridership. This analysis looks at the characteristics of the Duluth-Superior metropolitan area population and identifies areas where current or future transit service may require change.

Research has established correlations between transit ridership and some demographic variables. A number of characteristics are identified as effecting transit ridership. In general, the characteristics that appear to influence ridership rates include population density, housing type, and employment concentrations.

The study area included in this analysis is the area currently served by the Duluth Transit Authority (DTA), as well as adjacent areas that may provide potential markets. The following tables, maps and information are provided as background information for some of the socioeconomic factors for these areas. For this description, 1990 U.S. Census of Population and Housing data were used. Neighborhood boundaries, as defined by the City of Duluth, were used to provide more information about Duluth than the larger census tracts. However, census tracts were used for the City of Superior in the absence of an alternative geographic unit. For the other Minnesota and Wisconsin communities included in the study area, the Minor Civil Division (MCD) geographic boundaries were used.

Transit Vision study area (refer to map on following page):

Minnesota:

- City of Duluth
- City of Hermantown
- City of Proctor
- Canosia Township
- Duluth Township
- Grand Lake Township
- Lakewood Township
- Midway Township
- Rice Lake Township
- Solway Township

Wisconsin:

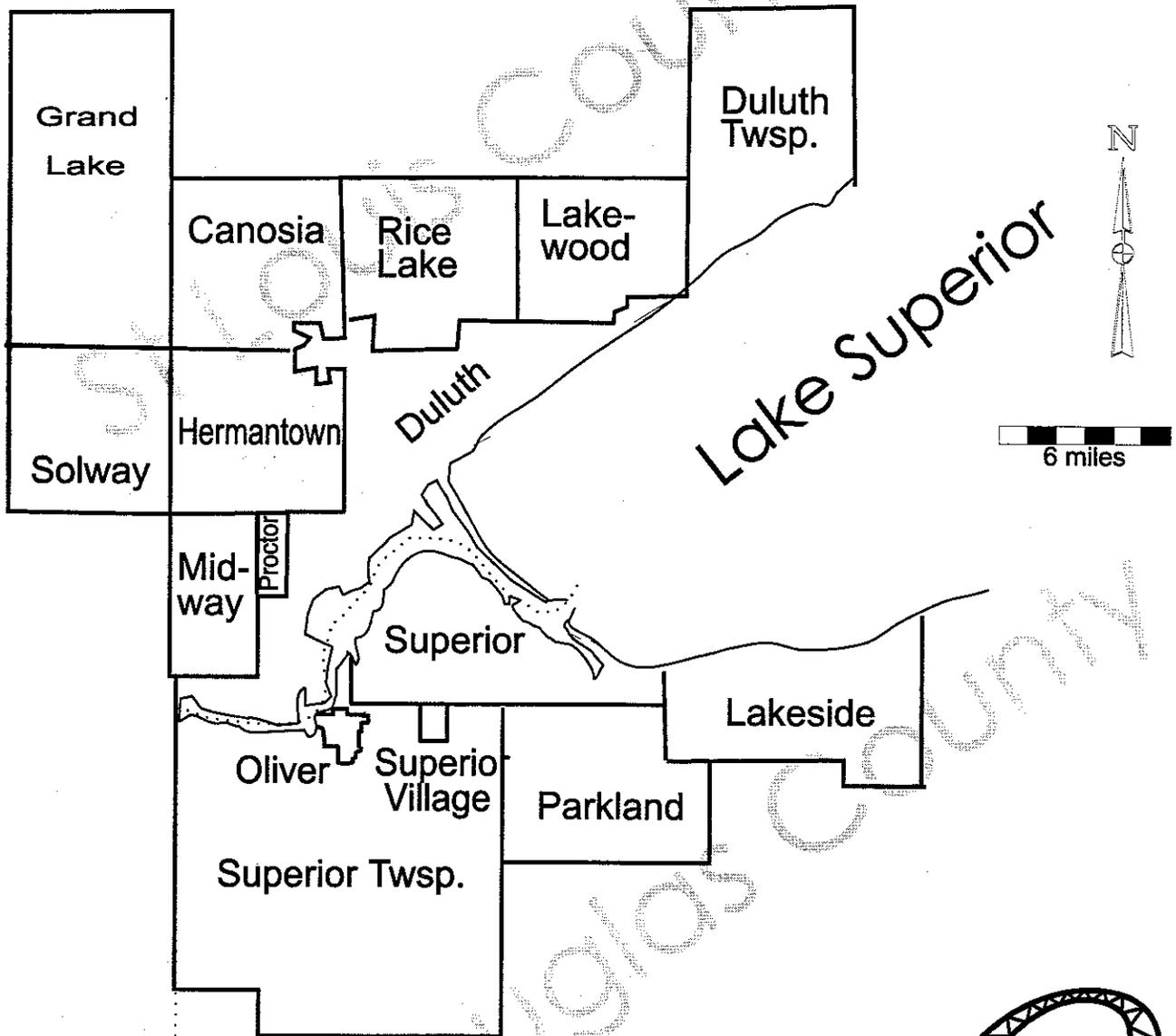
- City of Superior
- Village of Superior
- Village of Oliver
- Lakeside Township
- Parkland Township
- Superior Township

A number of demographic variables are identified as effecting transit ridership.

Duluth-Superior Metropolitan Interstate Committee

Jurisdiction

TRANSIT VISION

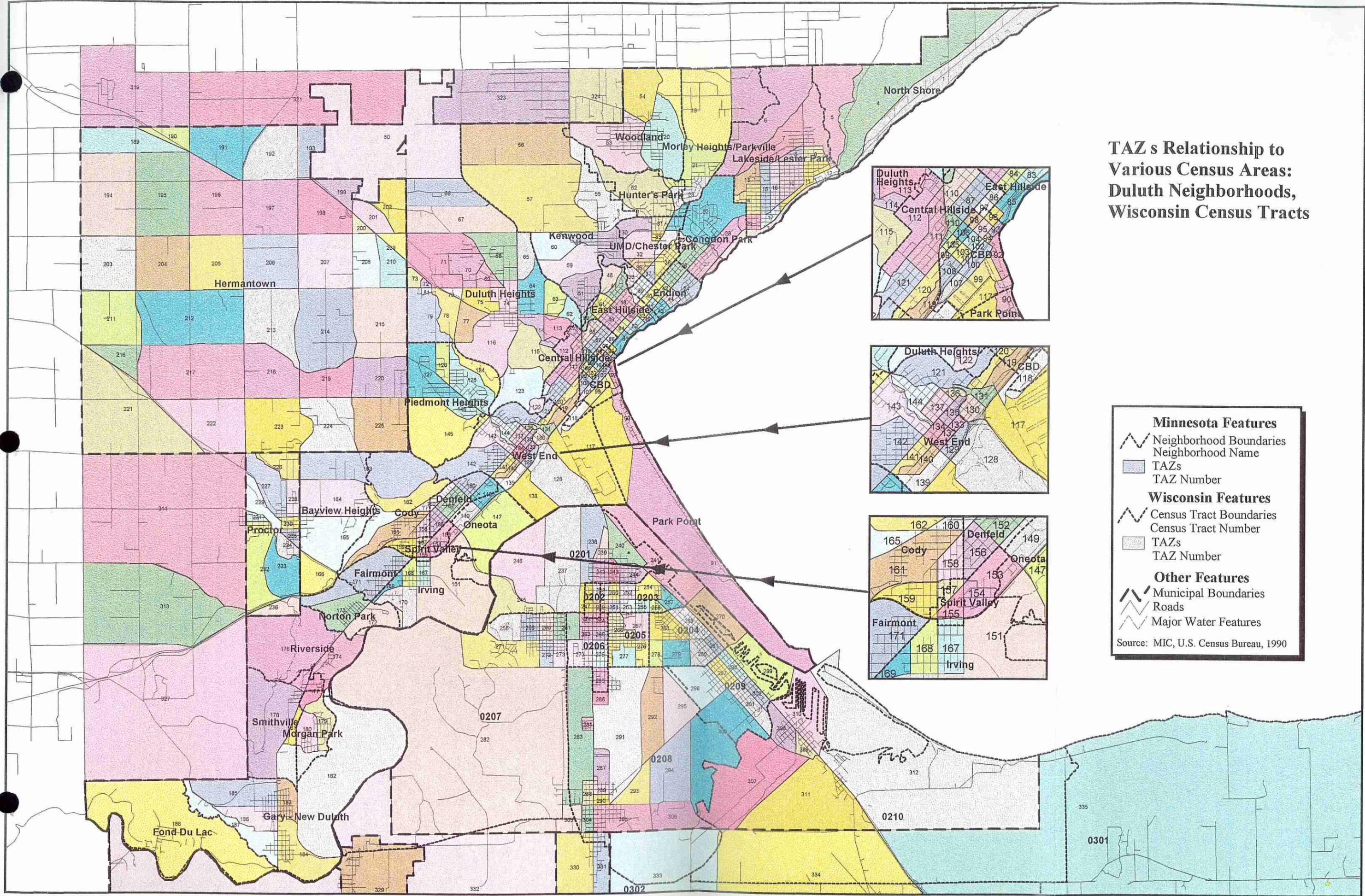


During the later stages of this study, The U.S. Department of Transportation's Bureau of Transportation Statistics released the "Census Transportation Planning Package: Urban Element" (CTPP). The CTPP provides 1990 transportation related census data at the Transportation Analysis Zone (TAZ) geographical level. Much of the CTPP information is obtained from the Census Long Form. Since only one in six households receive the Long Form, caution should be taken in interpreting this data, particularly in sparsely populated TAZ's.

Transportation Analysis Zones provide compact and contiguous geographic areas with homogenous travel related characteristics, for example, TAZ's separate commercial and residential activities within an area. The Metropolitan Interstate Committee, serving as the Duluth-Superior Metropolitan Planning Organization, was responsible for determining the 354 TAZ boundaries for the metropolitan area. Transportation Analysis Zones provide a smaller, more disaggregated geographic area than neighborhoods and census tracts which allows for a more detailed spatial analyses. The map on the following page identifies neighborhoods and TAZ boundaries. As the map illustrates, several TAZ's fit within each neighborhood.

While the Census information is approximately six years old, according to the latest available population estimates by the Minnesota Office of the State Demographer and the Wisconsin Demographic Services Center, the total population for these areas has not changed significantly since 1990. Therefore, the information presented should provide an accurate reflection of the communities in the DTA's service area and outlying areas.

Transportation Analysis Zones provide compact and contiguous geographic areas with homogenous travel related characteristics.



TAZ s Relationship to Various Census Areas: Duluth Neighborhoods, Wisconsin Census Tracts

Minnesota Features

- Neighborhood Boundaries
- Neighborhood Name
- TAZs
- TAZ Number

Wisconsin Features

- Census Tract Boundaries
- Census Tract Number
- TAZs
- TAZ Number

Other Features

- Municipal Boundaries
- Roads
- Major Water Features

Source: MIC, U.S. Census Bureau, 1990

General Characteristics

According to the American Public Transit Association (APTA), certain socioeconomic characteristics of the U.S. transit-riding population emerge as indicators of which segments of the population are more likely to use transit. The APTA findings identify the following groups as more likely to use transit:

- Females
- Senior citizens
- Persons with disabilities
- Households/families with below median incomes
- Renters

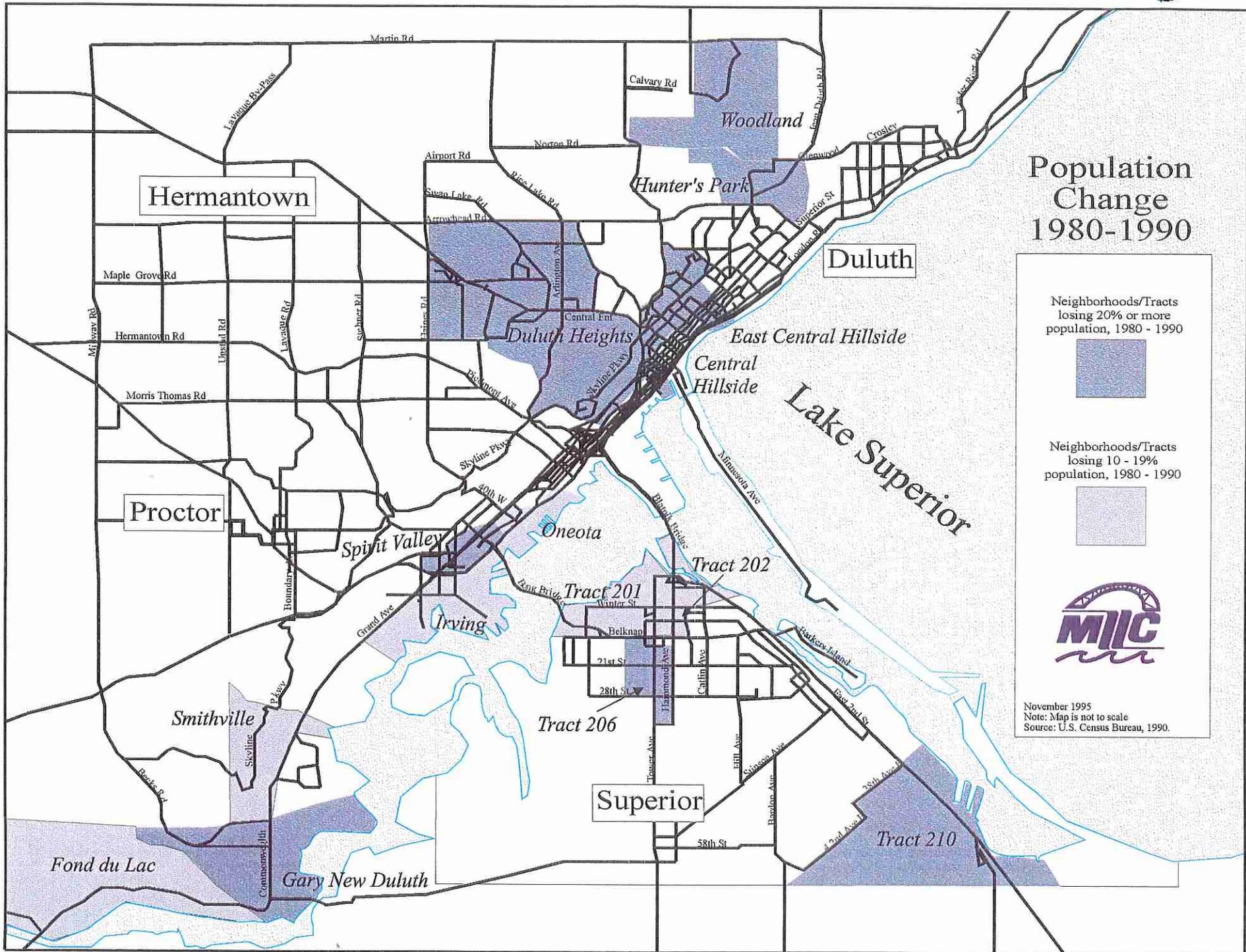
Other factors, such as the availability of an automobile, or whether employment areas discourage auto use also play a role in the likelihood of riding transit.¹ Though research has identified these factors as having impacts on transit ridership, there is little documentation on how much of an influence any one of these factors have. With the realization that there are unique characteristics of each transit system and service area, there are no industry-wide thresholds for determining exactly when a particular population characteristic indicates the likelihood of more or less transit ridership.

Population Change

The Duluth-Superior area saw a considerable change in population between 1980 and 1990. The loss of population over that time period impacted the DTA's transit ridership and service. The map on the following page illustrates the areas that experienced large population changes. The map shows that the Duluth neighborhoods of Oneota, Irving, Smithville and Fond du Lac lost 20 percent or more of their populations during the 1980's. In the City of Superior, the northern sections of the city lost similar population percentages.

Segments of the population are more likely to use transit.

¹ American Public Transit Association, "Americans in Transit: A Profile of Public Transit Passengers," 1992.



Population Change 1980-1990

Neighborhoods/Tracts
losing 20% or more
population, 1980 - 1990



Neighborhoods/Tracts
losing 10 - 19%
population, 1980 - 1990



November 1995
Note: Map is not to scale
Source: U.S. Census Bureau, 1990.

Tables 3a through 3c identify population changes in metropolitan area neighborhoods. Population losses may have affected other neighborhoods as population shifted from one neighborhood to another. This may be the case with the population growth seen by Grand Lake, Canosia, and Lakewood Townships. It is interesting that while the metro area as a whole lost population, these townships actually gained in population; this growth appears to indicate a shifting in population away from the denser, more populated urban areas to the less dense, suburban areas adjacent to Duluth.

Table 3a: Duluth Population Changes: 1980-1990

	1990 Population	1980 Population	Change	Percent Change
<i>City of Duluth</i>	85,493	92,811	-7318	-7.9%
Duluth Neighborhoods:				
Fond du Lac	281	350	-69	-19.7%
Gary New Duluth	2,528	2,795	-267	-9.6%
Morgan Park	1,981	1,940	41	2.1%
Smithville	499	783	-284	-36.3%
Riverside	632	627	5	0.8%
Norton Park	950	968	-18	-1.9%
Bayview Heights	1,641	1,659	-18	-1.1%
Fairmont	1,192	1,284	-92	-7.2%
Irving	1,041	1,476	-435	-29.5%
Cody	2,618	2,901	-283	-9.8%
Spirit Valley	845	981	-136	13.9%
Denfeld	3,598	3,902	-304	-7.8%
Oneota	55	204	-149	-73.0%
Lincoln Park (West End)	6,923	7,353	-430	-5.8%
Piedmont Heights	3,695	4,162	-467	-11.2%
Duluth Heights	5,676	6,573	-897	-13.6%
Central Hillside	5,379	6,328	-949	-15.0%
Central Business District	1,733	1,762	-29	-1.6%
Park Point	1,489	1,560	-71	-4.6%
Kenwood	5,361	5,856	-495	-8.5%
East Hillside	7,273	8,161	-888	-10.9%
Woodland	3,818	4,266	-448	-10.5%
Hunter's Park	1,521	1,711	-190	-11.1%
UMD/ Chester Park	5,731	5,621	110	2.0%
Endion	5,069	5,081	-12	-0.2%
Morley Heights	1,809	1,844	-35	-1.9%
Congdon Park	3,076	3,059	17	0.6%
Lakeside/ Lester Park	8,647	9,177	-530	-5.8%
North Shore	432	457	-25	-5.5%

Source: U.S. Census of Population and Housing, 1980, 1990.

Table 3b: Other MN Community Population Changes: 1980-1990

	1990 Population	1980 Population	Change	Percent Change
Hermantown city	6,761	6,759	2	0.0%
Proctor city	2,974	3,180	-206	-6.5%
Canosia township	1,743	1,562	181	11.6%
Duluth township	1,561	1,604	-43	-2.7%
Grand Lake township	2,355	2,166	189	8.7%
Lakewood township	1,799	1,680	119	7.1%
Midway township	1,500	1,656	-156	-9.4%
Rice Lake township	3,883	3,861	22	0.6%
Solway township	1,772	1,663	109	6.6%

Source: U.S. Census of Population and Housing, 1980, 1990.

Table 3c: Superior Population Changes: 1980-1990

	1990 Population	1980 Population	Change	Percent Change
<i>City of Superior</i>	27,134	29,460	-2326	-7.9%
Superior Census Tracts:				
Tract 201	1,866	2,369	-503	-21.2%
Tract 202	655	824	-169	-20.5%
Tract 203	3,072	3,196	-124	-3.9%
Tract 204	3,117	3,196	-79	-2.5%
Tract 205	2,935	3,168	-233	-7.4%
Tract 206	4,387	5,017	-630	-12.6%
Tract 207	3,978	4,078	-100	-2.5%
Tract 208	3,033	3,053	-20	-0.7%
Tract 209	2,401	2,624	-223	-8.5%
Tract 210	1,683	1,935	-252	-13.0%

Source: U.S. Census of Population and Housing, 1980, 1990.

Population Density

All other things being equal, mass transit operates more efficiently in densely populated areas since transit vehicles can serve a greater number of people while traveling shorter distances. The map following page 3-9 shows the population densities for the Duluth-Superior metropolitan area by TAZ. The density is measured by the number of persons per acre. As the map shows, the areas that exhibit the most dense populations are the central areas of Duluth and of Superior. These areas tend to be older neighborhoods which were built prior to the automobile.

The TAZ density map may be somewhat misleading for cases where a section of the TAZ is densely populated, while the remainder of the zone is relatively undeveloped. It may be useful to look at how extensively developed the road network is to gauge any discrepancies in population densities. In addition, grid pattern streets tend to indicate older, more traditional developments which tend to be higher density. The 1980-1990 trend suggests that the population is shifting away from densely populated neighborhoods within the city to lower density developments in the surrounding suburbs and townships, which should be of particular concern to the DTA.

It is important to note that in spite of the concentrations of population in some parts of the Duluth-Superior area, the population density overall is lower than in many other metropolitan areas. According to the 1990 Census, the City of Duluth, where the majority of the metropolitan area's population is located, had a density of 1,260 people per square mile. In comparison, the Cities of Rochester and St. Cloud have densities of 2,400 and 3,370 people per square mile. As a result, the DTA must extend itself further than other transit systems in the state to serve similar populations. Duluth's rugged topography explains much of the city's overall low density.

Employment Density

Perhaps a more important contributor to transit efficiency and attractiveness is employment density. Large concentrations of employment increases the likelihood that enough demand can be generated to make transit service cost-effective. Transit systems can more efficiently serve areas where trip takers are going to a single trip destination. This condition was common before and during the trolley car era, when most shopping and employment activity was conducted in or near the Central Business District (CBD). The single destination simplifies transit's ability to serve the needs of the population and create the amount of demand necessary to make transit an efficient and convenient alternative.

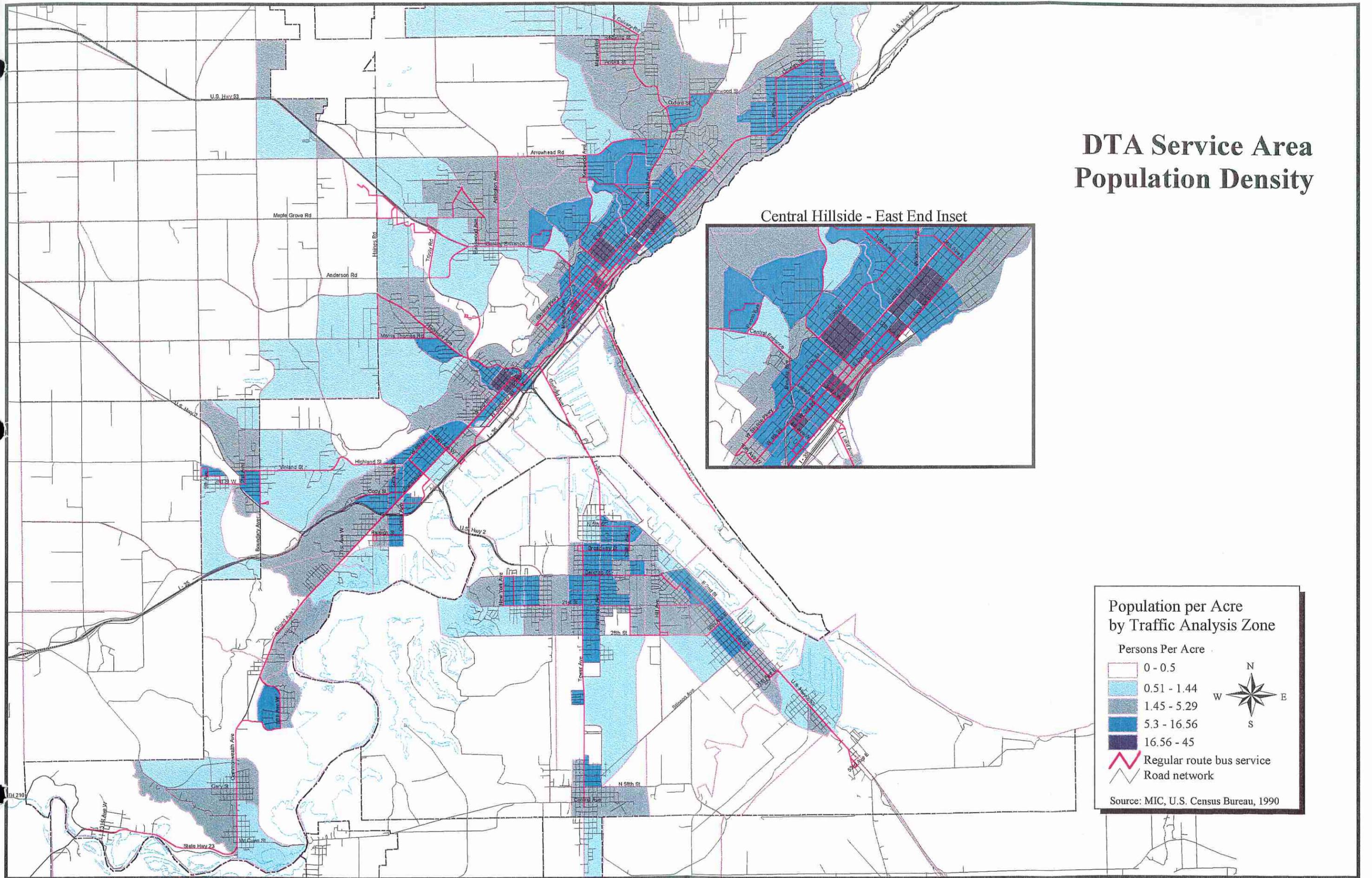
The map following the Population Density Map shows the metropolitan area's employment density. The Central Business District and the Medical campus area in Duluth have exceptionally high concentrations of employment; both of these areas are served well by existing transit service. However, employment and retail activities continue to be growing faster outside the CBD in lower density automobile oriented developments such as the Miller Hill Mall area, which are difficult to serve by transit.

The 1980-1990 trend suggests that the population is shifting away from densely populated neighborhoods within the city to lower density developments in the surrounding suburbs and townships.



Duluth Central Business District

DTA Service Area Population Density



Central Hillside - East End Inset

**Population per Acre
by Traffic Analysis Zone**

Persons Per Acre

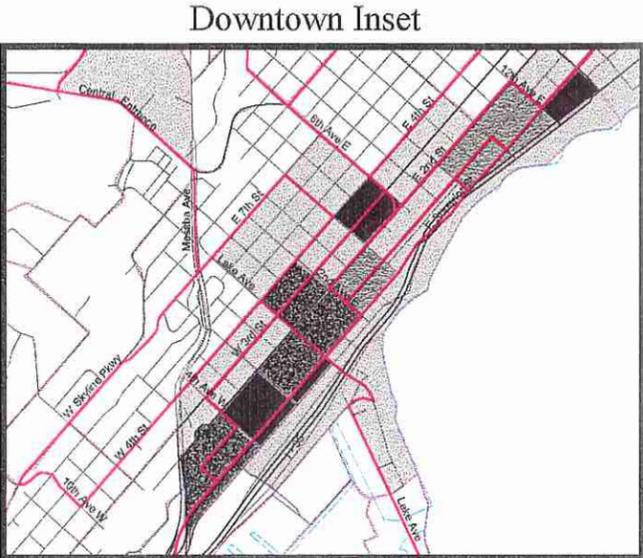
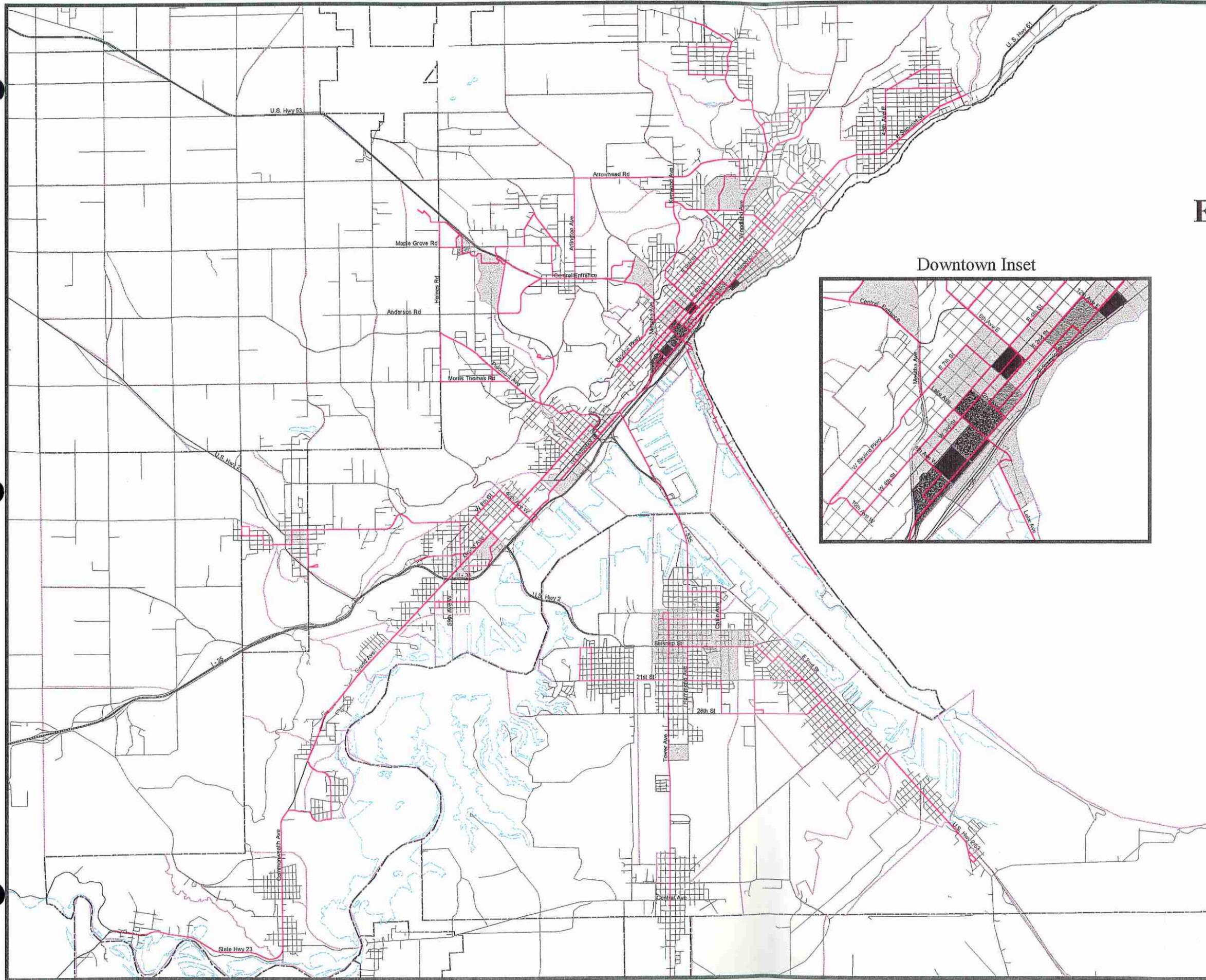
- 0 - 0.5
- 0.51 - 1.44
- 1.45 - 5.29
- 5.3 - 16.56
- 16.56 - 45

Regular route bus service

Road network

Source: MIC, U.S. Census Bureau, 1990

DTA Service Area Employment Density



**Employment per Acre
by Traffic Analysis Zone**

Jobs Per Acre

- 0 - 5
- 5 - 20
- 20 - 50
- 50 - 100
- 100 - 551

Regular Route Bus Service

Road Network

Source: MIC, U.S. Census Bureau, 1990

Population and Income

Though population and employment densities affect how efficiently a transit system can provide service to its service area, total population provides information about the potential "pool" of people from which the transit system can attract riders. Tables 3d through 3g show the total populations for Duluth neighborhoods, Superior census tracts, and other communities. As these tables illustrate, areas such as the West End, Duluth Heights, Central Hillside, East Hillside, UMD/Chester Park, and Lakeside/Lester Park neighborhoods in Duluth have several thousands of people within their boundaries.

Income level is another characteristic that may indicate likely transit ridership. In areas where incomes are lower, there may be an increased likelihood that the area's residents will use transit. While income alone does not indicate who will and will not use transit, the DTA's 1995 on-board survey suggests that transit riders are much more likely to have lower household incomes than Duluth's overall urbanized population. In addition, national profiles have suggested that due to the significant costs of owning and maintaining an automobile, some households opt to use transit in the place of a second automobile. These results indicate that lower income areas such as Spirit Valley, Central Hillside, and Central Business District neighborhoods in Duluth and Tracts 201 and 202 in the northern parts of the City of Superior, may provide opportunities to attract more transit riders (See Tables 3d-3g).

Table 3d: Duluth Populations, Households and Median Household Incomes.

	Total Population	Number of Households	Median Household Income
<i>City of Duluth</i>	85,493	34,646	\$23,370
Duluth Neighborhoods:			
Fond du Lac	281	106	\$27,857
Gary New Duluth	2,528	996	\$20,580
Morgan Park	1,981	844	\$16,889
Smithville	499	182	\$31,000
Riverside	632	216	\$28,125
Norton Park	950	337	\$34,544
Bayview Heights	1,641	667	\$24,770
Fairmont	1,192	511	\$16,464
Irving	1,041	469	\$19,970
Cody	2,618	1,018	\$23,414
Spirit Valley	845	391	\$11,676
Denfeld	3,598	1,591	\$20,804
Oneota	55	17	\$7,931
West End	6,923	2,948	\$16,269
Piedmont Heights	3,695	1,397	\$31,270
Duluth Heights	5,676	2,245	\$28,022
Central Hillside	5,379	2,470	\$14,192
Central Business District	1,733	1,268	\$6,356
Park Point	1,489	574	\$27,308
Kenwood	5,361	1,866	\$30,963
East Hillside	7,273	3,422	\$15,844
Woodland	3,818	1,457	\$33,908
Hunter's Park	1,521	526	\$53,296
UMD/ Chester Park	5,731	1,736	\$27,165
Endion	5,069	2,214	\$21,308
Morley Heights	1,809	606	\$42,067
Congdon Park	3,076	1,147	\$54,489
Lakeside/ Lester Park	8,647	3,252	\$33,326
North Shore	432	173	\$30,750

Source: U.S. Census of Population and Housing, 1990.

Table 3e: Other MN Community Populations, Households and Median Household Incomes.

	Total Population	Number of Households	Median Household Income
Hermantown city	6,761	2,192	\$32,069
Proctor city	2,974	1,196	\$27,768
Canosia township	1,743	629	\$34,777
Duluth township	1,561	587	\$30,560
Grand Lake township	2,355	766	\$34,621
Lakewood township	1,799	611	\$34,706
Midway township	1,500	462	\$30,781
Rice Lake township	3,883	1,373	\$30,009
Solway township	1,772	600	\$32,454

Source: U.S. Census of Population and Housing, 1990.

Table 3f: Superior Populations, Households and Median Household Incomes.

	Total Population	Number of Households	Median Household Income
<i>City of Superior</i>	<i>27,134</i>	<i>11,001</i>	<i>\$20,905</i>
Superior Census Tracts:			
Tract 201	1,866	778	\$10,918
Tract 202	655	411	\$7,786
Tract 203	3,072	1,335	\$16,200
Tract 204	3,117	1,228	\$30,241
Tract 205	2,935	997	\$27,482
Tract 206	4,387	2,003	\$17,970
Tract 207	3,978	1,421	\$26,906
Tract 208	3,033	1,126	\$25,827
Tract 209	2,401	1,008	\$20,417
Tract 210	1,683	691	\$22,831

Source: U.S. Census of Population and Housing, 1990.

Table 3g. Other WI Community Populations, Households and Median Household Incomes.

	Total Population	Number of Households	Median Household Income
Superior village	492	194	\$28,654
Oliver village	272	87	\$24,375
Lakeside township	583	209	\$25,536
Parkland township	1,326	457	\$25,938
Superior township	1,911	693	\$31,653

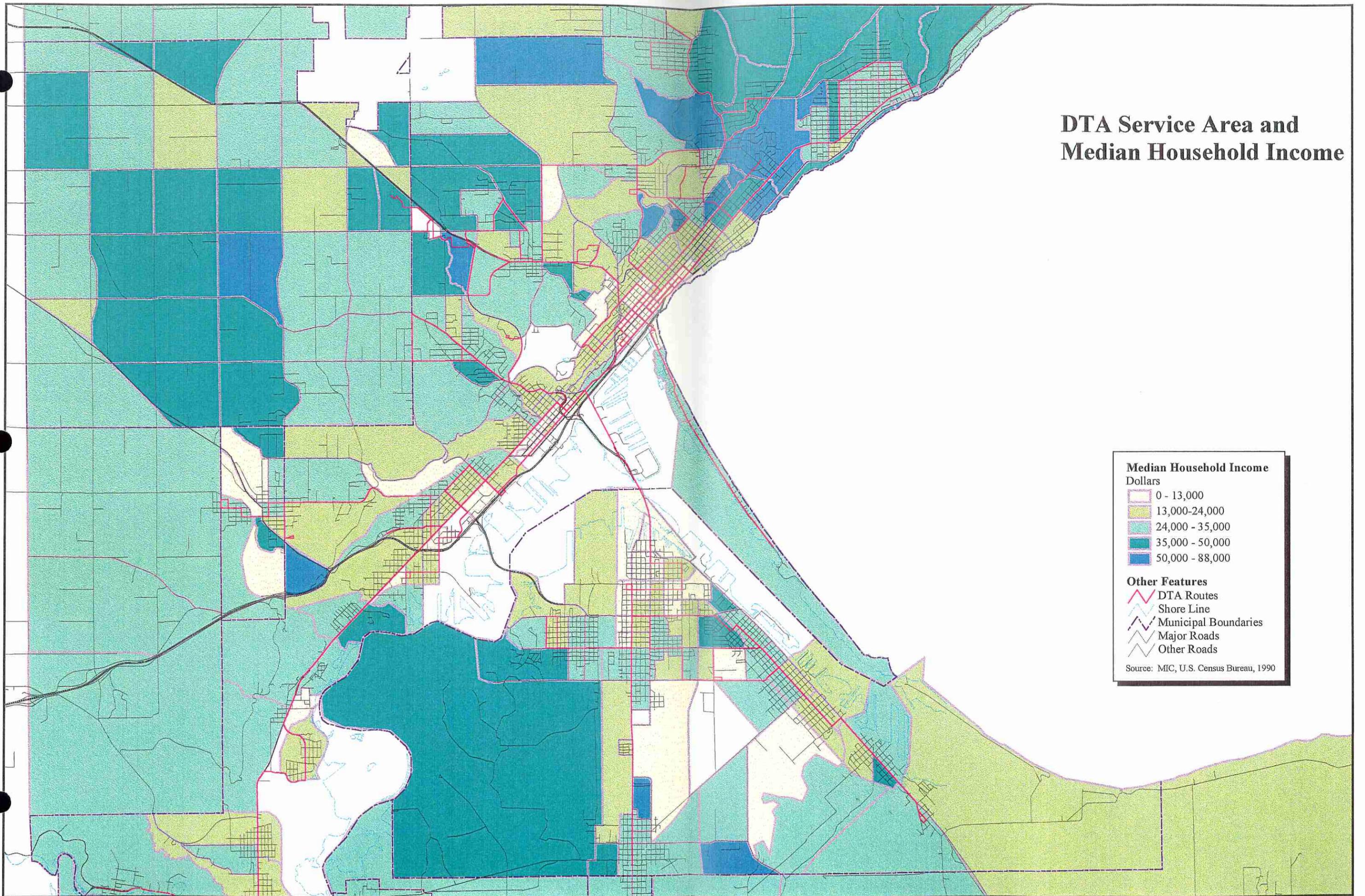
Source: U.S. Census of Population and Housing, 1990.

The map on the following page illustrates median household incomes at the more disaggregated TAZ geographic level. Given the connection between transit dependence and income, this map enables us to identify areas with lower household incomes which are more likely to utilize transit. The TAZ's in the east end neighborhoods of Congdon Park, Hunters Park, and Morely Heights show significantly higher median household incomes. In contrast, the TAZ's in the Central and East Hillside neighborhoods have lower median household incomes. In Superior, the northern TAZ's had lower median household incomes. This map, in conjunction with the population density map, shows that current bus route coverage appears to be serving the lower income, higher density areas as well.

The next map shows the TAZ median household incomes of those who identified themselves as taking transit to work. A variety of factors affect the information shown here, including the overall income level of the TAZ, the amount of service provided to the TAZ, and the small sample size from which the data was derived. First, the overall income level of the TAZ impacts the likelihood of the median income of TAZ transit users since this is the market pool which the transit service is operating. Secondly, the amount of service impacts these results because the more service provided, the more competitive transit can be with the automobile, even among wealthier neighborhoods. Finally, this data comes from the one in six households that receive the Census Long Form that reported commuting to work by transit (i.e., roughly 5-6 percent of the 16 percent of Long Form recipients); therefore, caution should be taken in interpretation.

Current bus route coverage appears to be serving the lower income, higher density areas as well.

DTA Service Area and Median Household Income



Median Household Income
Dollars

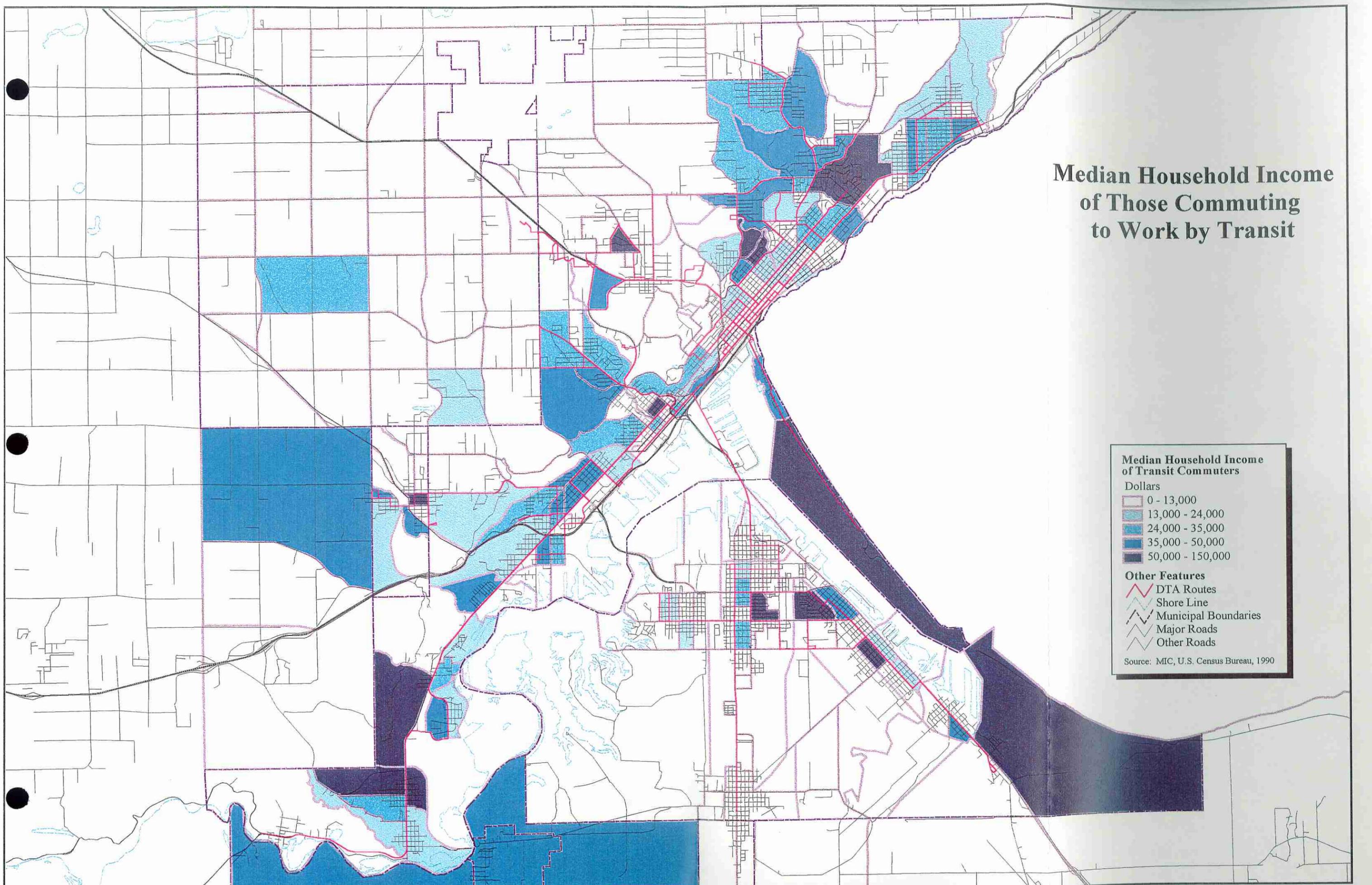
- 0 - 13,000
- 13,000-24,000
- 24,000 - 35,000
- 35,000 - 50,000
- 50,000 - 88,000

Other Features

- DTA Routes
- Shore Line
- Municipal Boundaries
- Major Roads
- Other Roads

Source: MIC, U.S. Census Bureau, 1990

Median Household Income of Those Commuting to Work by Transit



**Median Household Income
of Transit Commuters**
Dollars

- 0 - 13,000
- 13,000 - 24,000
- 24,000 - 35,000
- 35,000 - 50,000
- 50,000 - 150,000

Other Features

- DTA Routes
- Shore Line
- Municipal Boundaries
- Major Roads
- Other Roads

Source: MIC, U.S. Census Bureau, 1990

Table 3h: Duluth Senior Populations, Seniors Living Alone, and Seniors with No Vehicle.

	Population Age 65 and over	Number of Householders Age 65 and over Living Alone	Number of Householders Age 65 and over with No Vehicle
<i>City of Duluth</i>	14,626	5,128	3,342
Duluth Neighborhoods:			
Fond du Lac	49	19	0
Gary New Duluth	441	161	89
Morgan Park	376	178	70
Smithville	86	16	7
Riverside	52	11	5
Norton Park	247	28	7
Bayview Heights	234	67	38
Fairmont	158	61	38
Irving	205	92	53
Cody	396	159	82
Spirit Valley	226	103	79
Denfeld	803	347	237
Oneota	6	6	0
West End	1,098	471	460
Piedmont Heights	746	161	66
Duluth Heights	1,294	350	183
Central Hillside	840	274	237
Central Business District	891	723	659
Park Point	498	67	37
Kenwood	874	144	87
East Hillside	928	370	281
Woodland	608	199	95
Hunter's Park	120	14	19
UMD/ Chester Park	705	293	150
Endion	531	231	142
Morley Heights	157	45	12
Congdon	468	145	51
Lakeside/ Lester Park	1,558	386	151
North Shore	31	7	7

Source: U.S. Census of Population and Housing, 1990.

Senior Population

Seniors are a population that tends to be identified as likely being transit-dependent or having fewer transportation options. Tables 3h through 3k identify populations 65 years of age or older, as well as the number of those who live alone and the number who are without a vehicle available to them. As with total population, areas where there are large numbers of seniors, especially those living alone and/or without vehicles, such as in the West End and the central neighborhoods of Duluth, may provide opportunities for attracting more transit riders.

Seniors are a population that tends to be identified as likely being transit-dependent.

Table 3i: Other MN Community Senior Populations, Seniors Living Alone, and Seniors with No Vehicle.

	Population Age 65 and over	Number of Householders Age 65 and over Living Alone	Number of Householders Age 65 and over with No Vehicle
Hermantown city	630	183	47
Proctor	482	213	121
Canosia township	159	48	6
Duluth township	156	35	6
Grand Lake township	199	40	13
Lakewood township	128	29	2
Midway township	337	42	12
Rice Lake township	330	74	16
Solway township	146	33	9

Source: U.S. Census of Population and Housing, 1990.

Table 3j: Superior Senior Populations, Seniors Living Alone, and Seniors with No Vehicle.

	Population Age 65 and over	Number of Householders Age 65 and over Living Alone	Number of Householders Age 65 and over with No Vehicle
<i>City of Superior</i>	4,749	1,701	1,061
Superior Census			
Tracts:			
Tract 201	230	105	40
Tract 202	180	123	120
Tract 203	633	256	165
Tract 204	489	141	79
Tract 205	393	94	35
Tract 206	777	370	266
Tract 207	842	184	100
Tract 208	507	110	43
Tract 209	443	206	149
Tract 210	254	86	64

Source: U.S. Census of Population and Housing, 1990.

Table 3k: Other WI Community Senior Populations, Seniors Living Alone, and Seniors with No Vehicle.

	Population Age 65 and over	Number of Householders Age 65 and over Living Alone	Number of Householders Age 65 and over with No Vehicle
Superior village	83	28	9
Oliver village	15	16	2
Lakeside township	81	25	5
Parkland township	174	27	8
Superior township	179	45	16

Source: U.S. Census of Population and Housing, 1990.

The Senior Population Map, following page 3-21, indicates the number of persons 65 years of age or older within the Traffic Analysis Zones (TAZ). The map also shows senior housing facilities that have been identified through area senior housing directories. As the map illustrates, there are several TAZ's with over 200 seniors. It is important to note that the senior population is 1990 data which may have changed over the last seven years. The senior housing facilities and the number of residents per facility

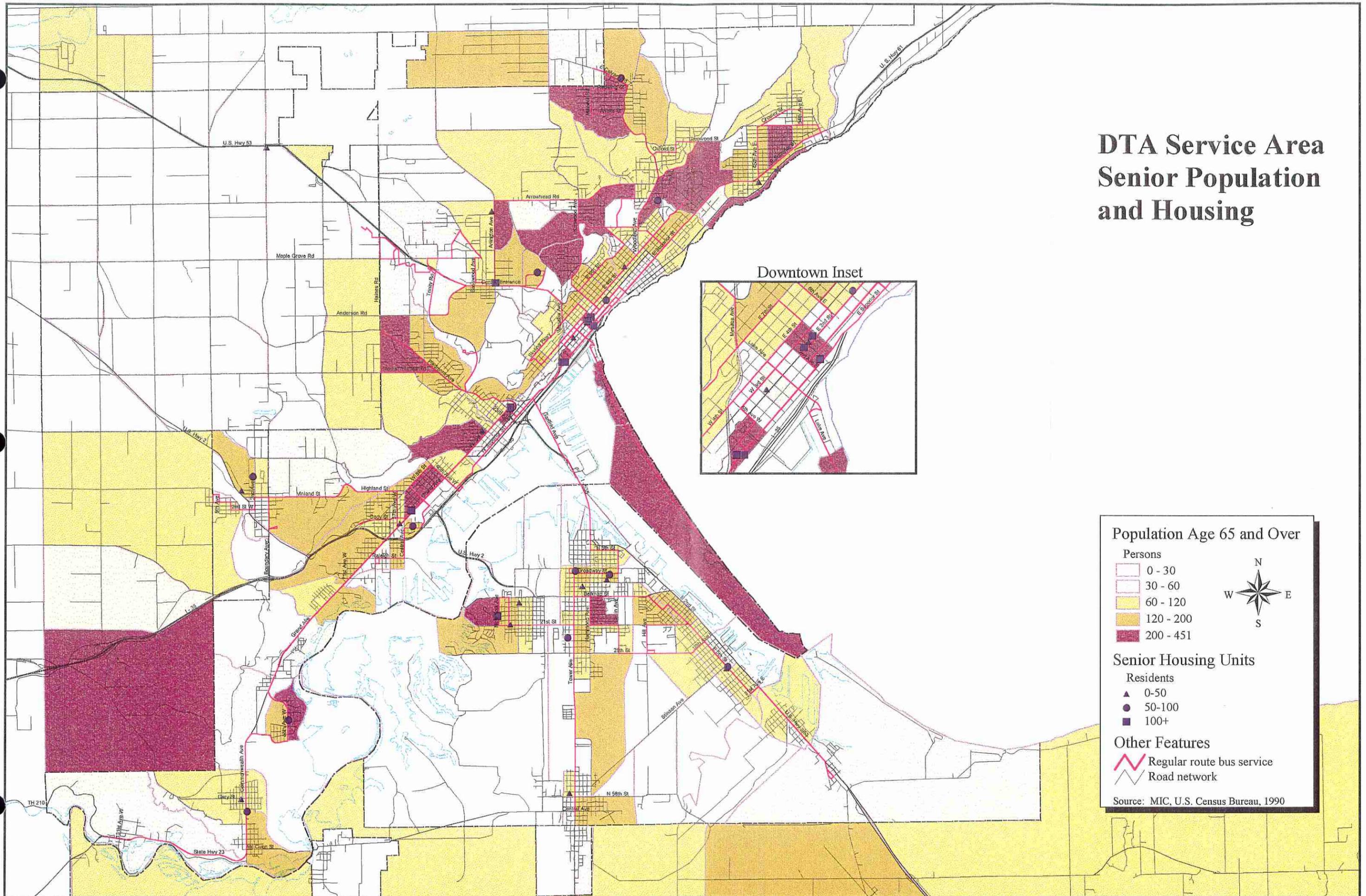
however, were obtained during the spring of 1997. More detailed information on the senior housing facilities is listed in the Appendix.

The following map shows the number of senior households in neighborhoods that do not have vehicles available to them. The West End and the CBD in Duluth show a significant number of senior households without vehicles. The Denfield, Central and East-Central Hillside neighborhoods in Duluth and Tract 206 in Superior also had a substantial amount of senior households without available vehicles.



Senior waiting in Superior for the DTA

DTA Service Area Senior Population and Housing



Population Age 65 and Over

Persons

- 0 - 30
- 30 - 60
- 60 - 120
- 120 - 200
- 200 - 451

Senior Housing Units

Residents

- ▲ 0-50
- 50-100
- 100+

Other Features

- Regular route bus service
- Road network

Source: MIC, U.S. Census Bureau, 1990

Table 3l: Persons 16 Years of Age and over in Duluth with Mobility Limitations.

	Number of Persons Age 16-64 with Mobility Limitation	Number of Persons Age 65 and over with Mobility Limitation	Percent of Total Population with Mobility Limitation
<i>City of Duluth</i>	996	1,791	3.3%
Duluth Neighborhoods:			
Fond du Lac	2	0	0.7%
Gary New Duluth	29	27	2.2%
Morgan Park	19	53	3.6%
Smithville	0	12	2.4%
Riverside	0	0	0.0%
Norton Park	7	7	1.5%
Bayview Heights	0	26	1.6%
Fairmont	14	30	3.7%
Irving	29	66	9.1%
Cody	42	41	3.2%
Spirit Valley	5	19	2.8%
Denfeld	0	85	2.4%
Oneota	0	0	0.0%
West End	124	190	4.5%
Piedmont Heights	71	55	3.4%
Duluth Heights	73	126	3.5%
Central Hillside	82	164	4.6%
Central Business District	99	179	16.0%
Park Point	14	20	2.3%
Kenwood	6	51	1.1%
East Hillside	112	128	3.3%
Woodland	32	66	2.6%
Hunter's Park	23	17	2.6%
UMD/ Chester Park	34	82	2.0%
Endion	46	102	2.9%
Morley Heights	9	0	0.5%
Congdon	11	59	2.3%
Lakeside/ Lester Park	111	186	3.4%
North Shore	2	0	0.5%

Source: U.S. Census of Population and Housing, 1990.

Persons with Disabilities

This population is often identified in transit studies as being "transit dependent". Tables 31 through 3o identify the persons with mobility limitations, defined by the Census as "any person with a health condition for longer than 6 months that makes it difficult to go outside the home alone for activities such as shopping and doctors' visits." In the 16-64 age group, such considerations as possible work trips may present opportunities for increased transit ridership for both regular route and STRIDE service. For the 65 years of age and older group, transit usage may be a particularly attractive (or necessary) mode of transportation. As shown in these tables and the maps on the following pages, the west end, Lakeside/Lester Park, and the central areas of Duluth, may be areas to target for transit ridership, especially when considering the transportation needs of seniors as well as persons with disabilities.

Table 3m: Persons 16 Years of Age and over in Other MN Communities with Mobility Limitations.

	Number of Persons Age 16- 64 with Mobility Limitation	Number of Persons Age 65 and over with Mobility Limitation	Percent of Total Population with Mobility Limitation
Hermantown city	30	33	0.9%
Proctor	20	4	0.8%
Canosia township	12	12	1.4%
Duluth township	5	7	0.8%
Grand Lake township	21	14	1.5%
Lakewood township	0	19	1.1%
Midway township	0	0	0.0%
Rice Lake township	11	0	0.3%
Solway township	3	7	0.6%

Source: U.S. Census of Population and Housing, 1990.



STRIDE offers mobility to person with disability

Table 3n: Persons 16 Years of Age and over in Superior with Mobility Limitations.

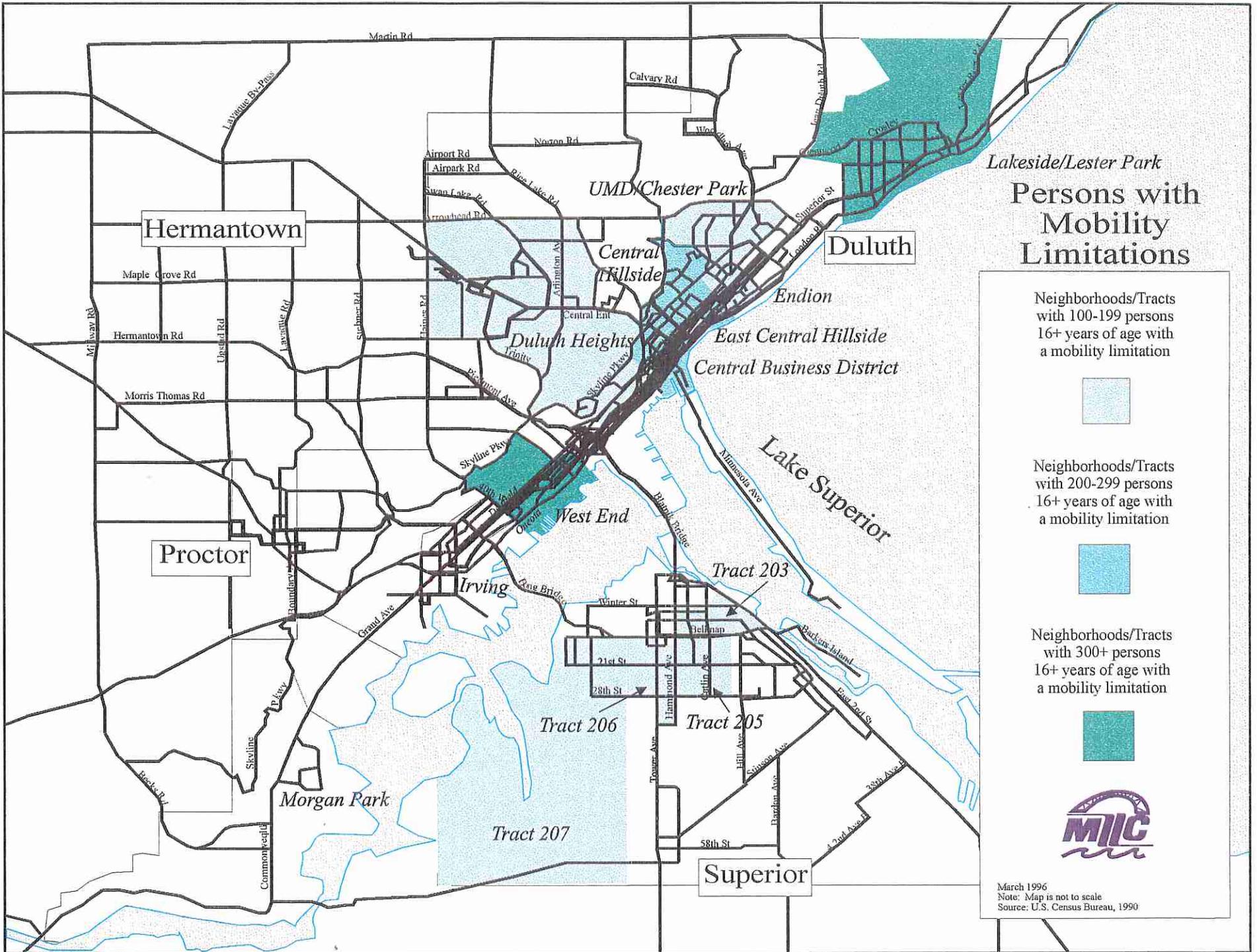
	Number of Persons Age 16-64 with Mobility Limitation	Number of Persons Age 65 and over with Mobility Limitation	Percent of Total Population with Mobility Limitation
<i>City of Superior</i>	290	583	3.2%
Superior Census Tracts:			
Tract 201	57	39	5.1%
Tract 202	13	50	9.6%
Tract 203	28	81	3.5%
Tract 204	9	45	1.7%
Tract 205	28	78	3.6%
Tract 206	55	78	3.0%
Tract 207	47	72	3.0%
Tract 208	9	49	1.9%
Tract 209	32	58	3.7%
Tract 210	12	33	2.7%

Source: U.S. Census of Population and Housing, 1990.

Table 3o: Persons 16 Years of Age and over in Other WI Communities with Mobility Limitations.

	Number of Persons Age 16-64 with Mobility Limitation	Number of Persons Age 65 and over with Mobility Limitation	Percent of Total Population with Mobility Limitation
Superior village	0	11	2.2%
Oliver village	2	4	2.2%
Lakeside township	2	6	1.4%
Parkland township	13	27	3.0%
Superior township	2	5	0.4%

Source: U.S. Census of Population and Housing, 1990.



Hermantown

Proctor

UMD/Chester Park

Duluth

Lakeside/Lester Park
 Persons with
 Mobility
 Limitations

Central
 Hillside

Endion

East Central Hillside
 Central Business District

Duluth Heights

Lake Superior

West End

Tract 203

Irving

Tract 206

Tract 205

Morgan Park

Tract 207

Superior

March 1996
 Note: Map is not to scale
 Source: U.S. Census Bureau, 1990

Housing Characteristics

The presence of renter-occupied units provide opportunities for targeting transit usage. Multi-family and renter-occupied units tend to be a "more intense", higher density land use than owner-occupied, single-family housing units and provide pockets of residents around the metropolitan area. As Tables 3p through 3s indicate, the West End, Central Hillside, Central Business District, East Hillside, and Endion neighborhoods in Duluth, and Tract 206 in the heart of Superior are areas where large numbers of renter-occupied units exist. These areas can be served more efficiently with transit than similar total populations who live in single-family, owner-occupied units in less densely populated areas.

Another characteristic that contributes to transit ridership are the households which do not have available vehicles. A number of geographic areas in the Twin Ports include residents who do not have vehicles available to them. The following identifies those areas that have a significant number of households without an available vehicle. These "transit dependent" households need to be considered when determining which areas to serve with limited transit resources.

Table 3p: Duluth Occupied Housing Characteristics.

	Number of Occupied Housing Units	Number of Renter- Occupied Housing Units	Percent of Renter- Occupied Housing Units	Percent of Occupied Housing Units with No Vehicle Available
<i>City of Duluth</i>	<i>34,563</i>	<i>12,288</i>	<i>35.6%</i>	<i>17.0%</i>
Duluth Neighborhoods:				
Fond du Lac	103	4	3.9%	0.0%
Gary New Duluth	1,015	270	26.6%	14.4%
Morgan Park	855	301	35.2%	15.9%
Smithville	171	13	7.6%	4.1%
Riverside	230	29	12.6%	4.3%
Norton Park	320	24	7.5%	15.9%
Bayview Heights	627	88	14.0%	6.1%
Fairmont	452	148	32.7%	11.9%
Irving	464	136	29.3%	19.2%
Cody	1,016	170	16.7%	16.0%
Spirit Valley	463	289	62.4%	27.6%
Denfeld	1,571	342	21.8%	19.7%
Oneota	18	12	66.7%	66.7%
West End	3,065	1,312	42.8%	24.6%
Piedmont Heights	1,396	94	6.7%	7.7%
Duluth Heights	2,237	658	29.4%	12.1%
Central Hillside	2,361	1,454	61.6%	33.2%
Central Business District	1,287	1,268	98.5%	73.9%
Park Point	561	196	34.9%	8.9%
Kenwood	1,870	679	36.3%	7.1%
East Hillside	3,404	2,082	61.2%	22.9%
Woodland	1,425	154	10.8%	8.8%
Hunter's Park	539	36	6.7%	3.5%
UMD/ Chester Park	1,659	570	34.4%	11.5%
Endion	2,271	1,406	61.9%	12.9%
Morley Heights	622	47	7.6%	1.9%
Congdon	1,136	182	16.0%	5.6%
Lakeside/ Lester Park	3,236	302	9.3%	7.0%
North Shore	189	22	11.6%	3.7%

Source: U.S. Census of Population and Housing, 1990.

Table 3q: Other MN Community Occupied Housing Characteristics.

	Number of Occupied Housing Units	Number of Renter-Occupied Housing Units	Percent of Renter-Occupied Housing Units	Percent of Occupied Housing Units with No Vehicle Available
Hermantown	2,192	250	11.4%	2.5%
Proctor	1,196	279	23.3%	13.7%
Canosia township	629	57	9.1%	1.3%
Duluth township	587	53	9.0%	1.5%
Grand Lake township	766	49	6.4%	2.2%
Lakewood township	611	27	4.7%	0.3%
Midway township	462	23	5.0%	2.6%
Rice Lake township	1,373	61	4.7%	1.5%
Solway township	600	30	5.0%	1.5%

Source: U.S. Census of Population and Housing, 1990.

Table 3r: Superior Occupied Housing Characteristics.

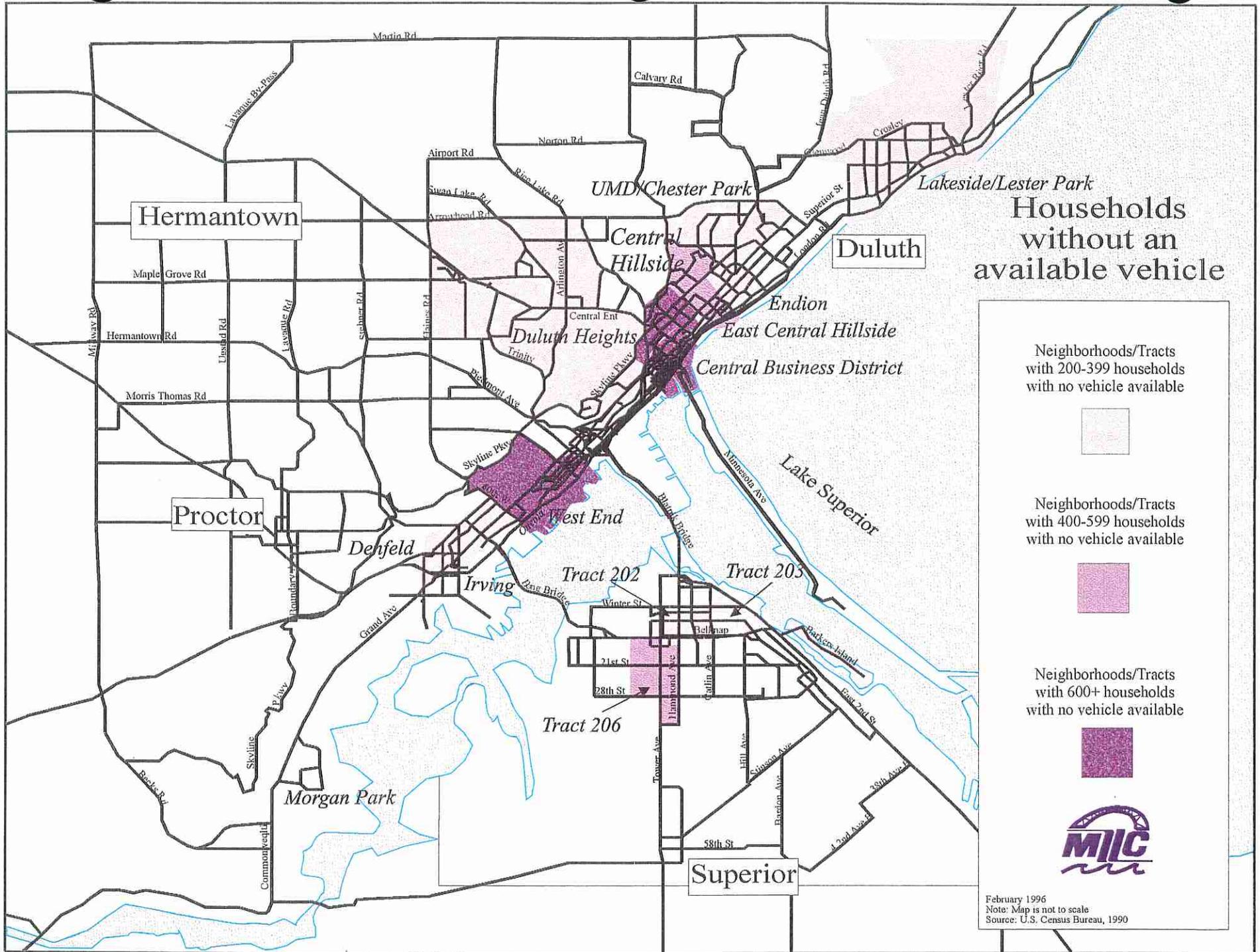
	Number of Occupied Housing Units	Number of Renter-Occupied Housing Units	Percent of Renter-Occupied Housing Units	Percent of Occupied Housing Units with No Vehicle Available
<i>City of Superior</i>	<i>11,001</i>	<i>4,269</i>	<i>38.8%</i>	<i>16.6%</i>
Superior Census Tracts:				
Tract 201	778	465	59.8%	24.0%
Tract 202	411	352	85.6%	55.2%
Tract 203	1,335	647	48.5%	20.0%
Tract 204	1,228	296	24.1%	9.6%
Tract 205	997	298	29.9%	8.2%
Tract 206	2,003	1,141	57.0%	21.5%
Tract 207	1,421	313	22.0%	8.5%
Tract 208	1,126	307	27.3%	11.1%
Tract 209	1,008	307	30.5%	18.7%
Tract 21 0	691	143	20.7%	11.1%

Source: U.S. Census of Population and Housing, 1990.

Table 3s: Other WI Community Occupied Housing Characteristics.

	Number of Occupied Housing Units	Number of Renter- Occupied Housing Units	Percent of Renter- Occupied Housing Units	Percent of Occupied Housing Units with No Vehicle Available
Superior village	193	45	23.3%	7.8%
Oliver village	83	20	45.8%	2.4%
Lakeside township	210	26	12.4%	3.3%
Parkland township	439	34	58.5%	4.6%
Superior township	690	62	9.0%	2.9%

Source: U.S. Census of Population and Housing, 1990.



Households without an available vehicle

Neighborhoods/Tracts with 200-399 households with no vehicle available



Neighborhoods/Tracts with 400-599 households with no vehicle available



Neighborhoods/Tracts with 600+ households with no vehicle available



February 1996
 Note: Map is not to scale
 Source: U.S. Census Bureau, 1990

Work-trip Data

One population that could potentially take more advantage of transit is the workforce. Nationally, the work-trip is transit's most dominant trip by purpose, though it is mostly underutilized as a worker's transportation mode. According to the 1990 Census, as shown in Tables 3t through 3w, Morgan Park, Denfeld, and Central Business District neighborhoods in Duluth are the only areas in the metropolitan area where at least ten percent of the workforce used transit to get to work on a regular basis. Overall, the Cities of Duluth and Proctor have 5-6 percent of its workforce using transit, which is around the national average; the other jurisdictions' workforce use transit significantly less. In considering the availability of transit to the Duluth-Superior's workforce, closer examination of why workers across the country and in our metropolitan area opt not to use transit for work-trips may be necessary.



DTA Transit Center

Table 3t: Duluth Workforce and Travel-to-Work Characteristics.

	Number of Workers	Number of Workers Using Autos	Number of Workers Using Public Transit	Number of Workers Using Other Modes	Percent of Workers Using Public Transit
<i>City of Duluth</i>	36,697	30,727	2,143	3,827	5.8%
Duluth					
Neighborhoods:					
Fond du Lac	108	108	0	-	0.0%
Gary New Duluth	969	810	78	81	8.0%
Morgan Park	783	648	85	50	10.9%
Smithville	235	212	21	2	8.9%
Riverside	313	293	8	12	2.6%
Norton Park	418	364	29	25	6.9%
Bayview Heights	727	648	19	60	2.6%
Fairmont	421	390	6	25	1.4%
Irving	464	378	40	46	8.6%
Cody	1,098	943	91	64	8.3%
Spirit Valley	240	188	14	38	5.8%
Denfeld	1,551	1,263	165	123	10.6%
Oneota	6	0	6	-	100.0%
West End	2,745	2,312	178	255	6.5%
Piedmont Heights	1,643	1,554	56	33	3.4%
Duluth Heights	2,263	2,046	46	171	2.0%
Central Hillside	2,198	1,461	185	552	8.4%
Central Business Dist.	305	107	58	140	19.0%
Park Point	606	530	27	49	4.5%
Kenwood	2,478	2,207	51	220	2.1%
East Hillside	3,215	2,449	299	500	8.3%
Woodland	1,862	1,617	146	99	7.8%
Hunter's Park	763	678	23	62	3.0%
UMD/Chester Park	2,272	1,696	59	517	2.6%
Endion	2,594	2,047	223	324	8.6%
Morley Heights	897	820	15	62	1.7%
Congdon	1,341	1,249	34	58	2.5%
Lakeside/Lester Park	3,956	3,501	214	241	5.4%
North Shore	226	208	0	18	0.0%

Source: U.S. Census of Population and Housing, 1990.

Table 3u: Other MN Community Workforce and Travel-to-Work Characteristics.

	Number of Workers	Number of Workers Using Autos	Number of Workers Using Public Transit	Number of Workers Using Other Modes	Percent of Workers Using Public Transit
Hermantown city	2,841	2,691	14	136	0.5%
Proctor city	1,272	1,066	68	138	5.3%
Canosia township	861	820	2	39	0.2%
Duluth township	710	679	0	31	0.0%
Grand Lake township	1,041	987	5	49	0.5%
Lakewood township	1,007	823	0	184	0.0%
Midway township	595	550	4	41	0.7%
Rice Lake township	1,901	1,759	0	142	0.0%
Solway township	884	746	3	135	0.4%

Source: U.S. Census of Population and Housing, 1990.

Table 3v: Superior Workforce and Travel-to-Work Characteristics.

	Number of Workers	Number of Workers Using Autos	Number of Workers Using Public Transit	Number of Workers Using Other Modes	Percent of Workers Using Public Transit
<i>City of Superior</i>	<i>11,264</i>	<i>9,954</i>	<i>203</i>	<i>1,107</i>	<i>0.4%</i>
Superior Census Tracts:					
Tract 201	557	488	0	69	0.0%
Tract 202	173	99	8	66	4.6%
Tract 203	1,124	1,007	10	107	0.9%
Tract 204	1,444	1,371	28	45	1.9%
Tract 205	1,389	1,107	24	258	1.7%
Tract 206	1,921	1,667	44	210	2.3%
Tract 207	1,619	1,481	11	127	0.7%
Tract 208	1,242	1,125	13	104	1.0%
Tract 209	1,075	936	50	89	4.7%
Tract 210	711	666	15	30	2.1%

Source: U.S. Census of Population and Housing, 1990.

Table 3w: Other WI Community Workforce and Travel-to-Work Characteristics

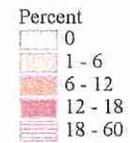
	Number of Workers	Number of Workers Using Autos	Number of Workers Using Public Transit	Number of Workers Using Other Modes	Percent of Workers Using Public Transit
Superior village	234	200	3	31	1.3%
Oliver village	100	95	2	3	2.0%
Lakeside township	229	196	0	33	0.0%
Parkland township	606	551	0	55	0.0%
Superior township	915	841	0	74	0.0%

Source: U.S. Census of Population and Housing, 1990.

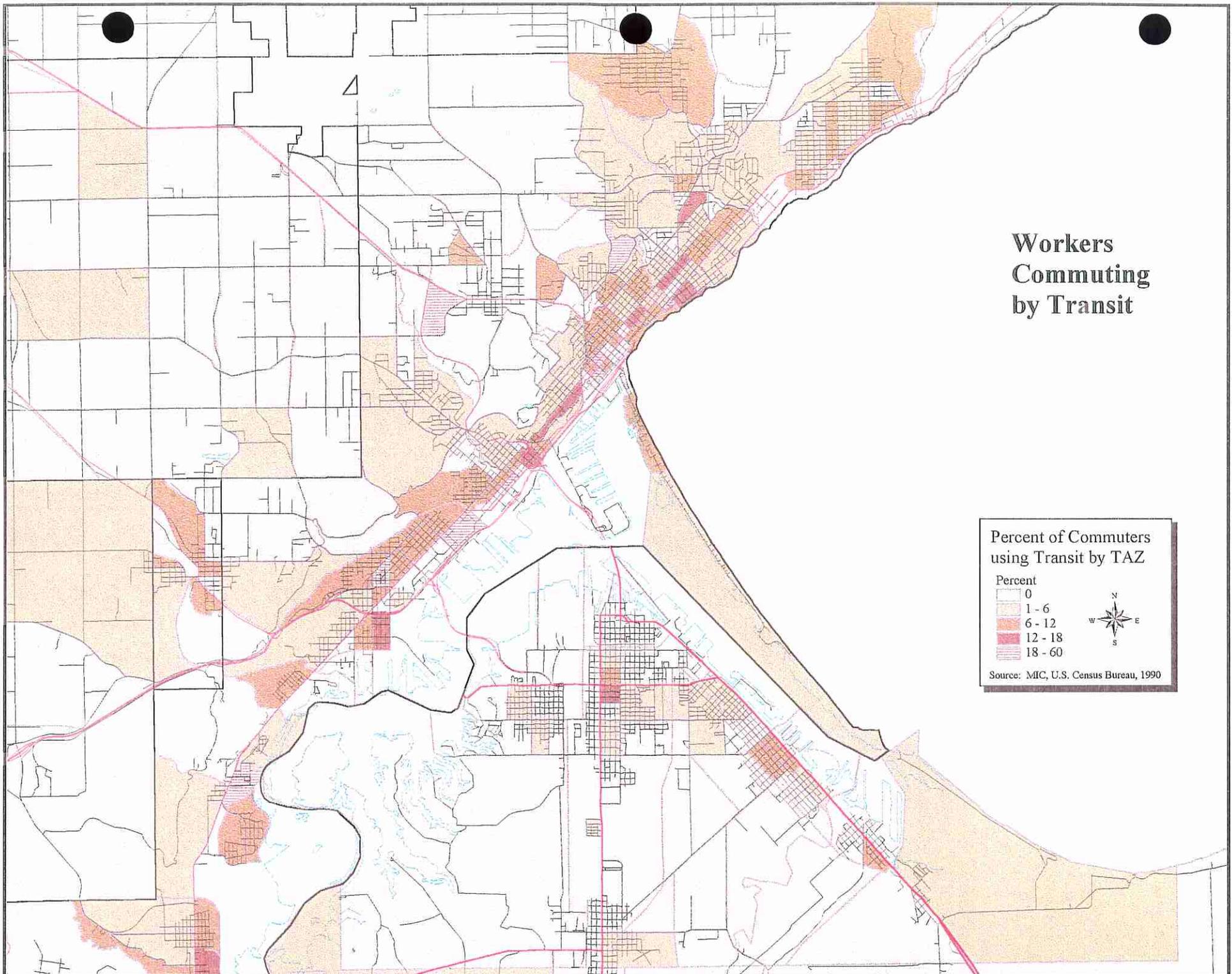
The map on the following page illustrates the percent of workers commuting to work by transit according to the 1990 Census. It is useful to look at this map in conjunction with the population density map in order to differentiate between populated residential areas and commercial activity areas. The West End and Denfeld neighborhoods have both good population densities and transit commuter percentages. Scattered TAZ's in the Central Hillside, East Hillside, Endion and Congdon neighborhoods have both high transit commuter percentages and population densities. While the TAZ's which make up the Woodland neighborhood have a modest population density, the percentage of transit commuters is fairly good. The TAZ 264 in central Superior stands out as a high transit commuter area among the higher density areas. Also, there are several TAZ's along Highway 2 and 53 corridor that have a decent percentage of transit commuters in more densely populated areas. Once again it is important to keep in mind that this information comes from the Census Long Form which represents only one in six households.

Workers Commuting by Transit

Percent of Commuters
using Transit by TAZ



Source: MIC, U.S. Census Bureau, 1990



While the outlying and suburban areas probably do not warrant any additional fixed route type service, there may be enough demand to justify the addition of a different type of service.

Outlying and Suburban Areas

The tables and maps provided in this section have identified a number of areas in the Duluth-Superior area that have population and housing characteristics that may indicate transit ridership potential. However, the information also identifies a number of areas that do not have the characteristics associated with high transit ridership. Such areas as the outlying townships adjacent to Duluth and Superior, the City of Hermantown, and the Villages of Oliver and Superior, do not appear to exhibit the characteristics that are typical of areas with higher transit ridership. These areas do not have high population densities, or the concentrations of seniors, persons with disabilities, workers, or other groups that may be "transit dependent" or more likely to use transit over other modes. In considering characteristics such as the availability of vehicles and income levels, it appears that the outlying area populations would unlikely utilize transit if it were available to the extent it would be cost-effective for the DTA. National trends indicate that with the exception of the most densely populated areas (e.g. New York City) as household incomes and the number of vehicles available increases, the likelihood of transit usage decreases considerably.

While the outlying and suburban areas probably do not warrant any additional fixed route type service, there may be enough demand to justify the addition of a different type of service. The map following page 3-39 shows the number of commuters coming to Duluth from the surrounding areas. According the 1990 Census, approximately 16,000 workers commuted to the City of Duluth from outside the city. A majority of those commuters came from Superior and the adjacent cities and townships. Of those commuters, 2,500 were from the City of Superior. Approximately 4.6 percent of Superior commuters reported using the bus. Hermantown also had a significant number of workers destined for Duluth with about 2,100 commuters. Hermantown, which does not have fixed route transit service, had 0.6 percent of commuters using transit; suggesting that some may be accessing bus service near the Miller Hill Mall, the nearest bus stop. The City of Proctor reported around 800 daily commuters into Duluth, of which 61 (7.6%) reported using fixed route bus service.

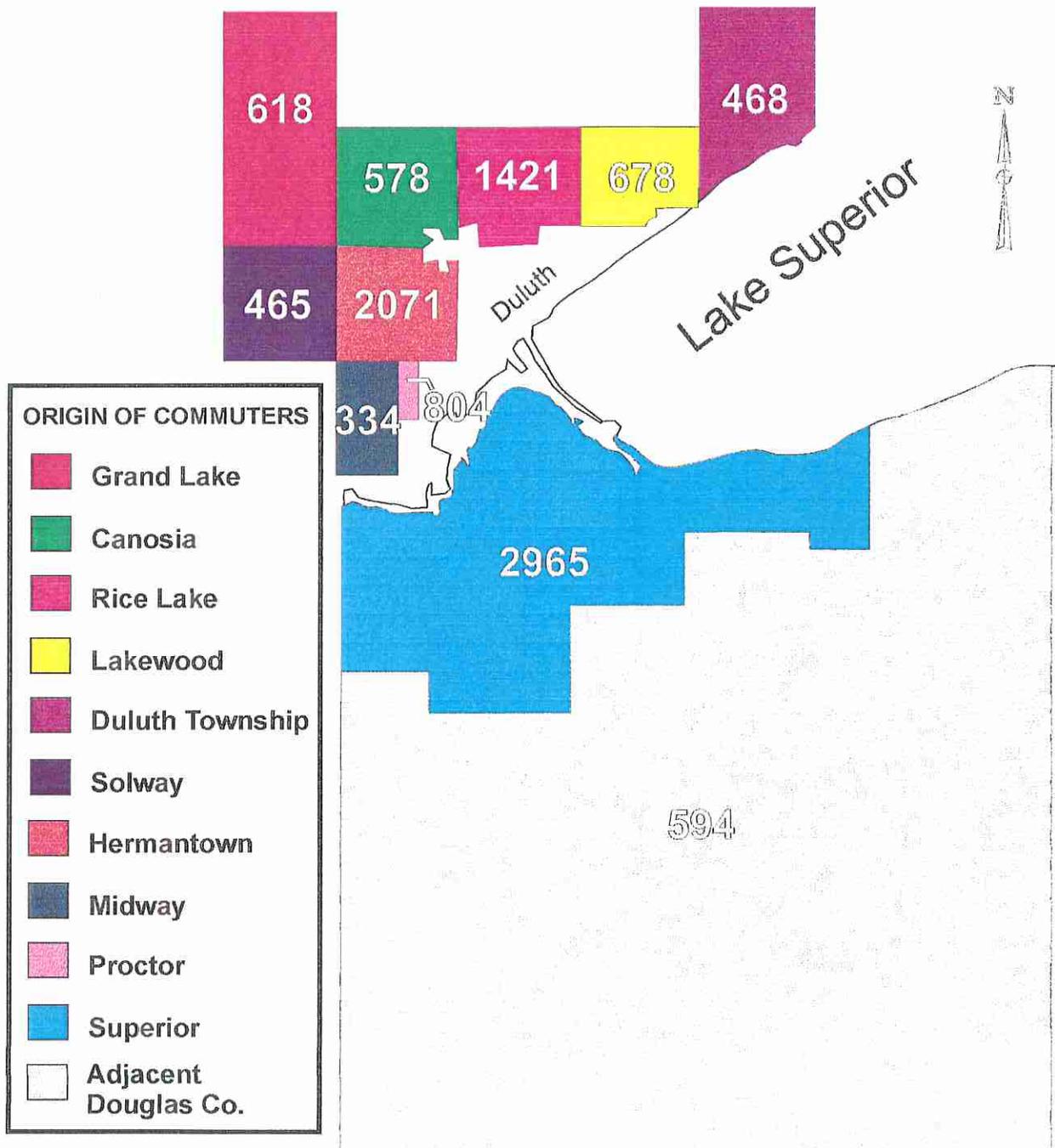
Included in the following table are the total number of commuters coming from areas outside of the metropolitan area to Duluth. Table 3x also provides the number of commuters who drove alone or took transit. According to the 1990 Census, approximately 1,000 workers commute every day from areas in the Iron Range. Of those commuters, about 800 drove alone, suggesting that approximately 20 percent are likely participating in some form of car or van-pool. In Cloquet about 700 commute to Duluth of which around 550 drove alone and 50 utilized bus transportation. The remainder of Carlton County reported approximately 1,400 commuters working in Duluth (See Table 3x).

Table 3x: Suburban and Outlying Area Commuters to Duluth

Residence	Total # Workers from Residence to Duluth	Drove Alone	Bus or Trolley
Arnold CDP	1,058	897	0
Duluth city	30,898	21,859	2,013
Hermantown city	2,071	1,804	12
Proctor city	804	642	61
Remainder of Canosia township	578	529	0
Remainder of Duluth township	468	402	0
Remainder of Grand Lake township	618	539	0
Remainder of Lakewood township	678	576	0
Remainder of Midway township	334	295	4
Remainder of Rice Lake township	363	348	0
Remainder of Solway township	465	412	3
<i>Duluth Metro Area Subtotal</i>	<i>38,335</i>	<i>28,303</i>	<i>2,093</i>
Iron Range	1,045	780	0
Remainder of St. Louis County	1,442	1,163	0
Two Harbors city	123	114	0
Remainder of Lake County	218	180	0
<i>Lake County Subtotal</i>	<i>341</i>	<i>294</i>	<i>0</i>
Cloquet city	696	544	50
Remainder of Carlton County	1,419	1,174	18
<i>Carlton county Subtotal</i>	<i>2,115</i>	<i>1,718</i>	<i>68</i>
Superior city	2,505	2,070	115
Remainder of Superior township	234	194	0
Remainder of Superior village	39	24	3
Remainder of Oliver village	36	31	0
Remainder of Lakeside township	40	30	0
Remainder of Parkland township	111	101	0
<i>Superior Metro area Subtotal</i>	<i>2,965</i>	<i>2,450</i>	<i>118</i>
Remainder of Douglas County	594	437	0
<i>Total Commuters to Duluth</i>	<i>46,837</i>	<i>35,145</i>	<i>2,279</i>
<i>Duluth to Duluth Commuters</i>	<i>30,898</i>	<i>21,859</i>	<i>2,013</i>
<i>Outlying Area Commuters to Duluth</i>	<i>15,939</i>	<i>13,286</i>	<i>266</i>

Source: U.S. Census of Population and Housing, 1990.

Number of Commuters to City of Duluth



Approximately 8,000 of the total 12,700 Superior workers in 1990 resided within the City of Superior with almost 1,250 workers living in the adjacent jurisdictions (See Table 3y). There are a little less than 5,000 daily commuters who reside outside the City of Superior destined for Superior employment sites. Of those workers, approximately 1,600 are commuting from Duluth with a total of 2,044 Superior workers residing within the overall Duluth metro area. In 1990, slightly less than 10 percent reported using transit for their commute from Duluth to Superior.

One interesting finding shows that almost 11 percent of Superior City commuters working inside Superior reported using the bus to get to work. Whereas, only 4.6 percent of Superior commuters reported taking transit to Duluth. According to the Census numbers, almost 10 percent of the Superior metro area workers commute to Superior work places via transit. These numbers seem high given the general Superior ridership figures reported by the DTA.

Almost 250 workers per day reported working in Superior while living in Carlton County; only 50 of which resided in the City of Cloquet. It is interesting to note that while no one reported taking the bus from Cloquet to Superior, 25 claimed to take transit from the remainder of Carlton County to Superior.

Table 3y: Suburban and Outlying Area Commuters to Superior

Residence	Total # workers from Residence	Drove Alone	Bus or Trolley
Superior city	7,850	5,953	809
Remainder of Superior township	544	470	59
Remainder of Superior village	159	137	11
Remainder of Lakeside township	111	103	6
Remainder of Oliver village	62	51	6
Remainder of Parkland township	360	279	30
<i>Superior Metro Area Subtotal</i>	<i>9,086</i>	<i>6,993</i>	<i>921</i>
<i>Remainder of Douglas County</i>	<i>1,370</i>	<i>1,075</i>	<i>251</i>
Duluth city	1,607	1,357	153
Remainder of Duluth township	22	20	2
Remainder of Canosia township	38	36	0
Remainder of Grand Lake township	47	47	0
Hermantown city	87	80	2
Remainder of Lakewood township	35	35	0
Remainder of Midway township	32	29	3
Proctor city	68	62	6
Arnold CDP	61	47	14
Remainder of Rice Lake township	18	18	0
Remainder of Solway township	29	24	5
<i>Duluth Metro-Area Subtotal</i>	<i>2,044</i>	<i>1,755</i>	<i>185</i>
<i>Cloquet city</i>	<i>53</i>	<i>53</i>	<i>0</i>
<i>Remainder Carlton County</i>	<i>194</i>	<i>165</i>	<i>25</i>
Total # Commuting to Superior	12,747	10,041	1,382
Superior to Superior Commuters	7,850	5,953	809
<i>Outlying Area Commuters to Superior</i>	<i>4,897</i>	<i>4,088</i>	<i>573</i>

Source: U.S. Census of Population and Housing, 1990.

As discussed, there are several characteristics that impact a population's likelihood of taking transit and in turn, the cost-effectiveness of providing transit. Key factors that should be considered when determining what areas warrant transit service include population densities, employment densities, income levels, and number of rental units. This analysis found that the greatest concentrations of population remain in older, more traditional neighborhoods in the City of Duluth. Likewise, the highest employment concentrations remain in the CBD and medical campus areas in downtown Duluth. These areas benefit from transit service routes that mimic the trolley lines of yesteryear. In addition, as the housing stock of these areas have aged, they have generally become more affordable for households of modest means, resulting in greater concentrations of lower income households in traditional neighborhoods. As discussed, lower income groups are also more likely to take transit.

As noted, the suburban and outlying areas do not have the characteristics associated with cost-effective fixed route transit service. However, there may be opportunities to provide specialized services targeted toward long distant commuters or infrequent regional trip takers. Further investigation may be warranted to determine if enough demand exists for the provision of some form of transportation service to these areas.

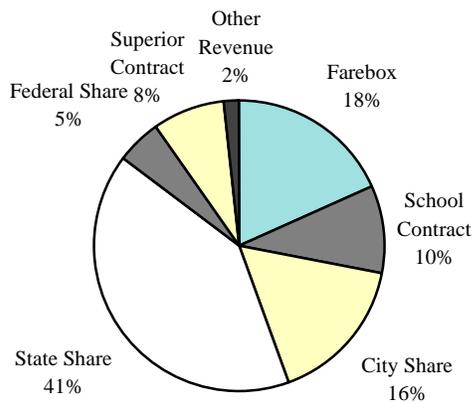
There may be opportunities to provide specialized services targeted toward long distant commuters market or infrequent regional trip takers.

DULUTH TRANSIT AUTHORITY FINANCIAL AND CAPITAL SUMMARY

The purpose of this section is to provide a brief overview of the DTA's financial situation in order to assess general fiscal trends, changes, and issues which will impact future decisions relating to DTA operations. The section looks at historical data to provide insight into the DTA's current and future financial outlook.

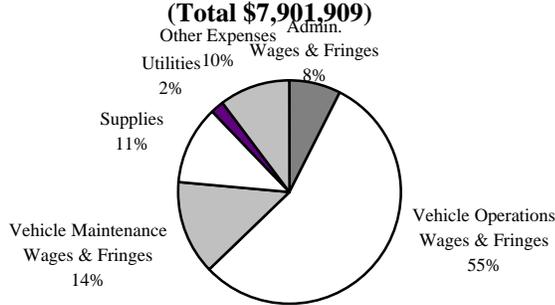
Figure 4a provides a general picture of the DTA's annual revenue sources. State dollars constitute the largest share of DTA funding. Total government assistance represents nearly 62 percent of the total operating budget. This proportion increases to 70 percent when funding from the DTA's contract with the City of Superior is included. Farebox revenues account for around 18 percent of total funding. The DTA provides bus service for students in grades seven through twelve through a contract with the Duluth School District. The school contract in 1995 accounted for ten percent of the DTA's total income dollars.

Figure 4a: DTA Revenue Sources for 1995



Bus Fleet at DTA Bus Facility

Figure 4b: DTA Expenses for 1995



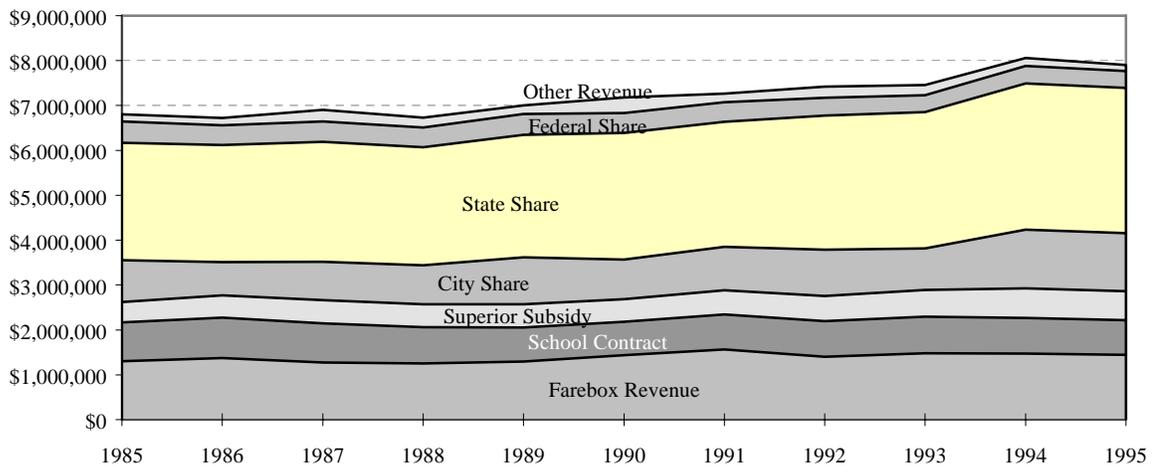
Source: Metropolitan Interstate Committee and Duluth Transit Authority.

Approximately 55 percent of the DTA's total expenses go toward vehicle operation wages and fringe benefits (i.e., drivers) in 1995 (see Figure 4b). Total salaries and fringe benefits account for 77 percent of the almost \$8 million in expenses. Supplies which include fuel and lubricants, tires and tubes, and other materials were 11 percent of total expenses. Utilities

accounted for only 2 percent of DTA Expenses.

Figure 4c below illustrates the changes in DTA funding that have occurred over the last ten years. As noted, assistance from the State of Minnesota has provided the single largest source of DTA income; this has been true for the last ten years. Federal assistance, in contrast, is only a relatively small proportion of total DTA funding and was a smaller proportion of funding in 1995 than it was in 1985.

Figure 4c: DTA Funding Sources; 1985-1995



Source: Metropolitan Interstate Committee and Duluth Transit Authority
 Note: Not adjusted for inflation

Over the last ten years, Farebox Revenues have remained relatively stable, particularly since 1992. The share contributed by the City of Duluth has

become a more important income source over the last ten years, with funding dollars greater in 1995 than in 1985. Data from 1970 to 1995 is provided in the Appendix.

The following table provides a general financial summary for the DTA between 1985 and 1996. Total Cost and Revenues include all DTA activities including STRIDE operations and school service (i.e., seasonal tripper service). The Total Cost for operating the DTA in 1996 was almost \$8.4 million and Total Revenues reached approximately \$3 million (see Table 4a). Total Costs and Total Revenues have grown by \$1.7 million and \$609,000 over the last decade, respectively; a 25 percent increase. In 1995, farebox revenues were around \$1.4 million, only \$137,000 or ten percent more than in 1985. The school contract creates a significant stream of revenue for the DTA with approximately \$770,000 in 1996. However, the school contract funding amounts have declined somewhat over the last ten years. Table 4a also identifies the annual percentage change for Total Costs, Total Revenues and Farebox Revenues. Revenue as a percentage of Total Cost was highest in 1991 at 42 percent and lowest in 1989 at 31 percent. The difference between the Total Costs and the Total Revenues (i.e., deficit) are funded through local, state and federal sources. The annual changes in Total Costs over the last decade have remained fairly stable. The highest annual Total Cost percentage increase occurred between 1984 and 1985 with ten percent higher costs. An eight percent Total Cost increase took place between 1993 and 1994.

Table 4a: DTA Operating Costs and Farebox Revenues. 1985-1996.

Year	Total Costs	Annual Cost Percent Change	Total Revenues	Revenue Percent of Total Cost	Rev. Annual Percent Change	Farebox Revenue (FR)	FR Annual Percent Change	School Contract
1985	\$6,804,174	10%	\$2,328,872	34%	-22%	\$1,305,587	-8%	\$861,879
1986	\$6,722,260	-1%	\$2,435,168	36%	5%	\$1,375,108	5%	\$896,294
1987	\$6,901,010	3%	\$2,405,530	35%	-1%	\$1,272,818	-7%	\$873,492
1988	\$6,730,048	-2%	\$2,276,914	34%	-5%	\$1,249,958	-2%	\$813,243
1989	\$7,005,518	4%	\$2,204,265	31%	-3%	\$1,292,803	3%	\$760,900
1990	\$7,176,854	2%	\$2,509,866	35%	14%	\$1,438,920	11%	\$745,497
1991	\$7,268,262	1%	\$3,069,435	42%	22%	\$1,565,002	9%	\$780,363
1992	\$7,418,099	2%	\$2,997,314	40%	-2%	\$1,401,289	-10%	\$794,895
1993	\$7,458,614	1%	\$3,029,924	41%	1%	\$1,479,621	6%	\$811,647
1994	\$8,060,985	8%	\$3,085,674	38%	2%	\$1,474,991	0%	\$792,666
1995	\$7,901,909	-2%	\$2,974,012	38%	-4%	\$1,442,612	-2%	\$773,517
1996	\$8,399,310	6%	\$3,044,553	36%	2%	-	-	-

Source: Metropolitan Interstate Committee and Duluth Transit Authority

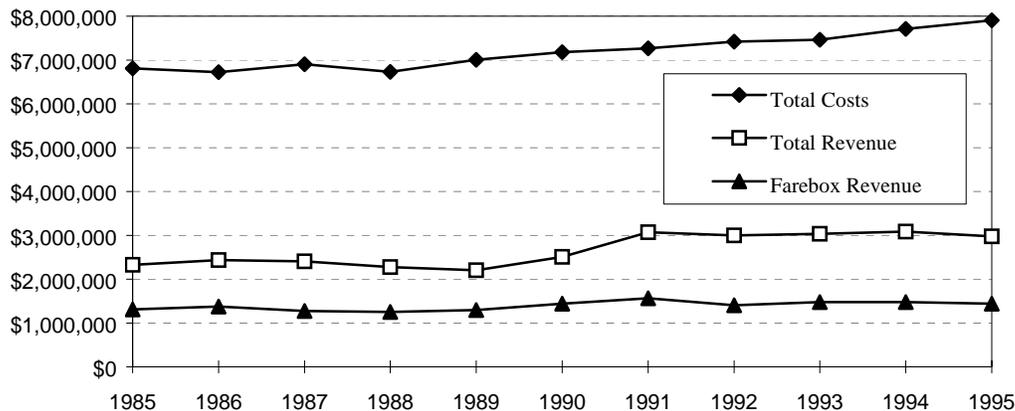
Note: Not adjusted for inflation.

Revenues have generally shown larger yearly fluctuations than Total Costs. Between 1984 and 1985, Total Revenue decreased 22 percent and

between 1990 and 1991, it increased 22 percent. These revenue fluctuations are due, in part, to the varying amounts of Farebox Revenues generated each year. Farebox Revenues have fluctuated somewhat over the last ten years, from an 11 percent increase in 1990 to a 10 percent decrease in 1992 (see Table 4a). It is important to note that these figures are not adjusted for inflation. Over the last 15 years, the U.S. Consumer Price Index (CPI) has ranged from a low of around 1.5 percent in 1986 to a high of around five percent in 1990. Throughout most of the 1990's, the CPI has remained around three percent per year. However, some evidence indicates that the CPI, as currently calculated, overstates the real rate of inflation by around one percentage point.

Figure 4d provides a better illustration of total costs and revenues. As the chart shows, total costs have grown at a fairly constant rate over the last ten years. Total revenues, have remained relatively stable with the exception of a growth period between 1989 and 1991. Farebox revenues have also remained relatively constant between \$1.2 million and \$1.5 million.

Figure 4d: DTA Farebox Revenues by Total Revenues and Costs

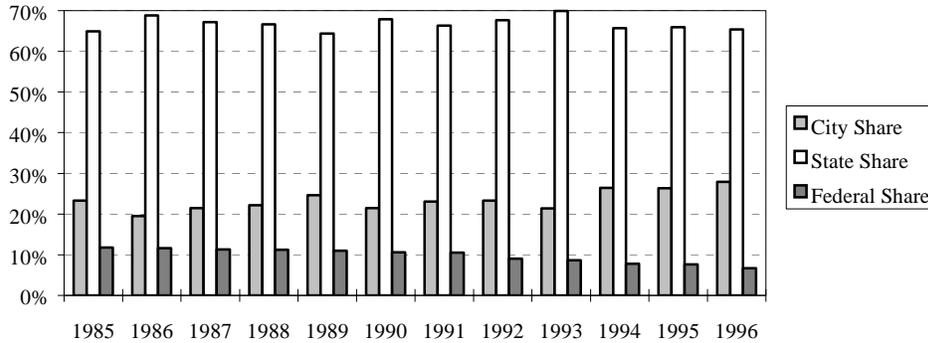


Source: Metropolitan Interstate Committee and Duluth Transit Authority

The difference between the total costs and total revenues is the deficit. This deficit is funded through assistance from the various levels of government. The following chart shows the percentage of total governmental transit assistance provided by City, State, and Federal government. The Federal share of all government transit funding to the DTA has declined from 12 percent in 1985 to seven percent in 1996. This decline reflects a continuing trend in decreasing federal transit assistance. State assistance as a percentage of all governmental assistance peaked in 1993 when it made up 70 percent of governmental aid. The current state share of governmental transit assistance in 1996 is 65 percent. The City share of transit funding has fluctuated throughout this period between a

low of 20 percent in 1986 and a high of 28 percent in 1996 (see Figure 4e).

Figure 4e: Percentage of Total Governmental Assistance to DTA



Source: Metropolitan Interstate Committee and Duluth Transit Authority

Note: City Share includes only the City of Duluth.

At times, more funds may be collected through the city tax levy than is required to cover the operating deficit; if this occurs, those funds are carried over to the following year. Likewise, several years have seen operating deficits which necessitated a greater share from the city than the tax levy provided. As a result, the city share used toward the deficit fluctuates from year to year while the amounts collected for transit from 1985 to 1993 remained constant at \$929,000. In 1994, the city tax levy increased and in 1995 and 1996, the city generated \$1,406,000 and \$1,450,000, respectively.

The following table lists the dollar amounts of governmental transit assistance and annual percentage changes of that funding. Keep in mind that these figures are not adjusted for inflation. Federal Transit funding decreased steadily between 1985 and 1996 by a total of 24 percent. While the State and City share have increased 59 percent and 34 percent respectively. The amount of total governmental assistance to the DTA has increased by 33 percent (see Table 4b).

Table 4b: Annual Changes in Governmental Transit Assistance. 1985-1996.

Year	City Share		State Share		Federal Share		Total	
	Dollars	Change	Dollars	Change	Dollars	Change	Dollars	Change
1985	\$938,232	-	\$2,613,637	-	\$474,434	-	\$4,026,303	-
1986	\$739,566	-21%	\$2,608,482	0%	\$441,326	-7%	\$3,789,374	-6%
1987	\$855,305	16%	\$2,672,683	2%	\$450,600	2%	\$3,978,588	5%
1988	\$870,867	2%	\$2,624,240	-2%	\$441,000	-2%	\$3,936,107	-1%
1989	\$1,045,991	20%	\$2,726,605	4%	\$465,000	5%	\$4,237,596	8%
1990	\$891,243	-15%	\$2,817,369	3%	\$441,000	-5%	\$4,149,612	-2%
1991	\$971,272	9%	\$2,786,555	-1%	\$441,000	0%	\$4,198,827	1%
1992	\$1,029,916	6%	\$2,991,511	7%	\$399,358	-9%	\$4,420,785	5%
1993	\$929,000	-10%	\$3,034,252	1%	\$377,551	-5%	\$4,340,803	-2%
1994	\$1,312,041	41%	\$3,257,774	7%	\$388,644	3%	\$4,958,459	14%
1995	\$1,295,736	-1%	\$3,237,429	-1%	\$375,496	-3%	\$4,908,661	-1%
1996	\$1,494,795	15%	\$3,501,523	8%	\$358,439	-5%	\$5,354,757	9%
1985-1996								
Change		59%		34%		-24%		33%

Source: Metropolitan Interstate Committee and Duluth Transit Authority

Note: Not adjusted for inflation

Employee compensation (i.e., wages and fringe benefits) represent a significant portion of total DTA expenses; 77 percent in 1995. From 1985 to 1995, operator wages have ranged between 32 percent and 37 percent of the DTA's total costs and between 51 percent and 59 percent for total wage and fringe benefits. Vehicle maintenance wages and fringes have ranged around 13 and 14 percent of total costs with administration wages representing around four to five percent of total DTA costs between 1985 and 1995.

Table 4c below provides wage history information from 1985 to 1995. During this time, the DTA's hourly wage increased by 30.6 percent which translate to an annual average increase of 3.06 percent per year. However, total dollars allocated toward operator wages only increased 17 percent during this time period with total wages plus fringes increasing 23.4 percent. At the same time, total dollars going toward administration wages have increased 33.4 percent.

Table 4c: DTA Wage History

Year	Hourly Wage (HW)	HW Annual Percentage Change	Total Operator Wages (TOW)	TOW Annual Percentage Change	Total Administration Wages (TAW)	TAW Annual Percentage Change
1985	\$10.69	6%	\$2,294,787	5%	\$898,011	9%
1986	\$10.78	1%	\$2,172,420	-5%	\$901,146	-1%
1987	\$11.18	4%	\$2,327,156	7%	\$498,134	0%
1988	\$11.36	2%	\$2,339,328	1%	\$865,638	11%
1989	\$12.15	7%	\$2,446,400	5%	\$942,282	-2%
1990	\$12.55	3%	\$2,528,468	3%	\$923,849	5%
1991	\$12.99	4%	\$2,510,117	-1%	\$879,017	-1%
1992	\$13.09	1%	\$2,771,056	10%	\$1,009,047	10%
1993	\$13.45	3%	\$2,593,065	-6%	\$1,075,631	6%
1994	\$13.65	1%	\$2,643,306	2%	\$1,088,813	4%
1995	\$13.96	2%	\$2,684,815	2%	\$1,076,061	0%
1985-1995 Total						
Percentage Change		31%	-	17%	-	20%
Annual Average						
Percentage Change		3.1%	-	1.7%	-	2.0%

Source: Metropolitan Interstate Committee and Duluth Transit Authority

Note: Not adjusted for inflation

Projected DTA Capital Improvement and Operating Funding

The following table lists the DTA's capital improvements that have been approved for funding from the Federal Government's Surface Transportation Program (STP) through the state of Minnesota's Area Transportation Partnership (ATP) process and included in the Duluth Area Transportation Improvement Program (TIP) through the year 2000 (see Table 4d). These dollars require a 20 percent match from the DTA.

Table 4d: Federal Surface Transportation Program (STP) Funding

Year	Vehicles	\$ / vehicle	Totals	Bids Let	Award	Delivered
1997	10 buses	\$265,000	\$2,650,000	1/31/97	3/31/97	2/15/98
1998	5 buses	\$270,000	\$1,305,000	1/31/98	3/31/98	2/15/98
1999	4 STRIDE	\$62,500	\$250,000	1/31/99	3/31/99	10/15/00
2000	6 STRIDE	\$75,000	\$450,000	1/31/00	3/31/00	10/15/00

Source: Duluth Transit Authority

Operating expenses funded through the Federal Transit Authority (FTA) for 1996 through 2000 have been set for Duluth and Superior at \$330,000 and \$140,000 per year, respectively. The FTA's small capital fund for that period provides an additional \$150,000 per year to the DTA for capital improvements.

Financial Projections for the DTA

In an attempt to forecast cost and revenues through the year 2001, linear trend-lines were calculated for total DTA cost, farebox revenue, state funds, and federal funds. Three trend-lines were created for each of these variables using data over the last five, ten and twenty year time segments. By creating a trend-line for each time segment, a projection range is created which provides a reasonable starting point for determining the most likely projection scenario.

Figure 4f illustrates the trend-line data and the projection range through the year 2001. Determining the most likely forecast requires consideration of a couple of factors. The linearity of data points needs to be considered in order to determine which trend-line offers the most likely forecast. Also, the amount of data variability is a factor that impacts how much confidence the trend-line offers as a projection. The total cost data points in Figure 4f show little linearity and a higher degree of variability over the 20 year period. This suggests that the ten and five year trend-lines may provide a more reasonable projection path. In contrast, farebox revenue has good linearity and little variability among data points which suggests that these trend-lines should provide a reasonable projection.

Source: Metropolitan Interstate Committee and Duluth Transit Authority

Figure 4f: DTA Financial Projections

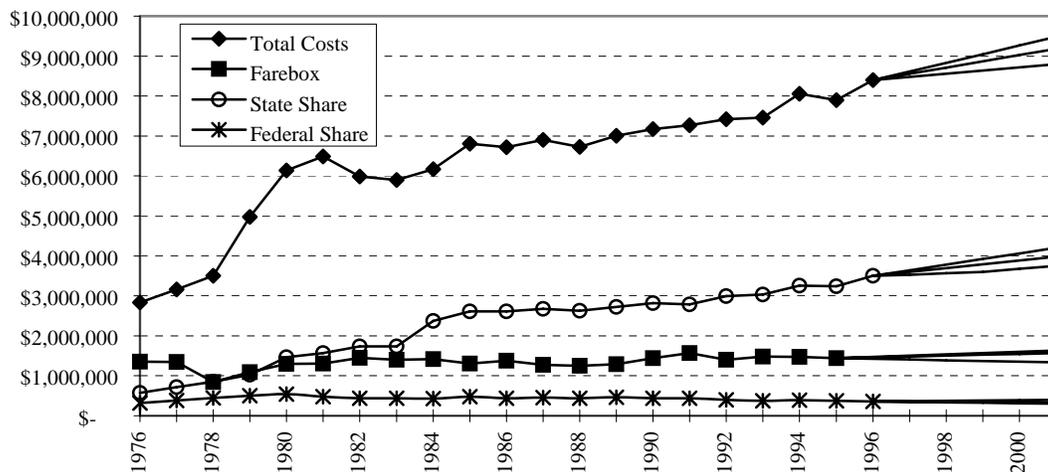


Table 4e provides projections for total costs, state revenues, federal revenues and farebox revenues based on the five year, ten year, and twenty year trend-lines. Upon considering the issues discussed above, the most likely future conditions were assessed and are highlighted with gray shading in the table below. It was felt that the five year total cost projection was reasonable given the high amount of variability and lack of

linearity of the data points. This projection was also consistent with the current rate of inflation.

While governmental funding can change because of a wide variety of factors effecting political decisions, the data shows fairly consistent trends with regards to both state and federal funding. The State share and federal fund projections were determined primarily because they were reasonable middle figures. The data points for farebox revenue have remained fairly consistent over the last two decades which provides confidence that the 20 year trend is a reasonable projection for the next five years.

Table 4e: Total Cost and Funding Projections

	1996	2001	Difference	% Change	Annual %
Total Cost Projections					
5 Year Trend	\$ 8,399,310	\$ 9,182,872	\$ 156,712	9%	2%
10 Year Trend	\$ 8,399,310	\$ 8,801,726	\$ 80,483	5%	1%
20 Year Trend	\$ 8,399,310	\$ 9,480,225	\$ 216,183	13%	3%
State Share Projections					
5 Year Trend	\$ 3,501,523	\$ 3,977,259	\$ 95,147	14%	3%
10 Year Trend	\$ 3,501,524	\$ 3,702,825	\$ 40,260	6%	1%
20 Year Trend	\$ 3,501,525	\$ 4,204,366	\$ 140,568	20%	4%
Federal Share Projections					
5 Year Trend	\$ 358,439	\$ 302,191	\$ (11,250)	-16%	-3%
10 Year Trend	\$ 358,439	\$ 327,255	\$ (6,237)	-9%	-2%
20 Year Trend	\$ 358,439	\$ 394,581	\$ 7,228	10%	2%
	1995	2001	Difference	% Change	Annual %
Farebox Revenue Projections					
5 Year Trend	\$ 1,442,612	\$ 1,335,849	\$ (17,794)	-7%	-1%
10 Year Trend	\$ 1,442,612	\$ 1,629,838	\$ 31,204	13%	3%
20 Year Trend	\$ 1,442,612	\$ 1,565,786	\$ 20,529	9%	2%

Source: Metropolitan Interstate Committee and Duluth Transit Authority

DTA Forecasts

The following table lists the projected revenues, expenses, and deficits estimated by DTA staff. The second column of Table 4f shows the total percentage change from 1987 to 1996 and the average annual change for all revenues, expenses, and deficit shares listed. Dollar amounts for this time period are provided in the Appendix. The DTA estimates ridership revenue to increase to \$2.5 million by 2001; a two percent annual increase. Total revenues are projected to increase to almost \$3.8 million for 2001 or four percent per year.

The DTA estimates operation expenses to increase 3 percent annually to a total of \$6 million in 2001. Maintenance / administration costs are projected to increase \$1.7 million and \$1.6 million, respectively; creating a total cost of \$9.3 million. DTA estimates federal, state, and city shares to



change zero percent, three percent, and one percent, respectively; and is relatively consistent with MIC estimates.

Table 4f: DTA Financial Projections: Total System (in dollars)

	87-96 Change*		Estimated 1997	Estimated 1998	Estimated 1999	Estimated 2000	Estimated 2001
	Ave. Annual* Change						
REVENUES							
Passenger Revenue	-3%		2,325,722	2,372,237	2,419,682	2,468,075	2,517,437
Annual Change	0%		2%	2%	2%	2%	2%
Charter Revenue	-50%		6,000	6,000	6,000	6,000	6,000
Annual Change	-6%		-24%	0%	0%	0%	0%
Other Revenue	49%		919,986	993,585	1,073,072	1,158,918	1,251,631
Annual Change	5%		8%	8%	8%	8%	8%
Total Revenues	7%		3,251,709	3,371,822	3,498,753	3,632,993	3,775,068
Annual Change	1%		4%	4%	4%	4%	4%
EXPENSES							
Operations	20%		5,295,474	5,454,338	5,617,968	5,786,508	5,960,103
Annual Change	2%		3%	3%	3%	3%	3%
Maintenance	4%		1,551,186	1,597,722	1,645,653	1,695,023	1,745,874
Annual Change	0%		3%	3%	3%	3%	3%
Administration	3%		1,495,064	1,524,965	1,555,465	1,586,574	1,618,305
Annual Change	0%		2%	2%	2%	2%	2%
Total Costs	13%		8,341,724	8,577,025	8,819,086	9,068,104	9,324,282
Annual Change	1%		3%	3%	3%	3%	3%
Deficit	18%		5,090,016	5,205,204	5,320,333	5,435,112	5,549,214
Annual Change	2%		2%	2%	2%	2%	2%
DEFICIT SHARES							
Federal	-19%		358,439	355,000	355,000	355,000	355,000
Annual Change	-2%		0%	-1%	0%	0%	0%
State	19%		3,390,501	3,486,139	3,584,525	3,685,738	3,789,862
Annual Change	2%		3%	3%	3%	3%	3%
Local	32%		1,341,076	1,364,065	1,380,808	1,394,373	1,404,352
Annual Change	4%		2%	2%	1%	1%	1%
Total Investment	18%		5,090,016	5,205,204	5,320,333	5,435,112	5,549,214
Annual Change	2%		2%	2%	2%	2%	2%

Source: MIC and DTA

* = based on 1987-1996 data provided by Duluth Transit Authority.

Table 4g shows the DTA's fixed asset schedule from 1998 to 2005. Projects that have been programmed are highlighted in bold text.

Table 4g: Duluth Transit Authority Fixed Asset Schedule 1998-2005 (Numbers shown in bold text are programmed.)

Assets	Original Cost	Service Life	1998	1999	2000	2001	2002	2003	2004	2005
Building and Structures										
Offices, Maintenance & Garage Building.	9,322,154.81	40								
Exterior Walls			25,000	50,000	25,000	100,000	10,000	10,000		
Roof Sections			100,000	100,000	75,000			20,000		
Floor Sealing & Repair			80,000				15,000			25,000
Air Exchanger 1989	50,774.00	10		50,000						50,000
Bus Shelters 1975-86	412,669.00	8	25,000	25,000	25,000				25,000	25,000
Turnarounds 1985	413,209.28	15	40,000	40,000				25,000		25,000
DTA Facility Parking Area					20,000					
Sub-Total	10,198,807.09		270,000	265,000	145,000	100,000	25,000	55,000	25,000	145,000
Revenue Equipment										
1977 Spare Engine	17,025.79	6								
Buses 1975 (1 remaining)	1,115,985.94	12								
Buses 1979 (15 remaining)	4,248,365.12	12	1,305,000							
Bus Rehab 1986 (8 remaining)	446,424.00	7								
Bus Rehab 1987 (7 remaining)	536,817.00	7								
Flexibles 1989 (10)	1,765,757.00	12					3,000,000			
TMC 1990 (10)	1,818,730.00	12						3,000,000		
Gilligs 1995 (25)	5,200,000.00	12								
Trolleys 1984	129,134.00	12								400,000
STRIDE Buses 1989 (5) 2 in use	235,000.00			160,000					200,000	
STRIDE Vans 1994 (2)	76,500.00			90,000				120,000		
STRIDE Buses 1995 (5)	289,825.00	6			450,000					500,000
Coin Sorter 1977	1,880.00	13		25,000						
Coin Sorter 1980	3,429.00	10		25,000						
Global Coin Counter 1984	19,800.00	10		25,000						
GFI Counting System 1989	386,887.63	10		35,000		35,000		35,000		35,000
Sub-Total	16,291,560		1,305,000	360,000	450,000	35,000	3,000,000	3,155,000	600,000	535,000
Furniture & Equipment										
Phone System 1986	19,328.01	10			25,000					
Radio Equipment 1989	165,000.00	10		600,000						
Audio Visual Equipment 1984	4,500.00	5 - 10								
Computer Equip. 1982-1989	98,439.00	5	40,000				20,000		20,000	
Office Equipment 1979-89	185,541.00	5 - 10	20,000	10,000	20,000	20,000		20,000		20,000
Sub-Total	472,808.01		60,000	610,000	45,000	20,000	20,000	20,000	20,000	20,000
DOWNTOWN IMPROVEMENTS										
Transit Center East	27,446.77	40	25,000		25,000		25,000			25,000
Transit Center West	492,814.30	15			10,000					
Shelters	204,586.00	15			25,000			25,000		
Sub-Total	724,847.07		25,000	0	60,000	0	25,000	25,000	0	25,000

Source: Duluth Transit Authority

Table 4g (con't): Duluth Transit Authority Fixed Asset Schedule: 1998-2005

Conclusion

Over the last ten years, the DTA has seen its financial situation stabilize. While this provides a certain amount of confidence in the DTA's financial direction, this future is not necessarily optimistic. Data shows farebox revenues growing slightly and not covering DTA's increasing operating costs. As a result, the DTA will need to rely increasingly on alternative revenue sources or increases in governmental investments to sustain current services.

DTA SYSTEM ANALYSIS

Historical

The Duluth Transit Authority (DTA) is a public authority corporation of the City of Duluth. The Board of Directors has the final authority in decision-making. The nine-member Board is appointed by the mayor and approved by the City Council. Officers of the DTA Board include a president, vice-president and secretary. The Board is comprised of a representative from each Duluth council district (five), three at-large members from Duluth and a City of Superior representative. Responsibilities of the Board include definition of the DTA's goals, objectives and standards and continual monitoring of DTA management in adherence to the system's goals. The Duluth City Council is responsible for budget control.

DTA provides bus service to the City of Superior on a contractual basis. The level of service is determined by the Superior City Council which has funding authority. Superior is represented on the Board with one member that has full voting privileges.

Ryder / American Transit Enterprises (ATE) a division of Ryder Public Transportation Services of Cincinnati, Ohio is responsible for management of the DTA. The General Manager of DTA is an employee of Ryder/ATE - Cincinnati. ATE Management of Duluth, Inc. has been formed as the local holding and management company responsible for operating the system on a physical level. Outside of the General Manager, all operating staff including management, support staff, drivers and maintenance staff are employees of ATE - Duluth.

The Metropolitan Interstate Committee (MIC) serves as the transit planning agency for the Duluth - Superior metropolitan area. Under a federal mandate the MIC has been established as the official Metropolitan Planning Organization (MPO) for the area with powers to analyze metropolitan transportation issues, to aid local governments in transportation planning, to review federal funding grants and to prepare and adopt a comprehensive plan for the urbanized area. MIC staff provides planning assistance to the DTA in research activities, policy, operational and funding decisions. An official operating agreement exists between the DTA and the MIC that defines planning activities carried out by each party.

*The Metropolitan
Interstate
Committee serves
as the transit
planning agency
for the Duluth-
Superior
metropolitan area.*

The DTA operates fixed route bus service in the metropolitan area with 14 separate routes in Duluth, a series of three radial routes in Superior and one inter-city route between Duluth and Superior.

The routes form a radial pulse network focused on downtown Duluth. All routes originate from the downtown and radiate outward including the inter-city route to Superior.

The DTA operates fixed route bus service in the metropolitan area with 14 separate routes in Duluth, a series of three radial routes in Superior and one inter-city route between Duluth and Superior. The DTA also operates a series of special services including seasonal tripper service (primarily for students), a circulator service in the summer for the downtown Duluth area and a shuttle bus service linking numerous commercial establishments in the Miller Hill shopping corridor.

The DTA also has a contract with a private transportation provider for the provision of paratransit services called "STRIDE". This is a demand responsive service for qualifying persons with disabilities. The private contractor furnishes all operators, scheduling, dispatching and liability insurance. The DTA provides the wheelchair accessible vehicles and provides vehicle maintenance. STRIDE is a curb-to-curb service operating seven days a week.

Fixed Route System Design

The Duluth Transit Authority (DTA) provides service for Duluth, Proctor and Superior, Wisconsin within the metropolitan area. Superior contracts for service from the DTA within its city limits. The primary fixed route system is identified in the DTA Fixed Route Bus System Map. The routes form a radial pulse network focused on downtown Duluth. All routes originate from the downtown and radiate outward including the inter-city route to Superior. (The routes within Superior are also radial focusing on downtown Superior). Routes are coordinated in downtown Duluth in order to facilitate transfers between buses and other routes. This method of operation is common for small to medium sized systems and has been in operation since the days of the streetcar lines.

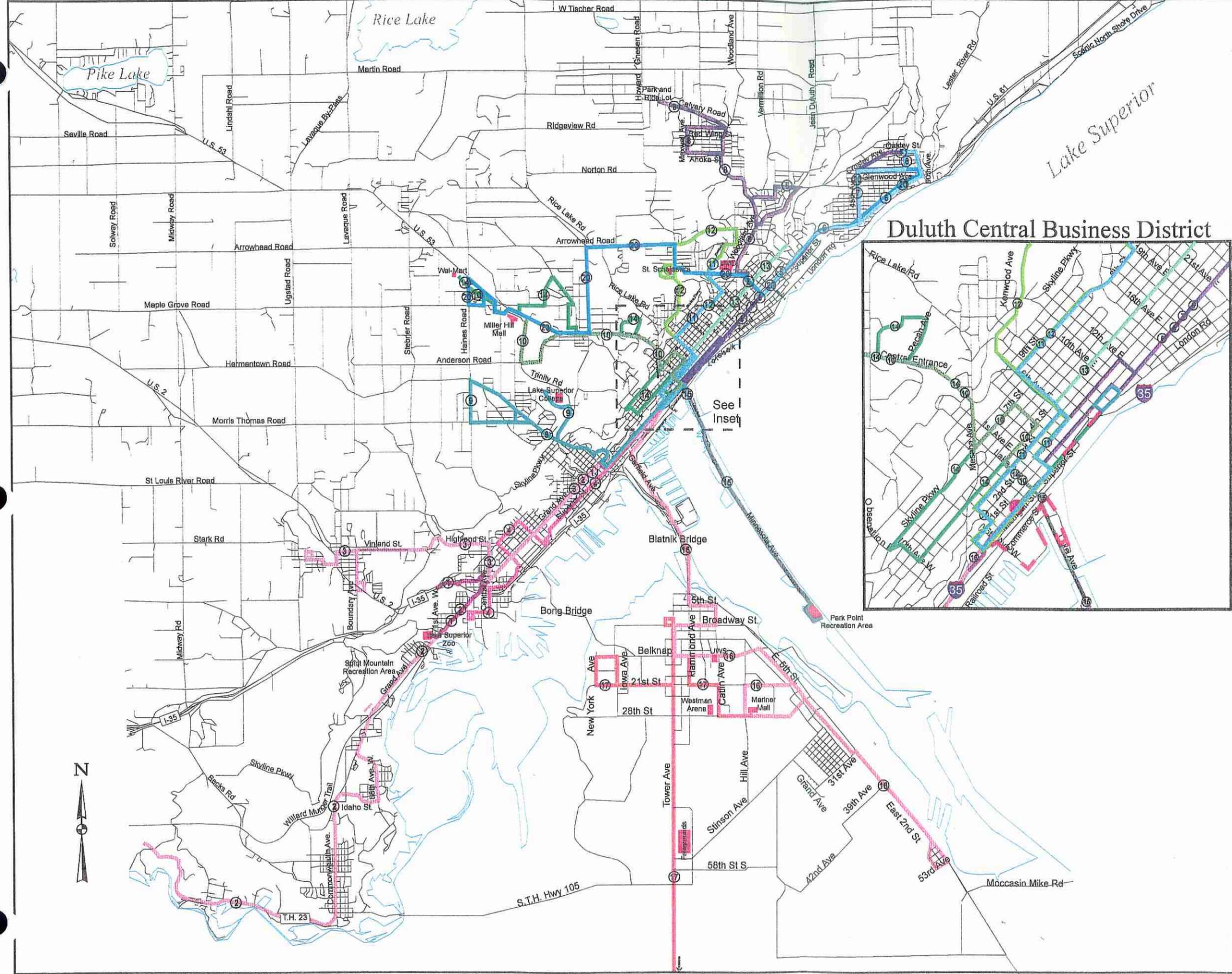
The central pulse point in downtown Duluth is located between the 200 and 300 block of West Superior Street. Transit centers are located along both sides of the street to facilitate bus movement in either direction (east and west). The transit centers serve as a waiting area and information site for bus users. Downtown Superior (14th Street and Tower Avenue) serves as the pulse point for routes within Superior and the cross city route to Duluth.

Six routes within the system are interlined or through-routed. These lines serve one section of Duluth, arrive downtown and then continue on from the transit center to serve another section of the city as a different route. The interlined routes are the mainline east and west routes within Duluth as well as the Woodland route serving northern portions of the service area.

Service Periods

The service periods for each route are listed in Table 5a. The majority of routes are in operation by 6:00 a.m. on the weekdays and range in service hours from 12 hours to 19 hours. The Far West route has the longest hours in service at 19 ½ hours. The cross-town Lakeside-Mall route has the shortest span of operation at 8 ½ hours. All routes within the system operate on Saturday. Most routes begin service at roughly 7:00 a.m. and cease operation between 7:00 p.m. and 8:00 p.m. Sunday service is limited. DTA does not operate in Superior on Sunday and also does not operate over four other fixed routes within Duluth. Sunday service begins by 9:00 a.m. and stops by approximately 7:00 p.m.

Duluth Transit Authority Fixed Route Bus System



Routes	
1 West Main Line	10 Duluth Heights/Mall
2 Far West	11 East 8th/UMD
3 Proctor	12 Kenwood
4 Ramsey/Raleigh/West 8th	13 East 4th
5 East Main Line	14 West 4th Blvd./Eklund/Mall
6 Lester Park	15 Park Point
7 Crosley	16 Duluth/Superior
8 Woodland	17 Superior, WI
9 Pledmont	20 Lake Side Mall
DTA Hub	Port Town Trolley



Table 5a; DTA Service Periods - Current Fixed Route System

#	Regular Routes	Weekday		Saturday	Sunday
		Operating Time*	Service Hours	Operating Time*	Operating Time*
2	Far West	4:45 AM - 12:15 AM	19 HRS 30 MIN	6:45 AM - 8:00 PM	7:15 AM - 7:00 PM
3	Proctor	5:15 AM - 10:15 PM	17 HRS	6:45 AM - 7:30 PM	9:00 AM - 6:30 PM
4	Ramsey/Raleigh/ West 8th	6:15 AM - 6:30 PM	12 HRS 15 MIN	9:45 AM - 6:00 PM	No Service
6	Lester Park	5:15 AM - 10:30 PM	17 HRS 15 MIN	6:45 AM - 8:00 PM	8:30 AM - 6:30 PM
7	Crosley	5:15 AM - 10:30 PM	17 HRS 15 MIN	6:45 AM - 8:00 PM	8:30 AM - 6:30 PM
8	Woodland	5:30 AM - 12:15 AM	18 HRS 45 MIN	7:15 AM - 7:45 PM	9:00 AM - 7:00 PM
9	Piedmont	6:00 AM - 8:15 PM	14 HRS 15 MIN	9:15 AM - 6:15 PM	11:00 AM - 5:45 PM
10	Duluth Heights/Mall	7:15 AM - 11:30 PM	16 HRS 15 MIN	6:45 AM - 7:00 PM	10:15 AM - 7:00 PM
11	East Eighth/UMD	5:45 AM - 12:00 AM	18 HRS 15 MIN	7:15 AM - 7:15 PM	9:30 AM - 6:30 PM
12	Kenwood	6:15 AM - 12:00 AM	17 HRS 45 MIN	7:15 AM - 6:00 PM	10:30 AM - 5:30 PM
13	East 4th	6:15 AM - 12:15 AM	18 HRS	7:15 AM - 7:00 PM	9:00 AM - 7:00 PM
14	West 4 th / Central Entrance/ Miller Hill Area	6:00 AM - 6:30 PM	12 HRS 30 MIN	9:15 AM - 6:45 PM	No Service
15	Park Point	6:15 AM - 6:45 PM	12 HRS 30 MIN	8:15 AM - 5:45 PM	No Service
16	Duluth/Superior	5:30 AM - 7:30 PM	14 HRS	6:15 AM - 7:00 PM	No Service
17	City of Superior South Superior Billings Park Mariner Mall	5:30 AM - 6:30 PM 6:00 AM - 6:30 PM 7:00 AM - 6:00 PM	13 HRS 12 HRS 30 MIN 11 HRS	8:15 AM - 5:45 PM 7:45 AM - 6:30 PM No Service	No Service No Service No Service
20	Lakeside/Mall	7:15 AM - 4:15 PM (a)	9 HRS	9:00 AM - 3:45 PM (b)	No Service

* Times are approximated to the nearest quarter hour.

(a) Monday - Friday (Sept - May)

(b) Also Monday - Saturday (Summer)



As a rule, most routes operate with approximately 30 minute peak headways and 60 minute off-peak headways.

Weekend headways for the routes in operation are almost all 60 minutes apart.

Headways

Table 5b lists the headways, or service frequency, for each route in the DTA system. Weekday headways are broken into four time segments of the day. The segments are AM peak (7:00 a.m. - 9:00 a.m.), Mid-day (9:00 a.m. - 2:30 p.m.), PM peak (2:30 p.m. - 6:00 p.m.) and Evening (6:00 p.m. and after). As a rule most routes operate with approximately 30 minute peak headways and 60 minute off-peak headways. The three routes that operate more frequently than 60 minutes in the off-peak period are fairly productive especially the Duluth Heights bus that serves the Miller Hill area.

The few routes that operate more frequently than 30 minutes during the peak hours are, for the most part, warranted given current levels of ridership. The Far West and Proctor routes provide express service in the peaks as well as non-express routing. The Woodland and Crosley routes also provide express routes that increases frequency of service within the peaks. Only on the Crosley route during the peak, given current ridership data, does it appear that too much service may be provided and some service cutbacks may be warranted. This is partially due to the fact that the Lester Park bus follows the same routing as the Crosley bus into downtown which decreases headways along the route corridor thereby providing sufficient service with one bus where two currently operate.

The routes in the evening time period have headways that vary from 30 minutes to 60 minutes. Some routes only have a small number of trips that operate in the evening and usually maintain the headways established for the PM peak. Other routes operate well into the late evening hours with service until 11:00 p.m. or midnight. Of note are the Piedmont, Woodland/East 4th, Duluth Heights and East Eighth routes that operate late into the evening and produce average or below average ridership. It may be possible that frequencies should increase in the evening for these routes or that one or more final trips for a particular bus route be eliminated as a cost saving measure.

Weekend headways for the routes in operation are almost all 60 minutes apart. The main exception to this situation is the Duluth Heights / Miller Hill Mall route that operates every 30 minutes out of the downtown. This level of service is warranted due to the amount of riders in need of accessing the Miller Hill commercial corridor.

**Table 5b; DTA Headways - Current Fixed Route System
(Average In Minutes)***

#	Regular Routes	HEADWAYS					
		WEEKDAY				Saturday	Sunday
		AM	MD	PM	EV		
2	Far West	20	60	23	60	60	60
3	Proctor	22	60	36	34	60	60
4	Ramsey/Raleigh/ West 8 th	30	60	25	-	60	-
6	Lester Park	30	60	30	40	60	60
7	Crosley	20	60	25	40	60	60
8	Woodland	15	30	14	41	60	60
9	Piedmont Heights						
	Piedmont	30	60	30	30	60	60
	Fitger's	25	60	30	30	60	60
10	Duluth Heights/Mall	30	30	30	34	30	30
11	East Eighth/UMD	30	30	30	45	60	60
12	Kenwood	30	60	30	60	60	60
13	East 4th	30	60	30	60	60	60
14	West 4th/Central Ent/ Miller Hill Area	23	120	22	-	120	-
15	Park Point	30	60	30	-	60	-
16	Duluth/Superior	30	60	30	30	60	-
17	Superior						
	South Superior	30	66	30	N/A	70	---
	Billings Park	30	62	22	N/A	70	---
	Mariner Mall	30	----	30	N/A	----	----
20	Lakeside/Mall	26	120	N/A	-	103 (a)	-

* Average headways determined by sum of minutes in a specific time period divided by the number of buses serving that same specific time period (rounded).

(a) Only three bus runs; two in AM and one in PM.

AM Peak - 7:00 am - 9:00 am

Mid-day - 9:00 am - 3:00 pm

PM Peak - 3:00 pm - 6:00 pm

Evening - After 6:00 pm

Fleet Size / Vehicle Requirements

A breakdown of the DTA fleet follows (non-specialized vehicles):

Table 5c; DTA Fleet

BUS	NUMBER
1970 Model GMC (rehab.)	16
1975 Model GMC	1
1979 Model GMC	15
1989 Model FLX	10
1990 Model TMC	10
1995 Model GILLIG	25
TOTAL	77

STRIDE vehicles, the Orions for the MAC service and the trolleys and tram are not included in this total.

Vehicle requirements vary by day and by time of day. During the weekday, the AM peak hour bus requirement is 44; the PM peak hour requirement is 49. These totals do not include the school tripper routes. The weekday off-peak (mid-day) bus requirement is 25.

Saturday buses in operation totals 20 while the Sunday bus requirement is 13.



Bus Fleet in DTA's bus facility

Revenue Miles

The table below lists the revenue miles for each DTA route including express routes.

Table 5d; DTA Revenue Miles - Current

FIXED ROUTES	Weekday		Saturday		Sunday	
	Trips	Miles	Trips	Miles	Trips	Miles
Far West	49	898.8	14	354.8	12	295.2
Proctor	19	410.4	13	280.8	10	216.0
Ramsey/Raleigh	19	267.9	9	126.9	--	--
Lester Park	24	336.9	13	183.3	10	141.0
Crosley	14	193.2	--	--	--	--
Woodland	41	600.0	13	198.9	10	153.0
Piedmont	22	222.2	9	90.9	7	70.7
Duluth Heights/Mall	29	478.5	24	396.0	17	280.5
East Eighth/ UMD	32	230.6	13	88.4	9	61.2
Kenwood	20	220.0	11	121.0	7	77.0
East 4 th	20	152.0	12	91.2	--	--
West 4 th / Eklund/Mall	10	186.0	5	93.0	--	--
Park Point	19	167.2	10	88.0	--	--
Duluth/Superior	19	289.4	14	232.4	--	--
Superior, WI						
South Superior	16	144.0	8	72.0	--	--
Billings Park	17	81.6	9	43.2	--	--
Mariner Mall	9	48.6	--	--	--	--
Lakeside/Mall	7	116.8	4	104.8	--	--
-- Express --						
Proctor Pacer	4	77.2	--	--	--	--
Crosley Clipper	3	41.4	--	--	--	--
Woodland Windjammer	3	15.3	--	--	--	--
Superior Streaker	2	11.2	--	--	--	--
West Duluth	4	98.4	--	--	--	--
FIXED ROUTE SYSTEM TOTAL	402	5,287.6	181	2,565.6	82	1,294.6

Revenue miles refers to the distance each route travels while in actual revenue generating service. Therefore, miles accumulated to and from the DTA garage are not included.

Weekday operations for the fixed route system account for nearly 5,300 miles on a daily basis.

The table identifies each route for the weekday and weekend listing the number of round-trip routes and total miles accounted for on a daily basis. Weekday express routes are listed separately. Weekday operations for the fixed route system account for nearly 5,300 miles on a daily basis. The Far West and Woodland routes provide the greatest amount of trips and revenue generating miles. Duluth routes account for 84% of revenue miles in the system. The routes within Superior account for 11% of total miles logged. Express routes account for the remaining five percent.

Saturday service roughly cuts the miles logged by DTA in half from the amount driven during each weekday. There are approximately 2,500 miles logged each Saturday by the system. Duluth routes account for 86% of system miles. Superior accounts for 14% of system miles.

Sunday service operated by the DTA cuts the amount roughly in half of the total provided on a Saturday. There is nearly 1,300 miles logged on a Sunday all within the City of Duluth.

RIDERSHIP ACTIVITY - FIXED ROUTE SYSTEM

Weekday Ridership - 1996

Weekday ridership activity is shown in Table 5e. All Duluth routes were surveyed in 1996 while the Superior figures date to 1993. However, the age of the Superior data should not pose a problem in analysis since the routes have not changed in structure and Superior's population has remained fairly stable. (1993 data is shaded in the table.) The data is based on the total number of passenger boardings made on each route.

On a typical weekday, a total of 9,457 passenger trips were made on the DTA.

On a typical weekday, a total of 9,497 passenger trips were made on the DTA. This figure does not include bus service between Duluth and Superior, within Superior or to Fitger's shopping complex in Duluth. If the 1993 figures for these routes are added to the 1996 totals, the DTA provides a total of 10,512 passenger trips on a typical weekday. In order to make comparisons, the totals in Table 5e take this absence of data into account.

Between 1993 and 1996, ridership increased by a percentage of just over 12%.

Between 1993 and 1996, ridership increased by a percentage of just over 12%. This occurred even though approximately 40 fewer trips system-wide were provided in 1996 than in 1993. Growth in rider patronage and a couple of structural changes to the DTA system account for the percentage increase. The major rerouting changes occurred in Routes 10 and 14 that serve the Central Hillside, Duluth Heights and Miller Hill Mall areas. Both of these routes were altered significantly which accounts for their fluctuation between the survey years. This is especially true of Route 14 where the increase in ridership was 165% due to the addition of certain street sections that were once a component of Route 10. In similar

fashion, the Route 10 bus decreased slightly in ridership due to losing street segments to Route 14.

The most heavily patronized regular route is the Far West route with over 2,000 passenger boardings per weekday. The Woodland route and the Duluth Heights/Mall route follow at second and third respectively for the DTA. The Lakeside/Mall cross-town route (108 passengers) and Park Point route (139 passengers) are the two routes in Duluth with the fewest riders. It should also be noted that the intra-city Superior routes are all quite low with a range of 36, 71 and 124 riders for each of the three routes (1993). On a positive note, with the lone exception of the Duluth Heights/Mall route, all DTA routes experienced a percentage gain between 1993 and 1996 in ridership.

Table 5e also provides a breakdown of ridership activity by inbound/outbound trip and by time of day. Inbound trips (to downtown) account for slightly more riders than outbound trips. The percentage is 55% for inbound trips to 45% for outbound trips.

Ridership statistics during the morning and afternoon peak travel times are very similar. The AM peak accounts for 27% of ridership with the PM peak accounting for 28%. The morning peak is defined as 7:00 a.m. to 9:00 p.m. (2 hours). The afternoon peak is three and one-half hours in length from 2:30 p.m. to 6:00 p.m. Mid-day ridership accounts for the largest percentage at 36%. Evening ridership accounts for the remaining 9%.

Inbound and outbound ridership vary as expected during each of the time periods. There are more inbound riders in the morning peak and mid-day than outbound riders. Conversely, outbound riders are greater than inbound in the afternoon peak and in the evening.

Weekend Ridership - 1993

Ridership data for a Saturday and Sunday is derived from the 1993 survey and can be seen in Table 5h. A total of 4,186 passenger trips were made on a typical Saturday. This is roughly 44% of the regular fixed route total for a weekday. The old configuration of the Duluth Heights/Mall route and the Far West route were the two most heavily patronized bus lines. This is largely due to the impact of shopping trips, especially in the case of service to the Miller Hill Mall commercial area. Routes that primarily served a residential area fared very poorly on a Saturday. This can be seen in the ridership figures for the Ramsey/Raleigh, Park Point and West 4th (old configuration) routes.

The most heavily patronized regular route is the Far West route with over 2,000 passenger boardings per weekday. The Woodland route and the Duluth Heights / Mall route follow at second and third respectively for the DTA.

The AM peak accounts for 27% of ridership with the PM peak accounting for 28%.

A total of 4,186 passenger trips were made on a typical Saturday. This is roughly 44% of the regular fixed route total for a weekday.

Sunday ridership is approximately 49% of ridership generated on a Saturday. Levels of service are likewise about ½ of what is operating on Saturday. Therefore, Sunday ridership statistics are not surprising. Again, the Duluth Heights/Mall and Far West routes plus the Proctor route are leading generators on a typical Sunday. The neighborhood routes, Kenwood, East 4th and Piedmont make up the bottom half of ridership generation.

ROUTE PRODUCTIVITY

Performance Indicator - Passengers per Mile per Route

With passenger totals and route mileage information, a route by route analysis is possible that ranks each route's productivity. Table 5f shows this rank order by route (express service included).

TABLE 5e; DTA Ridership Average Weekday - By Route

Route # / Route Name	1993*	1996	Percent (+,-)	Inbound	Outbound	AM Peak		Mid-day		PM Peak		Evening	
						In	Out	In	Out	In	Out	In	Out
2 / Far West	1,946	2,037	4.68%	1,179	858	433	190	534	366	136	207	76	95
3 / Proctor	713	818	14.73%	475	343	191	45	177	115	52	130	55	53
4 / Ramsey/Raleigh	231	292	26.41%	159	133	58	23	34	26	50	70	17	14
6 / Lester Park	693	849	22.51%	503	346	190	88	152	101	96	107	65	50
7 / Crosley	439	588	9.09%	350	238	95	12	119	69	136	157		
8 / Woodland	1,127	1,385	22.89%	724	661	255	136	231	138	140	267	98	120
9 / Piedmont Hts.													
Piedmont	335	389	16.12%	229	160	81	52	66	37	56	61	26	10
Fitzer's (a)	90	N/A		81	9								
Subtotal	425	N/A		310	169								
10 / Duluth Heights/Mall	1,106	1,016	-8.14%	476	540	92	66	302	235	49	191	33	48
11 / East 8th	786	797	1.40%	415	382	83	48	199	155	78	121	55	58
12 / Kenwood	330	338	2.42%	162	176	77	42	44	26	41	108		
13 / East 4th	313	409	30.67%	222	187	111	47	59	53	49	79	3	8
14 / West 4th/Eklund/Mall	125	332	165.60%	187	145	57	12	55	52	75	81		
15 / Park Point	130	139	6.92%	52	87	21	18	17	39	14	30		
16 / Duluth-Superior	694	N/A	N/A	329	365	119	80	164	180	46	80	0	25
17 / Superior (b)													
South Superior	124			61	63	22	7	29	33	9	22	1	1
Billings Park	71			32	39	12	8	17	19	2	12	0	1
Mariner Mall	36			11	25	5	17			6	8		
Subtotal	231	N/A	N/A	104	127	39	32	46	52	17	42	1	2
20 / Lakeside/Mall	85	108	27.06%	58	50	48	0	6	24	4	26		
TOTALS**	8,459	9,497	12.27%	5,191	4,306	1,792	779	1,995	1,436	976	1,635	428	456

N/A - Not Available

* Ridership figures from Fall of 1993 (Shaded).

** Not including Fitzer's component - Route 9/ Route 16 / Route 17 for Totals row for comparison purposes.

(a) Fitzer's component of route warrants separate listing of ridership figures.

(b) Three separate loop routes comprise the Route 17 Superior schedule.



Table 5f; Passengers per Revenue Mile - By Route (Weekday)

FIXED ROUTES (rank order)	Passengers per Revenue Mile
East Eighth/UMD	3.46
East 4 th	2.69
Lester Park	2.52
Crosley	2.51
Duluth/Superior *	2.31
Woodland	2.25
Duluth Heights/Mall	2.12
Far West	2.04
West 4 th /Eklund/Mall	1.78
Piedmont	1.75
Proctor	1.68
Kenwood	1.54
Ramsey/Raleigh	1.09
Lakeside/Mall	0.92
Superior - Billings Park*	0.87
Park Point	0.83
Superior - South Superior*	0.81
Superior - Mariner Mall*	0.74

* Figures from 1993 ridership data.

This table indicates that the East Eighth route operates at the most productive level in terms of passengers per mile. It must be understood that this listing indicates only a portion of the true picture since distance and amount of service varies from route to route which affects the outcome for this indicator. Given this assumption, each route can be assessed relative to each other.

The Duluth east side routes, Miller Hill Mall routes and the Far West route dominate the upper end of the scale and are therefore the strongest in the DTA system. Of greatest concern to the DTA are the routes on the lower end of the scale operating at about 1.0 passengers per mile or less. The routes in this category (Ramsey/Raleigh, Lakeside/Mall, Park Point and Superior intracity) are most in need of analysis to determine if changes in route structure or operation are warranted. (Further analysis of this performance indicator follows in the Route Profile section of this chapter.)

The East Eighth route operates at the most productive level in terms of passengers per mile

The Duluth east side routes, Miller Hill Mall routes and the Far West route dominate the upper end of the scale and are therefore the strongest in the DTA system

Weekday Fixed Route Productivity

Table 5g provides a detailed account of the fixed route system for the years 1993 and 1996. The table lists ridership, trips provided, average riders per route trip with ranking and a breakout of average riders per trip by time of day. The two different years of survey data are provided in order that increases/decreases in route productivity can be seen. The trend information can give some indication on routes that have performed and continue to perform well or poorly. Of particular importance are the routes that have exhibited poor performance. It is these routes that may need service operation changes in order to be more cost effective.

In 1996, the Far West route was the most productive one carrying 37.8 passengers per trip. The second and third most productive routes were Proctor (35.6) and Lester Park (35.4) respectively.

The fixed route system average was 26.3 passengers per trip. Looking at only the Duluth routes in 1996, five routes stand out with an average that is significantly below the DTA system average. These include the Park Point, Kenwood, Piedmont, Lakeside/Mall and Ramsey/Raleigh routes. Of these five routes, the Park Point line operates with the lowest average at 7.7 passengers per trip.

The time period breakdowns exhibit similar patterns as the overall average figure in terms of identifying quality and inferior quality routes. The same five routes identified above (Park Point, Kenwood, Piedmont, Lakeside/Mall and Ramsey/Raleigh) all have more than one time period where the average riders per trip is significantly lower than the system-wide average. In addition, the East 4th route has two time periods that also fall into this category. For example, the Ramsey/Raleigh bus on average carries 12.4 passengers per trip in the mid-day operating hours. This figure is less than 50% of the system-wide average for this same time slot (25.66) and may indicate that bus service provided is well ahead of bus service demand in this area. Therefore, corrective action can be taken for this route in the form of decreasing service, rerouting to increase route potential or providing the identified area with a different form of transit service (i.e., demand responsive). In similar fashion, the other routes with low riders per trip will be analyzed to determine the best remedial action for the DTA to consider for both the short and long term.

In comparing 1993 rankings with 1996 figures, the majority of DTA routes exhibit only small fluctuations between the years. The most significant change is seen with the Duluth Heights/Mall and West 4th routes. The rank changes for these two routes are attributable to alterations in route configuration that occurred after the 1993 data was collected. The Duluth Heights/Mall line experienced a decrease in trips provided and no longer entered neighborhood areas. The West 4th route



expanded operations to include the residential areas previously served by the Duluth Heights bus and subsequently experienced a large increase in riders per trip. The only other major change in route ranking occurred with the Kenwood line. Though ridership remained essentially stable between the survey years, the Kenwood line dropped from 8th to 13th in terms of riders per trip.

Productivity for the routes operating in Superior can be seen in Table 5g under the 1993 columns. The inter-city Duluth-Superior route is one of the most productive in the DTA system. In fact, the route ranks 2nd in terms of passenger per trip at 31.5. All time periods were also operating well especially the mid-day service. In contrast, the intracity routes within Superior exhibit low to very low ridership numbers. Overall averages for the three intracity routes as well as the individual time period averages are all significantly below system averages. Given demand, it is these intracity routes that may warrant service provision changes.

Weekend Fixed Route Productivity

Table 5h provides information on fixed route productivity for an average weekend. This data was collected and processed in 1993. Though the data is slightly dated it still gives an indication of route productivity since few changes have occurred in the DTA system. The table provides a ranking for each route on Saturday and Sunday.

The top two routes on Saturday (Duluth Heights/Mall and Far West) stand out from the rest of the routes in terms of riders. These two routes are serving major commercial strips with links to downtown Duluth and select residential areas. Both routes have an average per trip figure well above the DTA system average for a Saturday. The current configuration for the Duluth Heights/Mall route would still indicate a route that is strong in terms of ridership and productivity. Routes operating significantly below the DTA average include Ramsey/Raleigh, Piedmont/Fitger’s, West 4th (old configuration), Park Point and the intracity Superior lines.

Sunday productivity figures reflect similar rankings from those seen on a Saturday. The top three routes for Sunday are the same three for a Saturday (Duluth Heights/Mall, Far West and Proctor). These routes all average more than 30 riders per trip. Four routes operate significantly below the DTA average for a Sunday. These include the Piedmont, East 8th, Kenwood and East 4th routes. (Since 1993 the East 4th route has been cut back in terms of service area.) Select routes in Duluth and all Superior routes do not operate on Sundays.

The inter-city Duluth-Superior route is one of the most productive in the DTA system. In fact, the route ranks 2nd in terms of passenger per trip at 31.5.

The top two routes on Saturday (Duluth Heights/Mall and Far West) stand out from the rest of the routes in terms of ridership and productivity. These two routes are serving major commercial strips with links to downtown Duluth and select residential areas.

Insert Table 5g - DTA FIXED ROUTE PRODUCTIVITY



TABLE 5h; DTA Fixed Route Productivity Average Weekend By Route

Route # / Route Name	1993							
	Saturday				Sunday			
	Riders	Trips	Overall Ave./Trip	Rank*	Riders	Trips	Overall Ave./Trip	Rank*
2 / Far West	743	29	25.6	2	422	14	30.1	3
3 / Proctor	323	13	24.8	3	307	10	30.7	2
4 / Ramsey/Raleigh	43	8	5.4	15	No Service			
6 / Lester Park	297	14	21.2	5	245	10	24.5	4
7 / Crosley	158	10	15.8	9	No Service			
8 / Woodland	273	13	21.0	6	222	10	22.2	5
9 / Piedmont Hts.								
Piedmont	81	9	9.0	12	69	7	9.9	7
Fitzer's (a)	25	9	2.8	18	No Service			
10 / Duluth Heights/Mall*	996	24	41.5	1	578	16	36.1	1
11 / East 8th	296	13	22.8	4	101	9	11.2	6
12 / Kenwood	148	11	13.5	11	40	7	5.7	9
13 / East 4th	180	12	15.0	10	63	8	7.9	8
14 / West 4th/Eklund/Mall*	40	8	5.0	17	No Service			
15 / Park Point	54	10	5.4	15	No Service			
16 / Duluth-Superior	338	14	19.7	7	No Service			
17 / Superior (b)								
South Superior	77	9	8.6	13	No Service			
Billings Park	55	10	5.5	14	No Service			
Mariner Mall	No Service				No Service			
20 / Lakeside/Mall	59	3	19.7	7	No Service			
TOTALS	4,186	219	15.7	----	2,047	91	19.8	----

* Reflects 1993 route configuration.

(a) Fitzer's component of route warrants separate listing of ridership figures.

(b) Three separate loop routes comprise the Route 17 Superior schedule.

5.5 50% or less of average
 8.6 50% to 60% of average



ROUTE PROFILES

This section consists of a detailed description of each route in the DTA's system. Specific route parameters are detailed along with route performance measures for a weekday and weekend. In addition, specific information for each route is highlighted and lastly route analysis results are discussed.

ROUTE PROFILE - FAR WEST / ZOO

Parameters

Headway

Weekday AM - 15 minutes
 MD - 21 minutes
 PM - 13 minutes
 EV - 30 minutes

Saturday 60 minutes

Sunday 60 minutes

Express Routes Inbound - 2 AM Outbound - 2 PM

Bus Trips (from hand schedules)*

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	6	2				
Mid-day	6	6				
PM Peak	5 (a)	8				
Evening	10 (b)	6				
Other (early AM runs)	2	6 (c)				
TOTAL	29	28	14	14	12	12

* Does not include trips between 71st A.W. and downtown (21) and short trips to/from DTA garage (4).
 (a) 1 bus trip terminates in W. Duluth (b) 6 trips terminate in West Duluth (c) 2 trips begin in West Duluth.

Performance

Weekday Average Boardings - **2,037**

Weekday Passengers per Trip - **37.8**

Weekday Rank - **1 (1996)**

Weekday Passengers per Revenue Mile - **2.04**

Saturday Average Boardings - **743**

Saturday Passengers per Trip - **25.6**

Saturday Rank - **2 (1993)**

Sunday Average Boardings - **422**

Sunday Passengers per Trip - **30.1**

Sunday Rank - **3 (1993)**

Description

The Far West route serves the Fond du Lac, Gary, New Duluth and Morgan Park neighborhoods to the southwest of the Duluth Zoo/Spirit Mountain area. This is the only route that serves these far western locations. The route also serves West Duluth and the West End via Grand

The Far West route serves the Fond du Lac, Gary, New Duluth and Morgan Park neighborhoods to the southwest of the Duluth Zoo/Spirit Mountain area.



This bus line is the key route in serving the western sections of Duluth and exhibits the largest number of riders of any route in the system.

Avenue, 3rd Street and Superior Street as it enters the downtown. This route is radial thereby following the same streets inbound and outbound.

The Far West route follows the main highway corridor to the west of Duluth and provides service to all major commercial strips and larger employers along the route.

There are two express routes serving downtown Duluth both in the morning and afternoon peak hour periods. The route enters/exits the freeway at Central Avenue in West Duluth.

This route is interlined with five other routes or express routes during the week; most serving the Lester Park area. Weekend interlines are with the Lester/Crosley route.

Issues

- This bus line is the key route in serving the western sections of Duluth and exhibits the largest number of riders of any route in the system. Eleven trips were deleted from the bus line since 1993 and ridership still increased slightly.
- Overall riders per weekday trip increased by 24% from 1993 counts to 1996 counts. It is the highest ranked route in the DTA system.
- All weekday time period averages increased during 1993 to 1996. Lesser increases were found in the midday and evening time periods.
- Saturday ridership ranks second in the system; Sunday ridership ranks third (1993 COA).
- This line travels through three neighborhoods that lost 20% or more of its population between 1980 and 1990: Smithville, Fond du Lac and Irving.
- The route travels through the West End where transit characteristics such as elderly population, disabled population and a high amount of rental units all support potentially high levels of ridership.
- Areas of high boarding/alighting: Commonwealth and Gary (Gary), 88th and Falcon/Edward/Concord (Morgan Park), Grand and 56th-59th (West Duluth), Grand and Central (West Duluth), Grand and 40th-44th (Denfeld area), 3rd and 21st-29th (West End), Superior and 20th-21st (West End), Superior and 2nd-6th (Downtown Duluth).

ROUTE PROFILE - PROCTOR

Parameters

Headway

Weekday AM - 22 minutes
MD - 60 minutes
PM - 36 minutes
EV - 60 minutes

Saturday 60 minutes

Sunday 60 minutes

Express Routes Inbound - 2 AM Outbound - 2 PM

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	4	2				
Mid-day	6	5				
PM Peak	5	8				
Evening	7 (a)	4				
Other (early AM runs)	1	4 (b)				
TOTAL	23	23	13	13	10	10

(a) 1 bus trip terminates in W. Duluth

(b) 2 bus trips begin in W. Duluth

Performance

Weekday Average Boardings - **818**

Weekday Passengers per Trip - **35.6**

Weekday Rank - **2 (1996)**

Weekday Passengers per Revenue Mile - **1.68**

Saturday Average Boardings - **323**

Saturday Passengers per Trip - **24.8**

Saturday Rank - **3 (1993)**

Sunday Average Boardings - **307**

Sunday Passengers per Trip - **30.7**

Sunday Rank - **2 (1993)**

Description

The Proctor route links the City of Proctor with downtown Duluth via West Duluth and the West End. This is the only bus route that serves the Proctor area. Major residential complexes in Proctor are served including Zenith Terrace and Hillside Gardens. The bus line meets Grand Avenue at West 57th Street, follows West 3rd Street to the West End and continues

Weekday ridership increased nearly 15% between 1993 and 1996. Overall average riders per trip increased by 20% over the three year span.

along Superior Street entering the downtown area. The major commercial areas of West Duluth and the West End receive service via this bus route.

There are two express routes both in the morning and afternoon peak hour periods. The route enters/exits the freeway at Central Avenue in West Duluth. This route is interlined with five different routes during the weekday; most to the Crosley route. Saturday and Sunday interlines are with the Woodland route.

Issues

- The Proctor route is one of the most productive routes in the system both during the week and on the weekends. Weekday ridership increased nearly 15% between 1993 and 1996. Overall average riders per trip increased by 20% over the three year span.
- All time periods increased in riders per trip. Larger increases were in the AM and PM periods with a lesser increase over the midday period.
- A survey of Proctor residents revealed the following information (105 respondents).
 - a) Over 30% use the bus for work trip purposes.
 - b) 52% favored more express bus service to downtown Duluth.
 - c) 61% favored new express bus service to the Miller Hill area.
 - d) Nearly 50% stated that a Park and Ride facility would not be attractive for their travel needs.
 - e) Nearly 50% of the respondents would favor City of Proctor funding in order to provide expanded service.
- 30% of ridership originates/terminates in downtown Duluth; 23% in West End; 20% in West Duluth; 17% within the City of Proctor.
- Proctor's population declined by 6.5% between 1980 and 1990. Other demographics include renter occupied units at 23%; 16% of the population aged 65+; 5% of the total workforce currently uses transit for their work trip.
- Areas of high boarding/alighting: Ugstad and 6th (Proctor); Boundary and 2nd (Proctor); Zenith Terrace apartments (Proctor); Grand and 46th-57th (West Duluth); Grand and 40th (Denfeld area); 3rd and 21st-29th (West End); Superior and 2nd-6th (Downtown Duluth).

ROUTE PROFILE - RAMSEY/RALEIGH

Parameters

Headway

Weekday AM - 30 minutes
 MD - 60 minutes
 PM - 25 minutes
 EV - 60 minutes

Saturday 60 minutes

Sunday N/A

Express Routes N/A

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	4	3				
Mid-day	6	6				
PM Peak	5	6				
Evening	3	1				
Other (early AM runs)	1	1				
TOTAL	19	17	9	8		

Performance

Weekday Average Boardings - **292**

Weekday Passengers per Trip - **18.3**

Weekday Rank - **10 (1996)**

Weekday Passengers per Revenue Mile - **1.09**

Saturday Average Boardings - **43**

Saturday Passengers per Trip - **5.4**

Saturday Rank - **15 (1993)**

Sunday Average Boardings - **N/A**

Description

The Ramsey/Raleigh route connects residential areas in the West Duluth area with the downtown. Service at the residential end is bordered by I-35, Grand Avenue and Central Avenue. The route then travels through West Duluth's commercial district along Central Avenue and industrial district along Colalillo Drive. At this point the route travels north around Denfeld High School, returns to Superior Street via 40th Avenue West and continues through the West End and downtown Duluth.

Weekday service is limited to only 7:00 p.m. Saturday service cuts the number of weekday trips in half (8). Sunday service is not provided.

Issues

- Ridership increased slightly between 1993 and 1996 even with three fewer trips provided by the DTA. Overall average riders per trip increased by 50%. However, the route still ranked at 10th best in terms of average riders per trip during the weekday.
- Overall riders per trip performs at 70% of the DTA system average. Mid-day ridership operates at less than 50% of system average. AM peak and evening ridership also operate significantly lower than the system average.
- Saturday ridership ranks 15th in the system with only 5.4 riders per trip (1993).
- 21 percent of total ridership is generated during the mid-day hours. This represents one of the lowest producing routes in the system for this time period.
- 19 percent of route ridership is generated out of the Raleigh Street area south and west of I-35.
- 29 percent of all boarding/alighting activity occurs in the downtown. This is on line with other routes and indicates that the downtown is still important to this route.

ROUTE PROFILE - LESTER PARK

Parameters

Headway

Weekday AM - 30 minutes
 MD - 60 minutes
 PM - 30 minutes
 EV - 40 minutes (Lester-Crosley)

Saturday 60 minutes

Sunday 60 minutes

Express Routes N/A

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	4	3				
Mid-day	6	5				
PM Peak	5	7				
Evening	7	5				
Other (early AM runs)	2	4				
TOTAL	24	24	13	13	10	10

Performance

Weekday Average Boardings - **849**

Weekday Passengers per Trip - **35.4**

Weekday Rank - **3 (1996)**

Weekday Passengers per Revenue Mile - **2.52 (includes Lester-Crosley trips)**

Saturday Average Boardings - **297**

Saturday Passengers per Trip - **21.2**

Saturday Rank - **5 (1993)**

Sunday Average Boardings - **245**

Sunday Passengers per Trip - **24.5**

Sunday Rank - **4 (1993)**

Description

The Lester Park route provides service along the main east artery of the city (Superior Street) between downtown and Lakeside/Lester Park neighborhoods. In the evening, service is provided north of Superior Street along Glenwood Street between 45th Avenue East and 60th Avenue East. The larger residential areas of the far and near east side are



The Lester Park route is the third most productive route in the system in terms of riders per trip.

connected to the downtown via this route. East High School and Ordean Middle School are within walking distance of this route. The medical campus area is also encircled by this route.

Weekday service is provided from 5:15 AM to 10:30 PM. Saturday and Sunday service is provided with 60 minute headways. No express routes are provided.

Issues

- The Lester Park route is the third most productive route in the system in terms of riders per trip. Ridership increased by approximately 22 percent between 1993 and 1996 with the same number of trips available.
- With the exception of mid-day ridership, all of the other time periods increased between 1993 and 1996 in terms of average riders per trip.
- Weekend service is relatively strong with Saturday service ranking 5th and Sunday service ranking 4th.
- Only 37 inbound passengers utilize the Lester-Crosley evening service component of this route representing approximately 5 percent of total route ridership.
- Strong boarding locations in Lakeside/Lester Park include: 60th Avenue East / Superior Street, 47th Avenue East / Superior Street and 40th Avenue East / Superior Street near Ordean Junior High School.
- Thirty-nine percent of route ridership is generated in the downtown.

ROUTE PROFILE - CROSLEY

Parameters

Headway

Weekday AM - 20 minutes
 MD - 60 minutes
 PM - 25 minutes
 EV - 40 minutes (Lester-Crosley)

Saturday 60 minutes

Sunday 60 minutes

Express Routes Inbound - 1 AM Outbound - 2 PM

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	5	3				
Mid-day	6	6				
PM Peak	7	7				
Evening	6	5				
Other (early AM runs)	2	4				
TOTAL	26	25	13	13	10	10

Performance

Weekday Average Boardings - **588**

Weekday Passengers per Trip - **34.6**

Weekday Rank - **4 (1996)**

Weekday Passengers per Revenue Mile - **2.51**

Saturday Average Boardings - **158**

Saturday Passengers per Trip - **15.8**

Saturday Rank - **9 (1993)**

Sunday Average Boardings - **(Lester Park/Crosley; refer to Lester Park figures)**

Description

The Crosley route, similar to the Lester Park line, provides service along the main eastern artery (Superior Street) of Duluth extending into the near east side, Lakeside and Lester Park residential areas. The lone difference is at the intersection of 45th Avenue East and Superior Street, where the route proceeds north to Crosley Avenue, 54th Avenue East and Glenwood Street before returning to Superior Street again via 45th Avenue East.



There is also selective early morning and evening service that extends further eastward into Lester Park (see Lester Park route profile).

From 45th Avenue East and Superior Street, the bus route travels over the identical roadway network as the Lester Park bus route. Therefore, this means that headways are actually more frequent than indicated by one bus line alone. For example, mid-day service along the corridor from 45th Avenue East to downtown is 30 minutes (as opposed to 60 minutes) when considering both bus lines acting as one. Also, PM peak inbound headways are actually about 15 minutes (as opposed to 25 minutes) by this same logic.

Saturday and Sunday service is provided on an hourly basis. The Lester-Crosley route structure covers the service area on weekends.

There are three express routes in operation; one in the AM peak and two in the PM peak (Crosley Clipper). The express line heads south on 40th Avenue East to London Road, enters the freeway and exits at Lake Avenue in the downtown.

Issues

- Ridership increased only slightly for this route between 1993 and 1996 (9%). Fifty percent of ridership occurs during the PM peak time period. Only 18 percent of route ridership is generated out of the AM peak. By way of contrast, 55 percent of the Lester Park route ridership is generated out of the AM peak that follows the same roadway network into downtown as the Crosley route. This may indicate a duplication of service along this corridor in the AM peak that is not cost effective for the DTA to maintain. 1993 ridership data also confirmed this situation. In further comparison, 18 percent of route ridership out of the AM peak is atypically low when compared to any route in the DTA system.
- PM peak ridership on this route is strong. Fifty percent of ridership is generated in the PM peak possibly due to the two express routes that operate from the downtown to the east side neighborhoods. Also, the trips operate ahead of the Lester Park bus, thereby gaining additional passengers.
- The Crosley route ranks fourth in the DTA system in overall average riders per trip. The route ranked first in 1993.
- 25 percent of inbound riders originate out of the Crosley Avenue / Glenwood Street section of this route.

ROUTE PROFILE - WOODLAND

Parameters

Headway

Weekday AM - 15 minutes
 MD - 30 minutes
 PM - 14 minutes (includes Morley Heights)
 EV - 41 minutes (average)

Saturday 60 minutes

Sunday 60 minutes

Express Routes Inbound - 1 AM Outbound - 2 PM

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	7	4				
Mid-day	11	12				
PM Peak	12	13				
Evening	10	7				
Other (early AM runs)	3	7				
TOTAL	43	43	13	13	10	10

Performance

Weekday Average Boardings - **1,385**

Weekday Passengers per Trip - **33.8**

Weekday Rank - **5 (1996)**

Weekday Passengers per Revenue Mile - **2.25**

Saturday Average Boardings - **273**

Saturday Passengers per Trip - **21.0**

Saturday Rank - **6 (1993)**

Sunday Average Boardings - **222**

Sunday Passengers per Trip - **22.2**

Sunday Rank - **5 (1993)**

Description

The Woodland route provides service along one of the main arteries to the north of downtown Duluth using 24th Avenue East and Woodland Avenue. The route connects the Woodland and Morley Heights residential areas with the medical campus area and the downtown. Evening service changes slightly with the line following 21st Avenue East and 4th Street into the downtown area. (The near east side of the route along Superior

The route connects the Woodland and Morley Heights residential areas with the Medical campus area and the downtown.



The far north end of the route provides service to a Park and Ride lot along Calvary Road for commuter use.

The Morley Heights loop is quite low in productivity.

Street is bypassed in the evening.) The far north end of the route provides service to a Park and Ride lot along Calvary Road for commuter use.

Saturday and Sunday service is provided for the Woodland area with hourly headways (13 trips on Saturday; 10 trips on Sunday).

There is one AM peak and two PM peak express routes provided along this bus line. The non-stop segment is between the UMD/Woodland School area (Woodland Avenue/Kent Road) and Medical campus. The express route travels along 21st Avenue East and 2nd/3rd Streets deviating from the regular routing along 24th Avenue East and Superior Street.

Issues

- Ridership increased by nearly 23 percent between 1993 and 1996 figures. Average riders per trip increased by 38 percent over the same time period. All time segments during the weekday remain productive particularly in the peak hours. The route ranks 5th in terms of ridership productivity and 2nd in terms of actual number of riders.
- Weekend ridership is relatively strong; ranking 6th on Saturday and 5th on Sunday.
- Eleven percent of ridership is generated out of the Woodland neighborhood area (north of Woodland Avenue and Anoka Street).
- According to 1993 ridership data, the Morley Heights loop is quite low in productivity. Inbound boardings were near zero and outbound boardings were equally insignificant. This may be an area where service is not warranted.
- Ridership in the vicinity of UMD/Woodland School and along Superior Street, west of 24th Avenue East, is strong.
- Boardings are very low for the evening portion of this route along 4th Street between 6th Avenue East and 21st Avenue East. There are some de-boardings along this segment that are transfers from another bus, but there are no boardings along 4th Street outbound within the survey data. This issue will require further investigation to determine validity.
- Forty-two percent of route ridership is generated in the downtown area.

ROUTE PROFILE - PIEDMONT - PIEDMONT HEIGHTS

Parameters

Headway

Weekday AM - 30 minutes
 MD - 60 minutes
 PM - 30 minutes
 EV - N/A

Saturday 60 minutes

Sunday 60 minutes

Express Routes N/A

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	4	6				
Mid-day	7	6				
PM Peak	5	6				
Evening	4	2				
Other (early AM runs)	2	2 (a)				
TOTAL	22	22	9	9	7	7

(a) 2 trips begin in Piedmont Heights

Performance

Weekday Average Boardings - **389**

Weekday Passengers per Trip - **17.7**

Weekday Rank - **12 (1996)**

Weekday Passengers per Revenue Mile - **1.75**

Saturday Average Boardings - **81**

Saturday Passengers per Trip - **9.0**

Saturday Rank - **12 (1993)**

Sunday Average Boardings - **69**

Sunday Passengers per Trip - **9.9**

Sunday Rank - **7 (1993)**

Description

The Piedmont route provides service linking downtown Duluth with the Piedmont Heights residential area via the West End. Service is provided along Superior Street, Piedmont Avenue, Morris Thomas Road and Haines Road. There are selected trips to the recently expanded Lake Superior

The Piedmont route provides service linking downtown Duluth with the Piedmont Heights residential area via the West End.



Assets	Original Cost	Service Life	1998	1999	2000	2001	2002	2003	2004	2005
Shop & Garage Equipment										
1977 GMC Wrecker	12,858.36	10						35,000		
1978 Ford Pickup w/plow	7,535.09	5		30,000						
1981 Used Pickup Truck	1,600.00	10								
1984 Chevrolet Wrecker	43,961.00	10	20,000							
1984 Dumptruck attachment	5,322.39	10	9,000							
1983 Dodge Pickup	11,750.35	5		30,000						
1983 Chevrolet Citation	7,819.00	5								
1983 Chevrolet Citation	7,664.00	5								
1986 Superv. Autos	21,423.00	5								
1989 Superv. Auto	11,568.00	5		20,000		20,000		20,000		20,000
1979 Drum Lathe & Equipment	20,674.28	10				40,000				
1980 Forklift	19,624.00	15								35,000
1980-85 Small Tools & Equipment	65,826.74	5	30,000		15,000		15,000		25,000	
1980 Sweeper	21,773.00	10	20,000							30,000
1982 Scrubber	19,512.00	10				40,000				
1984 Front End Loader	45,051.00	15								
Bus Washer Brushes	4,288.16	3	5,000			5,000			5,000	
Trucks Front End Loader	8,212.00	10								
Hoist Refurbishments		10		60,000						
Fuel Tank Storage Monitor			20,000							
Sub-Total	336,462.37		104,000	140,000	15,000	105,000	15,000	55,000	30,000	85,000
VISIONING PROJECTS										
Small Buses for Hub System				1,000,000		2,000,000				
Hub Development				3,000,000						
Travel Link AVL			250,000	1,000,000	500,000					
Travel Link ATIS			50,000							
Sub-Total			300,000	5,000,000	500,000	2,000,000	0	0	0	0
Yearly Totals			1998	1999	2000	2001	2002	2003	2004	2005
Base Needs Total			2,064,000	6,375,000	1,215,000	2,260,000	3,085,000	3,310,000	675,000	810,000
Section 9 Capital (incl. local share)			150,000	150,000	150,000	150,000	150,000	150,000	140,000	150,000
STP Funds			1,305,000	250,000	450,000	0	3,000,000	3,120,000	600,000	500,000
Other State or Federal Program			300,000	5,000,000						
Un-funded Needs			309,000	975,000	615,000	2,110,000	(65,000)	40,000	(65,000)	160,000

Source: Duluth Transit Authority

College location. In addition, this route continues beyond the downtown transit centers to serve the Fitger's shopping complex. The route then returns to the downtown. (This segment of the bus line is described with a separate route profile.)

Saturday and Sunday service is provided with hourly headways (nine trips on Saturday; seven trips on Sunday). There are no express routes.

Issues

- Ridership increased slightly between 1993 and 1996 (16%) with two fewer trips provided. Overall average riders per trip also increased, but is still operating at 67 percent of DTA system average. The route ranks 12th among the 14 ranked routes within the City of Duluth.
- AM and PM peak ridership plus mid-day ridership are all operating below DTA system averages. In particular, the mid-day average riders per trip is operating at 57 percent of system average.
- Weekend service is also operating at below system averages. Saturday ridership accounts for slightly less than 2 percent of all Saturday totals, while Sunday Piedmont ridership accounts for 3 percent of total Sunday riders. This weekend service is one where optional service provisions (i.e. demand responsive) may be warranted and most cost effective.
- The majority of Lake Superior College (LSC) riders are transferred from another bus line in the downtown. This may indicate the need for more direct bus service from other sections of the community to LSC.
- Ridership along Morris Thomas Road and Haines Road account for less than one percent of total route ridership. This indicates an area where route alterations may be warranted. Ridership along upper Piedmont Avenue is fairly steady.
- Forty-eight percent of route ridership is generated in the downtown area.

ROUTE PROFILE - PIEDMONT - FITGER'S

Parameters

Headway

Weekday AM - 25 minutes
 MD - 60 minutes
 PM - 30 minutes
 EV - N/A

Saturday 60 minutes

Sunday 60 minutes

Express Routes N/A

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	4	6				
Mid-day	7	6				
PM Peak	5	6				
Evening	4	2				
Other (early AM runs)	2	2 (a)				
TOTAL	22	22	9	9	7	7

* To Fitger's

** To Downtown

(a) No service back to Downtown from Fitger's

Performance

Weekday Average Boardings - **90**

Weekday Passengers per Trip - **4.5**

Weekday Rank - **15 (1993)**

Weekday Passengers per Revenue Mile - **Not Applicable**

Saturday Average Boardings - **25**

Saturday Passengers per Trip - **2.8**

Saturday Rank - **18 (1993)**

Sunday Average Boardings - **N/A**

Description

The Fitger's shopping complex is a destination east of downtown that operates as a continuation of the Piedmont bus line. The downtown transit center serves as a transfer point for people who can board this bus route for the short trip to Fitger's as well as other destinations along Superior Street. Twenty trips are provided on weekdays from 6:30 a.m. to 7:00 p.m. Saturday and Sunday service is provided during regular shopping hours for the complex.

Issues

- Ridership counts were not conducted for the Fitger's component of the Piedmont route in 1996. Therefore, analysis is based on 1993 figures. The number of trips has remained the same (20) between the study years.
- In 1993, 90 riders, on average, used the Fitger's segment of the Piedmont route. Given the 20 trips, this equals 4.5 riders per trip. Most are catching the bus between the downtown and Fitger's (90%).
- The overall route segment productivity is low; however, since the bus line is not truly acting as a separate route by itself, there is some merit for continuing to provide this connection from downtown to Fitger's and other businesses along Superior Street on a regular year-round basis. (The Port Town Trolley provides a similar service, but is seasonal and has shorter operating hours).
- The boardings for the route in the early AM hours (prior to 10:00 a.m.) should be investigated further. Since few commercial establishments are not open until 9:00 a.m. or 10:00 a.m., early AM service may not be warranted.

ROUTE PROFILE - DULUTH HEIGHTS / MALL

Parameters

Headway

Weekday AM - 30 minutes
 MD - 30 minutes
 PM - 30 minutes
 EV - 34 minutes (average)

Saturday 30 minutes

Sunday 30 minutes

Express Routes (See Table Below)

Medical
 area, near
 Duluth,
 extensive
 via this
 route.

Bus Trips (from hand schedules)

Time Period	Weekday				Saturday				Sunday			
	Inbound		Outbound		Inbound		Outbound		Inbound		Outbound	
	Non-X	X-press	Non-X	X-press	Non-X	X-press	Non-X	X-press	Non-X	X-press	Non-X	X-press
AM Peak	2	0	3	1								
Mid-day	6	5	6	5								
PM Peak	5	2	5	2								
Evening	8	0	7	0								
Other (early AM runs)	--	--	--	--								
TOTAL	21	7	21	8	16	7	16	8	10	6	11	6

Performance

Weekday Average Boardings - **1,016**

Weekday Passengers per Trip - **32.8**

Weekday Rank - **7 (1996)**

Weekday Passengers per Revenue Mile - **2.12**

Saturday Average Boardings - **996**

Saturday Passengers per Trip - **41.5**

Saturday Rank - **1 (1993)**

Sunday Average Boardings - **578**

Sunday Passengers per Trip - **36.1**

Sunday Rank - **1 (1993)**

Description

The Duluth Heights / Mall bus route provides limited service to the Duluth Heights residential area with more extensive service to the Miller Hill commercial corridor along Central Entrance and Miller Trunk Highway. Immediately north of downtown, the route serves the Central and East Hillside areas. Along Central Entrance the route is also near Duluth Central and Duluth Marshall High Schools.

This route was altered as a result of the analysis conducted in 1993. Therefore, ridership patterns changed between analysis years. This bus



line was the only route to provide extensive service in the Miller Hill corridor. The route also used to loop in the major residential neighborhoods and extended all the way to Wal-Mart in Hermantown. Presently, the residential loops (Eklund Avenue, Pecan Avenue) are served via an expanded West 4th bus (Route 14) that also serves Wal-Mart. The Duluth Heights route only extends to Haines Road before turning back inbound. In addition, the number of trips was decreased on the Duluth Heights route and picked up by the West 4th bus. All of these changes were positive for DTA and the public since the amount of bus service provided was increased and in an area most in need of expanded service.

The medical corridor area, near downtown Duluth, receives extensive service via this route. The route deviates from the usual alignment in the Central Hillside area following 6th Avenue East, 2nd / 3rd Streets, 2nd Avenue East and Superior Street east of Lake Avenue between the top of the ridge and downtown. The routing is important to the system in that a very productive and needed link is provided between the downtown and the Miller Hill commercial corridor that serves the hospital area.

There is extensive service on Saturday and Sunday including a number of trips through the medical corridor area.

Riders boarding and alighting within the Miller Hill corridor can request the Mall Area Short Hop (MASH) ride special fare of 25 cents. This provides an incentive for potential users to take the bus instead of driving from place to place to park. The option is especially attractive to the transit dependent riders.

Riders boarding and alighting within the Miller Hill corridor can request the Mall Area Short Hop (MASH) ride special fare of 25 cents.

Issues

- Ridership decreased by 8 percent between 1993 and 1996. However, this is not significant in light of the route modifications that occurred after the 1993 study. In terms of raw ridership numbers, the route ranks 3rd highest. Overall average riders per trip is fairly strong with a 7th place ranking.
- Over 50 percent of ridership is generated out of the mid-day time slot (9:00 a.m. to 2:30 p.m.). This indicates a strong point of this route (shopping and medical trips). In contrast, the evening service accounts for only 8 percent of total ridership, indicating an area where possibly too much service is provided.
- Mid-day and PM peak average riders per trip are strong. AM peak and evening time periods are around average compared to DTA system averages.

- Saturday and Sunday service ranks 1st in the system in terms of productivity. Again, this indicates the trip purpose of shopping is key to route function.
- Ridership on the Anderson Road and Trinity Road loop is very low. This is an area of predominantly single family homes that do not exhibit favorable demographic characteristics for transit potential.
- Forty-five percent of route ridership is generated in the downtown.

ROUTE PROFILE - EAST 8TH / UMD

Parameters

Headway

Weekday AM - 30 minutes
 MD - 30 minutes
 PM - 30 minutes
 EV - 45 minutes (average)

Saturday 60 minutes

Sunday 60 minutes

Express Routes N/A

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	4	4				
Mid-day	12	11				
PM Peak	6	7				
Evening	9	7				
Other (early AM runs)	1	3				
TOTAL	32	32	13	13	9	9

Performance

Weekday Average Boardings - **797**

Weekday Passengers per Trip - **24.9**

Weekday Rank - **8 (1996)**

Weekday Passengers per Revenue Mile - **3.46**

Saturday Average Boardings - **296**

Saturday Passengers per Trip - **22.8**

Saturday Rank - **4 (1993)**

Sunday Average Boardings - **101**

Sunday Passengers per Trip - **11.2**

Sunday Rank - **6 (1993)**

Description

The East 8th/ UMD route provides service between downtown and the UMD campus area while also serving the Medical campus and the Civic Center. The main route ascends the hill via 6th Avenue East, 9th / 8th Streets and 19th Avenue East to College Street / Oakland Avenue and into the UMD campus at the Kirby Center. Five evening bus trips serve the

Kenwood Shopping Center and St. Scholastica, as well as the residential area along Kenwood Avenue and College Street. Selected inbound evening trips bypass the Civic Center and travel directly down Lake Avenue to the downtown.

Saturday and Sunday service is provided with all inbound routes following Lake Avenue to the downtown. Service is on an hourly basis.

Issues

- Ridership for this route varied little between 1993 and 1996. Average riders per trip also varied little. The route ranks 8th in the system and operates at roughly the system average in terms of riders per trip.
- The impressive statistic for the route is its 3.46 passengers per mile of operation. This is at the top for the DTA and indicates that for the mileage logged, this route is quite productive. UMD generated ridership is the primary reason for this productivity.
- All time periods are operating at approximately the DTA system averages for riders per trip. Though the mid-day headway is 30 minutes, it may be needed since 44 percent of total ridership is generated out of this time slot. This percentage is higher than most other routes in the system.
- Saturday ridership is the 4th strongest in the system and significantly above the overall average. Sunday ridership is not strong, coming in at 3rd lowest in average riders per trip. This may be a service that gets cut back or combined with another route's Sunday service (i.e. Kenwood).
- Ridership is strong around the UMD campus, the Medical campus and the segment of 8th and 9th Streets between 6th Avenue East and 19th Avenue East.
- Ridership is very low for the evening service along Kenwood Avenue and College Street that serves the Kenwood Shopping Center and St. Scholastica. This service should be examined further to determine cost benefit. It may be better served on a demand responsive basis or eliminated entirely.
- Thirty-eight percent of route ridership is generated out of the downtown area.

The impressive statistic for the route is its 3.46 passengers per mile of operation. This is at the top for the DTA and indicates that for the mileage logged this route is quite productive.

ROUTE PROFILE - KENWOOD

Parameters

Headway

Weekday AM - 30 minutes
 MD - 60 minutes
 PM - 30 minutes
 EV - 60 minutes

Saturday 60 minutes

Sunday 60 minutes

Express Routes N/A

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	4	3				
Mid-day	6	6				
PM Peak	6	7				
Evening	8	6				
Other (early AM runs)	1	3				
TOTAL	25 (a)	25 (a)	11	11	7	7

(a) Kenwood - East 8th in evening

Performance

Weekday Average Boardings - **338**

Weekday Passengers per Trip - **16.9**

Weekday Rank - **13 (1996)**

Weekday Passengers per Revenue Mile - **1.54**

Saturday Average Boardings - **148**

Saturday Passengers per Trip - **13.5**

Saturday Rank - **11 (1993)**

Sunday Average Boardings - **40**

Sunday Passengers per Trip - **5.7**

Sunday Rank - **9 (1993)**

Description

The Kenwood route provides service between downtown, St. Scholastica, Kenwood Shopping Center, UMD and the residential areas of Kenwood and East Hillside. UMD is served from the north via Arrowhead Road, Carver Avenue and St. Marie Street. This differs from the East 8th / UMD route that approaches the campus from the south.

Most trips follow 6th Avenue East, East 13th Street and Kenwood Avenue to access the Kenwood Shopping Center area. However, evening service

The Kenwood route provides service between downtown, St. Scholastica, Kenwood Shopping Center, UMD and the residential areas of Kenwood and East Hillside.



to Kenwood is provided via the East 8th route alignment that first stops at UMD before traveling to St. Scholastica and the shopping center. Therefore, one bus serves the East 8th and Kenwood areas.

Routing is identical to the East 8th bus line between the downtown and 6th Avenue East which effectively increases headways within this area. For example, the AM peak headway by the Medical campus is roughly 12 minutes when accounting for both bus lines (as opposed to 30 minutes for each route individually). In addition, UMD is served better with two routes generating riders out of two different areas.

Saturday and Sunday service is provided with hourly headways both days. The weekend bus does not travel to UMD. It links the downtown with Kenwood Shopping Center along its normal route alignment.

Issues

- Like the East 8th route, ridership varied little between 1993 and 1996. The route dropped in ranking from 8th to 13th (next to last) in productivity. The route operates at 64 percent of DTA system average.
- All time periods for the route are operating below DTA system averages. In particular, the mid-day average is at 46 percent of the system average. In addition, the mid-day ridership accounts for 21 percent of total route ridership. These two statistics indicate a time slot where alternative options are provided to be more cost effective.
- Saturday service ranks 11th in productivity operating close to the system average. However, Sunday service ranks last, operating at only 29 percent of the system average for Sunday ridership. In the survey, 5.7 riders on average use each of the seven trips provided. Such a low figure may indicate whether regularly scheduled service is warranted. A demand responsive service covering the Kenwood, East 8th and East 4th areas may prove more cost effective in the long term.
- As indicated in the East 8th route profile, the evening service for the Kenwood area is low and may warrant less frequent service or another type of service provision.
- Ridership is favorable at certain locations including UMD, Kenwood Shopping Center, St. Scholastica and the Medical campus area.

ROUTE PROFILE - EAST 4TH

Parameters

Headway

Weekday AM - 30 minutes
 MD - 60 minutes
 PM - 30 minutes
 EV - 60 minutes

Saturday 60 minutes

Sunday 60 minutes (Woodland/East 4th)

Express Routes N/A

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	4	3				
Mid-day	6	6				
PM Peak	5	6				
Evening	9	7				
Other (early AM runs)	1	3				
TOTAL	25 (a)	25 (a)	12	12	10 (a)	10 (a)

(a) Woodland / East 4th Street in evening and Sunday

Performance

Weekday Average Boardings - **409**

Weekday Passengers per Trip - **21.5**

Weekday Rank - **9 (1996)**

Weekday Passengers per Revenue Mile - **2.69**

Saturday Average Boardings - **180**

Saturday Passengers per Trip - **15.0**

Saturday Rank - **10 (1993)**

Sunday Average Boardings - **63**

Sunday Passengers per Trip - **7.9**

Sunday Rank - **8 (1993)**

Description

The East 4th route is a linear one linking downtown with the near east side residential area. Alignment is identical to the East 8th / UMD and Kenwood routes between the downtown and the medical campus. Service is provided along East 4th Street to 34th Avenue East. Weekday evening service is provided to 24th Avenue East and 4th Street where the route then

follows the regular Woodland bus schedule. (The area east of 24th Avenue East and 4th Street does not receive service after 7:10 p.m. weekdays.) Regular route alignment serves the Civic Center, medical campus, Holy Rosary School and Duluth East High School.

Saturday service is provided with 12 trips run on an hourly basis. All of these trips travel down Lake Avenue inbound to access the downtown area.

This route experienced a change in provision of Sunday service as a result of the 1993 study. Service is provided along East 4th in conjunction with the Woodland route and is served in the same manner as weekday evening service (East 4th Street is served only to 24th Avenue East). This route had its own separate Sunday schedule. However, productivity was low and eventually dropped as a separate service.

Issues

- Ridership on this route increased by 30 percent between 1993 and 1996. Overall average riders per trip also increased by 37 percent ranking the route at 9th in the system; still slightly below system average.
- AM and PM peak time periods are operating near systems averages. The mid-day figure is below average while the evening riders per trip average is well below system standards operating at 37 percent of average. It should be noted that there are only two trips accounting for this figure before the late evening routing begins with the Woodland bus. However, the feasibility of starting the Woodland routing earlier for the 4th Street route should be examined.
- Saturday service ranks 10th in the DTA system operating at nearly the DTA system average. Service is provided on an hourly basis.
- Fifty-six percent of route ridership is generated out of the East 4th Street corridor.
- Thirty-five percent of route ridership is generated out of the downtown.

ROUTE PROFILE - WEST 4TH / EKLUND / MALL / WAL-MART

Parameters

Headway

Weekday AM - 23 minutes
 MD - 120 minutes
 PM - 22 minutes
 EV - N/A

Saturday 120 minutes

Sunday N/A

Express Routes N/A

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	4	3 (a)				
Mid-day	3	3				
PM Peak	3	5 (b)				
Evening	1	1 (b)				
Other (early AM runs)	1	2				
TOTAL	12	14	5	5	---	---

(a) 2 trips terminate at 5th A.W. & W. 4th St. (b) 1 trip terminates at 5th A.W. & W. 4th St.

Performance

Weekday Average Boardings - **332**

Weekday Passengers per Trip - **33.2**

Weekday Rank - **6 (1996)**

Weekday Passengers per Revenue Mile - **1.78**

Saturday Average Boardings - **40**

Saturday Passengers per Trip - **5.0**

Saturday Rank - **17 (1993)**

Sunday Average Boardings - **N/A**

Description

This route provides service from downtown to the Miller Hill Mall commercial corridor and also serves pockets of residential development in between these two points. The Hillside area is served by West 4th Street, 10th Avenue West and Skyline Drive. The Duluth Heights area is served with two loops north of Central Entrance. The first is the Highland Village apartment area along Pecan Avenue and Oakbend Drive. The second is

This route provides service from downtown to the Miller Hill Mall commercial corridor and also serves pockets of residential development in between these two points.



the Basswood Avenue, Swan Lake Road, Eklund Avenue loop. Both of these loops are new to the structure of this route having been previously connected to the Duluth Heights / Mall route. Additionally, this route reaches into Hermantown with service to Wal-Mart.

The West 4th route complements the Duluth Heights / Mall bus line by providing selective service into residential areas along Central Entrance and Miller Trunk Highway. This allows the Duluth Heights route to provide more frequent service to the main commercial generators along the corridor. There are only ten full trips for this route while the Duluth Heights route has 31 full trips during the weekday. The prior routing for the West 4th bus served only the Central and West Hillside areas before returning to the downtown. The new alignment still serves these residential areas while also providing another opportunity for passengers to connect with the Miller Hill area.

Saturday service is provided with five full round trips from the downtown on a 2-hour headway. Sunday service is not provided.

Riders boarding and alighting within the Miller Hill corridor can request the Mall Area Short Hop (MASH) ride special fare of 25 cents. This provides an incentive for potential users to take the bus instead of driving from place to place to park. The option is especially attractive to the transit dependent riders.

Issues

- Ridership more than doubled on this route between 1993 and 1996 due to its restructured alignment. The route ranks 6th in terms of average riders per trip which is a significant improvement on its ranking of 13th in 1993.
- All time periods for this route are fairly strong in production especially the mid-day and PM peak averages.
- Ridership on the Eklund Avenue, Swan Lake Road and Basswood Avenue loop is fairly low. This loop may be dropped, operated less frequently or operated on a more demand responsive basis.

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ROUTE PROFILE - PARK POINT

Parameters

Headway

Weekday AM - 30 minutes
 MD - 60 minutes
 PM - 30 minutes
 EV - N/A

Saturday 60 minutes

Sunday N/A

Express Routes N/A

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	4	4				
Mid-day	6	6				
PM Peak	6	6				
Evening	2	1				
Other (early AM runs)	1	2				
TOTAL	19	19	10	10	---	---

Performance

Weekday Average Boardings - **13.9**

Weekday Passengers per Trip - **7.7**

Weekday Rank - **14 (1996)**

Weekday Passengers per Revenue Mile - **0.83**

Saturday Average Boardings - **54**

Saturday Passengers per Trip - **5.4**

Saturday Rank - **15 (1993)**

Sunday Average Boardings - **N/A**

Description

The Park Point bus route provides the only public transportation connection from downtown through the Canal Park area and to the residential stretch along Minnesota Point. It is the only regularly scheduled bus to serve the growing number of commercial establishments in Canal Park. During the summer months the route extends further south along Minnesota Avenue to the beach area at Park Point.

The Park Point bus route provides the only public transportation connection from downtown through the Canal Park area and to the residential stretch along Minnesota Point. It is the only regularly scheduled bus to serve the growing number of commercial establishments in Canal Park.

Ten trips are provided on Saturday on an hourly basis between approximately 8:00 a.m. and 6:00 p.m. There is no Sunday service.

Issues

- Ridership has remained virtually the same between 1993 and 1996 with nearly the same amount of trips provided. The route ranks 14th (last) in the DTA system; the same as in 1993. Average riders per trip is also last in the system and well below the DTA average.
- The demographic characteristics of Park Point generally do not favor transit ridership. It is an area of mainly owner-occupied single family housing units, higher than average incomes, a relatively small elderly population and one where the large majority of households have a vehicle available for travel. It is also an area that is essentially built out to its maximum. Therefore, any potential for new areas to serve is eliminated.
- All time period average riders per trip are also well below DTA system averages. In the 1996 sample, the final evening trip had no riders and therefore a 0.0 average for this time slot.
- Saturday service also operates in last place for the DTA at 5.4 riders per each of the 10 trips provided.
- Forty-eight percent of route ridership is generated in the downtown.
- This route provides service to a portion of Duluth that is geographically isolated and has no other way of being serviced. The issue of whether regularly scheduled service south of the Lift Bridge is warranted is the primary question to be considered in any future route plans. Limited peak hour service, demand responsive service or service via some type of downtown circulator route may be the most cost beneficial option in the long term for this area.

ROUTE PROFILE - LAKESIDE / MALL

Parameters

Headway

Weekday AM - 26 minutes
 MD - 120 minutes
 PM - N/A
 EV - N/A

Saturday 103 minutes (only 3 runs; 2 AM, 1 PM)

Sunday N/A

Express Routes N/A

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound*	Outbound**	Inbound*	Outbound**	Inbound*	Outbound**
AM Peak	3	--				
Mid-day	2	2				
PM Peak	2	2				
Evening	--	--				
Other (early AM runs)	--	--				
TOTAL	7	4	3	3	---	---

* From Lakeside to Mall

** From Mall to Lakeside

Performance

Weekday Average Boardings - **108**

Weekday Passengers per Trip - **18.0**

Weekday Rank - **11 (1996)**

Weekday Passengers per Revenue Mile - **0.92**

Saturday Average Boardings - **59**

Saturday Passengers per Trip - **19.7**

Saturday Rank - **7 (1993)**

Sunday Average Boardings - **N/A**

Description

The Lakeside / Mall route is the only bus line in the DTA system that serves as a cross-town link between two locations. This route does not travel through the downtown hub. An attempt has been made with this alignment at linking the residential areas of Lester Park and Lakeside with UMD and with the Miller Hill commercial corridor. Therefore, this route eliminates the need for most east-side residents to travel to the downtown and transfer to another bus in order to access Miller Hill.

The Lakeside / Mall route is the only bus line in the DTA system that serves as a cross-town link between two locations.

The route is circuitous and one of the longest in the system at 27.7 miles for a round trip. The line stretches from 60th Avenue East in Lester Park to Haines Road in Hermantown. In between these two points other facilities served include: UMD, St. Scholastica, Kenwood Shopping Center, Aspenwood apartments and a nursing home along Arlington Avenue. Three trips during the weekday (of eight total) service the Miller Hill Mall area. Three early morning shorter trips to UMD are provided. The three AM peak buses follow a slightly different course than the full length bus.

While classes are in session at the universities (September to May), the full number of trips are in operation. During this same time period Saturday service is also provided with three full round trips. During the summer, service is decreased considerably since classes are not in session thereby losing a major rider base. Summer service consists of three trips Monday through Saturday from approximately 9:00 a.m. to 4:00 p.m. No Sunday service is provided.

Issues

- The route currently ranks 11th in the DTA system with an average of 18.0 riders per trip. In terms of actual riders and number per trip an increase was seen between the study years of 1993 and 1996. However, the average per trip figure is still below the DTA system average.
- The AM peak time period is the strongest for the route and essentially functions as a bus service for UMD students living in east side neighborhoods.
- Mid-day and PM peak ridership operate at below DTA system averages. Inbound ridership to UMD and Miller Hill area during these time periods is particularly low indicating a need to realign the route and determine more productive travel patterns.
- With only a limited number of trips, Saturday service is fairly productive ranking 7th in the system. In fact, increased desire for trips directly from the east side residential areas to the Miller Hill area may warrant additional service in the future.
- Though ridership is low, the concept of a cross-town route for the Duluth area is sound. More resources toward marketing and finding the most productive route alignment to boost ridership can still make this route important for the DTA to maintain.

ROUTE PROFILE - DULUTH-SUPERIOR

Parameters

Headway

Weekday AM - 30 minutes
 MD - 60 minutes
 PM - 30 minutes
 EV - N/A

Saturday 60 minutes

Sunday N/A

Express Routes Inbound - 1 AM Outbound - 1 PM

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	5	3				
Mid-day	6	6				
PM Peak	5	6				
Evening	4 (a)	3				
Other (early AM runs)	1	3				
TOTAL	21	21	14 (b)	14	---	---

(a) 1 trip to DTA Garage

(b) 2 evening trips to DTA Garage

Performance

Weekday Average Boardings - **694**

Weekday Passengers per Trip - **31.5**

Weekday Rank - **2 (1993)**

Weekday Passengers per Revenue Mile - **2.31 (1993)**

Saturday Average Boardings - **338**

Saturday Passengers per Trip - **19.7**

Saturday Rank - **7 (1993)**

Sunday Average Boardings - **N/A**

Description

The Duluth - Superior route provides the DTA with its only transportation link between the two cities. The bus line provides service for the Itasca, Allouez and North End residential areas of Superior following East 5th Street and East 2nd Street. University of Wisconsin - Superior is served with this line along Belknap Street. During the mid-day this route also serves Mariner Mall via a circle loop route. (Peak hour service is provided with intracity routes.) All trips funnel through the downtown

The Duluth - Superior route provides the DTA with its only transportation link between the two cities.

Superior Hub located at North 14th Street and Tower Avenue. The link to downtown Duluth is provided over the Blatnik Bridge. All trips, except the express route, use Garfield Avenue and Superior Street as they enter/exit Duluth.

There is an AM peak express bus leaving Superior and one PM peak express bus out of Duluth operating during the week. This bus does not leave the Interstate system for the trip. The express route operates between the Superior hub and the Duluth hub only. Routes provided within Superior funnel into the Superior hub allowing passengers to transfer to the Duluth - bound buses.

Saturday service is provided from approximately 7:00 a.m. to 7:00 p.m. on an hourly basis. Sunday service is not provided.

Issues

- Ridership on this route is very productive. In 1993, ridership ranked second highest in terms of riders per trip within the DTA system.
- Mid-day service is especially productive ranking well above the DTA system average. Approximately 50 percent of route ridership occurs during the mid-day hours.
- The few evening routes operate at slightly below system average. Essentially, the line operates to transport passengers back to Superior from Duluth. Ridership is virtually zero in the opposite direction. In fact, these evening Superior - bound buses do not return to downtown Duluth. Instead they travel directly back to the DTA Operating Center (24th Avenue West and Michigan Street).
- Saturday service in 1993 ranked favorably at 7th in the DTA system which is above average compared to the other Saturday routes in operation.
- According to 1993 ridership data, only three percent of route ridership is generated out of the Itasca and Allouez neighborhoods. As an alternative routing option that may be more cost effective, service to this area might be limited to just the peak time periods with mid-day service provided via a dial-a-ride operation.
- Ridership is favorable from the following areas: East 5th Street and 22nd Avenue, East 7th Street and North 28th Street, Belknap Street east of downtown Superior.

Ridership on this route is very productive. In 1993, ridership ranked second highest in terms of riders per trip within the DTA system.

- Twenty-one percent of route ridership is generated out of the Superior downtown area. This percentage does not include through - ridership figures (people already on this bus line as it travels through the downtown area).
- Forty percent of route ridership is generated out of downtown Duluth.

ROUTE PROFILE - CITY OF SUPERIOR - SOUTH SUPERIOR

Parameters

Headway

Weekday AM - 30 minutes
 MD - 66 minutes
 PM - 30 minutes
 EV - N/A

Saturday 70 minutes

Sunday N/A

Express Routes N/A

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	4	3				
Mid-day	4	4				
PM Peak	5	6				
Evening	2	1				
Other (early AM runs)	1	2				
TOTAL	16	16	8	8	---	---

Performance

Weekday Average Boardings - **124**

Weekday Passengers per Trip - **7.3**

Weekday Rank - **14 (1993 - includes all DTA routes)**

Weekday Passengers per Revenue Mile - **0.81 (1993)**

Saturday Average Boardings - **77**

Saturday Passengers per Trip - **8.6**

Saturday Rank - **13 (1993)**

Sunday Average Boardings - **N/A**

Description

This bus route is one of three intracity lines operating completely within the City of Superior. It is listed in DTA's Route Number 17 - City of Superior hand schedule. This bus line connects downtown Superior (transit hub) with South Superior and the Village of Superior via Tower Avenue (Highway 35). The route serves the growing commercial core of Superior with service to retail stores such as K-Mart, Target and Wal-Mart. The commercial area is located primarily south of North 28th Street.

This bus line connects downtown Superior (transit hub) with South Superior and the Village of Superior via Tower Avenue (Highway 35). The route serves the growing commercial core of Superior with service to retail stores such as K-Mart, Target and Wal-Mart.



Of the three intracity routes, this line serving Tower Avenue to South Superior performs the best.

Direct service into the Target and Wal-Mart parking areas off of Tower Avenue is provided during the mid-day hours and on the weekend. This line also serves businesses to the north of the downtown via a loop route; Winter Street, Banks Avenue and Broadway Street.

Currently, there are 16 round trips provided during the week. In 1993, when this data was collected, there was one additional PM peak trip for a total of 17.

There are eight trips provided on Saturday between 8:30 a.m. and 5:45 p.m. (70 minute headways). Sunday service is not provided.

Issues

- Of the three intracity routes, this line serving Tower Avenue to South Superior performs the best. However, it should be noted that ridership on this bus line accounts for only about one percent of total ridership throughout the DTA system on an average weekday. The passenger per mile statistic is also quite low (0.81).
- Within the time periods, the mid-day average is highest at 12.4 riders per trip. AM and PM peaks and the overall average riders per trip operate at less than 50 percent of DTA averages.
- In 1993, Saturday service ranked 13th in the DTA system which is ahead of the other intracity route in Superior (Billings Park) and also higher than the Ramsey/Raleigh and Park Point routes in Duluth. Ridership operated at 55 percent of DTA system average for a Saturday.
- Twenty-four percent of route ridership is generated out of the area south of the Fairgrounds (south of 52nd Street).
- Twenty-five percent of route ridership is generated in the commercial corridor along Tower Avenue between North 28th and North 37th Streets. This figure is likely higher at the present time due to recent retail expansion in the corridor (e.g. Target).
- Forty-four percent of route ridership is generated in the downtown area of Superior.

ROUTE PROFILE - CITY OF SUPERIOR - BILLINGS PARK

Parameters

Headway

Weekday AM - 30 minutes
MD - 62 minutes
PM - 22 minutes
EV - N/A

Saturday 70 minutes

Sunday N/A

Express Routes N/A

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	3	4				
Mid-day	5	4				
PM Peak	6	6				
Evening	1	1				
Other (early AM runs)	2	2				
TOTAL	17	17	9	9	---	---

Performance

Weekday Average Boardings - **71**

Weekday Passengers per Trip - **4.4**

Weekday Rank - **18 (1993 - includes all DTA routes)**

Weekday Passengers per Revenue Mile - **0.87 (1993)**

Saturday Average Boardings - **55**

Saturday Passengers per Trip - **5.5**

Saturday Rank - **14 (1993)**

Sunday Average Boardings - **N/A**

Description

This bus route is one of three intracity lines operating completely within the City of Superior. It is listed in DTA's Route Number 17 - City of Superior hand schedule. This bus line connects downtown Superior (transit hub) with the Billings Park residential district to the south and west of downtown. The line travels outbound via North 21st Street to Billings Park and then loops via Iowa Avenue, Belknap Street, New York

This bus line connects downtown Superior (transit hub) with the Billings Park residential district to the south and west of downtown.



Avenue and North 21st Street prior to returning downtown. Service is provided to Royalton Manor apartments via this bus route.

Currently, there are 17 round trips provided during the week. In 1993, when this data was collected, there was one less trip for a total of 16.

There are nine trips provided on Saturday between 7:45 a.m. and 6:30 p.m. (70 minute headways).

Issues

- Ridership is very low for this intracity route with a 1993 overall average of 4.4 riders per trip. This is well below the DTA system average. The time period averages are also below DTA standards.
- The PM peak average stands out as quite low and yet there are six trips provided during the time period. At a minimum, it would appear that some level of service reduction is warranted given the production of 2.8 riders per trip.
- In 1993, Saturday service ranked 14th in the DTA system and operated at less than 50 percent of DTA system average. There is one less trip provided currently than in 1993 when the data was collected.
- Thirty-five percent of route ridership is generated out of the Billings Park residential area.
- Forty-five percent of route ridership is generated in the downtown area of Superior.
- In general, ridership for this loop does not seem to warrant 17 round trips a day. Only nine trips are provided to the Mariner Mall area with roughly the identical production as this route. A decrease of service to just the peak periods or dial-a-ride for the entire loop might be considered by the DTA. Contracting the service might also be an option.

Ridership for this loop does not seem to warrant 17 round trips a day.

ROUTE PROFILE - CITY OF SUPERIOR - MARINER MALL

Parameters

Headway

Weekday AM - 30 minutes
MD - N/A
PM - 30 minutes
EV - N/A

Saturday N/A

Sunday N/A

Express Routes N/A

Bus Trips (from hand schedules)

	Weekday		Saturday		Sunday	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	4	3				
Mid-day	--	--				
PM Peak	4	5				
Evening	1	--				
Other (early AM runs)	--	1				
TOTAL	9	9	---	---	---	---

Performance

Weekday Average Boardings - **36**

Weekday Passengers per Trip - **4.0**

Weekday Rank - **19 (1993 - includes all DTA routes)**

Weekday Passengers per Revenue Mile - **0.74 (1993)**

Saturday Average Boardings - **N/A**

Sunday Average Boardings - **N/A**

Description

This bus route is one of three intracity lines operating completely within the City of Superior. It is listed in DTA's Route Number 17 - City of Superior hand schedule. This bus line connects downtown Superior (transit hub) with Mariner Mall via Belknap Street, Hammond Avenue, North 21st Street and Catlin Avenue. Service is provided to Superior Senior High School, Wessman Arena and near University of Wisconsin - Superior campus.

There are a total of nine trips provided for this line during the week focused on the AM and PM peak travel periods. Service is not provided

This bus line connects downtown Superior (transit hub) with Mariner Mall via Belknap Street, Hammond Avenue, North 21st Street and Catlin Avenue.

Ridership is very low for this bus line with a 1993 average of only four riders for each of the nine trips provided.

during the mid-day hours. The number of trips provided has not changed for this loop line since 1993 when the data was collected.

Weekend service is not provided with this intracity loop route. (Route 16, Duluth - Superior, serves the Mariner Mall area on Saturdays.)

Issues

- Ridership is very low for this bus line with a 1993 average of only four riders for each of the nine trips provided. All time period averages are also lower than DTA system averages.
- Boarding data indicates that ridership is generated almost solely out of the two endpoints of the route; Mariner Mall and downtown Superior. There is very little ridership generated within the residential sections of the route.
- With such low ridership this loop route might be more efficiently served with a dial-a-ride or deviated fixed route system at all times during the day. Contracting out service for this area might also be an option for the DTA to consider as a cost saving measure.

TRANSIT MODEL SUMMARY

A transit model of the Duluth Transit Authority's (DTA) fixed route system was developed to project future ridership and estimate ridership impacts of route changes. The transit model was created by MIC staff and BRW, Inc., a Minneapolis based transportation planning consultant.

Transit Model Creation

Using the travel demand software, TranPlan, the DTA's transit network was recreated in a computer environment. The TranPlan transit network, the Transportation Analysis Zones (TAZ), and the socioeconomic data needed for the model was generated from the 1990 Duluth-Superior Travel Demand Model utilized for the Metropolitan Interstate Committee's (MIC) Long Range Transportation Plan.

BRW used on-board origin-destination transit survey results from Flint, Michigan and Grand Rapids, Michigan to develop the model mode choice split curves for the Duluth-Superior transit model. The Flint and Grand Rapids surveys were used because these transit systems are similar to the DTA's system. The mode choice model "splits" trips by transportation mode according to trip purpose, trip productions and attractions, area type, cost, distance, and time of day. Upon determining trip mode splits based on these factors, TranPlan assigns these trips to the computer transit network. Details of the development of the Transit Model can be found in the Appendix.

Calibrated Base-Year Transit Model

In most cases, it is necessary to adjust the model through a calibration process to replicate existing ridership. The DTA Transit Model was calibrated to 1995 DTA ridership for the AM peak period and midday period. Table 6a shows the calibrated model total system ridership compared with actual 1995 ridership. The difference between the model and existing ridership is three percent or less for the AM peak and midday models. The calibrated models meet transit model calibration criteria by route set by the Federal Transit Authority (FTA) and the Federal Highway Administration (FHWA) (refer to the Appendix for details).

A transit model was developed to project future ridership and estimate ridership impacts of route changes.

Table 6a: Model Calibration Results

	AM Peak Period * (6:00 AM - 9:00 AM)	Midday Peak Period * (9:01 AM - 3:00 PM)
1995 Ridership	2,827	3,897
1995 Model Ridership	2,901	3,810
Difference	74	-87
Percentage	3%	-2%

* Estimated from a Non-Directional Daily 1995 Ridership of 9,399
Source: BRW, Inc. MIC, and DTA

2015 Transit Ridership Projection

Using population and employment projections from the Duluth-Superior Travel Demand Model (i.e., highway traffic model), transit ridership projections were generated for the year 2015 AM peak and midday periods. Assuming the population and employment projections are accurate, the current fixed route transit system remains unchanged, AM peak period passenger trips are expected to increase 13 percent by the year 2015 (See Table 6b), approximately a 0.7 percent increase per year. In contrast, midday passenger trips are only expected to increase a total of seven percent by 2015 which is about a 0.3 percent annual increase.

Table 6b: Existing Transit Network Calibrated Model Results

Passenger Trips	1995	2015	Difference	Percent Change	Average Annual Change
AM Peak	2,901	3,285	384	13%	0.66%
Midday Peak	3,810	4,060	250	7%	0.33%

Source: BRW, Inc. MIC, and DTA

Network modifications were identified that warranted ridership analysis.

Transit Scenarios

Several transit network modifications were identified that warranted ridership analysis. These route considerations were developed with the assistance of the DTA staff and modeled by BRW. Four separate route scenarios were developed and modeled. The first scenario simulates a Hub and Spoke transit network for the midday period. The second scenario examined a reconfiguration of the Lakeside Mall route to increase service to Lake Superior College. The third scenario analyzed the effects of providing a direct connection between West Duluth and the Mall. The fourth and final scenario combined two separate circulator options; one to serve the downtown area and one to serve UMD students residing in Eastside neighborhoods.



Hub and Spoke Concept

Prior to the popularity of the automobile, most travel activity began or ended in or near the Central Business District (CBD). In addition, residential housing was constructed at higher densities and people tended to live in closer proximity to their places of employment. These communities offered simple travel patterns that could be served conveniently and cost-effectively by transit service. Today's auto influenced travel patterns are much more dispersed and complex. In an attempt to create transit systems which better serve today's destinations and travel patterns, transit agencies are increasingly looking for ways to increase route efficiency to non-traditional destinations.

Many transit systems are moving toward the Hub and Spoke concept similar to that used in the airline industry. The idea is to provide neighborhood transit service with short route circulators that transport riders to local hubs where riders have the option of going to a variety of major destinations directly and efficiently, without having to go downtown. Transfers at local hubs would need to be timed to minimize the inconvenience of transferring from hub to hub connection routes.

Hub and Spoke Requirements

Developing a Hub and Spoke system would require some infrastructure and service delivery changes to be successful. First, the location, design, and amenities of hubs need to be carefully considered. Second, the types of buses used may vary from the current system depending on how the service is provided. Third, service delivery may require greater use of technology or other service improvement strategies.

Hubs should be located in commercial or other major trip attraction areas. MIC and DTA staff identified the Spirit Valley Mall in West Duluth, the Miller Hill Mall, the University of Minnesota in Duluth, and downtown Superior as appropriate additional hub locations. Upon identifying these general hub locations, it will be necessary to determine specific site placement and design of hub facilities. Hubs should be placed so as to provide convenient pedestrian access to surrounding businesses. Hub facilities should be visible to the public, and be attractive additions to the area. It is crucial that these facilities not only serve as functional shelters and informational areas, but also serve as a marketing tool for the DTA and its services.

Determining what amenities to include within hub facilities would need to be decided. Since these facilities do not serve as large of a market as the Downtown Transit Centers, fewer services are necessary. However, some minimum amenities should be included such as:

- An enclosed heated area with good outside visibility,
- All DTA informational literature, (e.g., route schedules, system maps)

To create transit systems which better serve today's destinations and travel patterns, transit agencies are increasingly looking for ways to increase route efficiency to non-traditional destinations.

- Seating areas inside and outside, and
- Video surveillance cameras.



The Miller Hill Mall entrance functions similar to a hub facility

A wide variety of optional amenities could be included; some of which may be created by partnering with area businesses. Optional amenities may include:

- Electronic information kiosk,
- Customer service attendant,
- Concessions venter or vending machines,
- Bicycle lockers,
- Restrooms,
- Child-care facilities, and
- Police substation.

A challenge with developing such facilities relates to the problems associated with the Downtown Transit Centers where youth “hang-out” and a few display objectionable behaviors. The problem behaviors of a few have led to the perception that these areas are unsafe and undesirable spaces for the general public. It is imperative that hubs do not transform into youth “hang-outs” that are avoided by the general public. Therefore, a plan for creating a secure and comfortable environment is crucial for developing neighborhood hub facilities so that these hubs are a source of neighborhood pride as well as a benefit to DTA customers. Some of these strategies include:

- Installing surveillance video cameras.
- Staffing a security guard.
- Partnering with police to create a neighborhood police substation.
- Playing classical music in and around hub facility.



California Hub facility

In a Hub and Spoke system, short routes provide service through residential neighborhoods to the local hub where customers wanting to proceed to downtown, the mall, or the university, would transfer to a mainline route proceeding directly to these sites. Since spoke routes serve small neighborhood areas, a smaller, lighter vehicle may be a more appropriate vehicle for this type of service. In addition, using small low floor buses may make serving the disabled population with regular bus service more attractive. These types of buses may allow greater opportunities to utilize roads that are not designed to accommodate the weight and size of current buses.

Large capacity buses would still be required to serve the mainline hub to hub connector routes. However, there may be opportunities to interline routes to help minimize the necessity for transferring along highly traveled

corridors (e.g., the far west routes). Not until a detailed Hub and Spoke system is analyzed according to the scheduling and resources needed, can a good determination of what vehicle mix would offer the greatest system benefits. Developing a hub and spoke network would be a long term modification which may require many years to allocate resources in establishing hub facilities and the optimum fleet mix.

Developing a Hub and Spoke network would be a long term modification which may require many years to allocate resources in establishing hub facilities and the optimum fleet mix.

SCENARIO 1: HUB AND SPOKE SYSTEM

In order to understand what effects a Hub and Spoke system would have for the DTA, a computer Hub and Spoke network was developed to be run with the transit model (see Scenario 1 Map). Because downtown commuters make up a significant percentage of transit riders during the peak period, the Hub and Spoke network is more conducive to midday, evenings, and weekend operations. Consistent with current DTA standards, headways for Scenario 1 were set at 60 minutes for neighborhood routes and 30 minutes for hub to hub routes. The Scenario 1 model route and service coverage are very similar to the existing service. This is important if the model is to measure the Hub and Spoke concept and not simply the effects of the amount of service; however, some minor route changes were made from the existing network.

The table below provides summary results of the Hub and Spoke model as compared with the existing transit system. Passenger trips for the Hub and Spoke system increased over the base year midday model by 39 trips or about one percent; a minor increase. The Scenario 1 2015 projection, however, showed passenger trips increasing by 344, an eight percent increase. Detailed passenger trip information by route for this scenario is provided in the Appendix

Table 6c: Scenario 1; Hub and Spoke Midday

Passenger Trips	Existing Network	Scenario 1	Difference	Percent Change
Midday 1995	3,810	3,849	39	1%
Midday 2015	4,060	4,404	344	8%

Source: BRW, Inc, MIC, and DTA

The Scenario 1 Map illustrates the Hub and Spoke model network and the passenger trips for each route during the midday period. It is important to keep in mind that these trips are for the entire midday time period from



9 a.m. to 3 p.m. The hub to hub routes were modeled with 30 minute headways and neighborhood routes with 60 minute headways; this translates to a total of 12 bus runs for hub to hub routes and six bus runs for neighborhood routes.

The model provides a good knowledge base for analyzing bus route alternatives.

The model provides a good knowledge base for analyzing bus route alternatives. Still, it is important to consider the results taking into account the assumptions and limitations of the modeling process. For example, the Airport route that feeds into the Miller Hill Mall area shows especially low ridership numbers. However, the models population and employment are based on 1990 data which may not reflect business growth occurring in the Airpark Industrial Park.

Albeit the model shows ridership increasing for the hub and spoke system, there are several issues that need to be considered. First, the model results need to be evaluated in relation to the assumptions of the model. For example, the transit model considers variables such as the number and density of households, and the amount and type of employment, but does not take into account other transit related demographics such as household incomes. Second, the model does not account for the confusion or “learning curve” often associated with service changes. Since the hub and spoke is being evaluated as an off-peak period alternative, confusion among customers may occur given the complexity of the service changes. Finally, the model does not take into account major behavioral trends such as increasing car ownership rates.

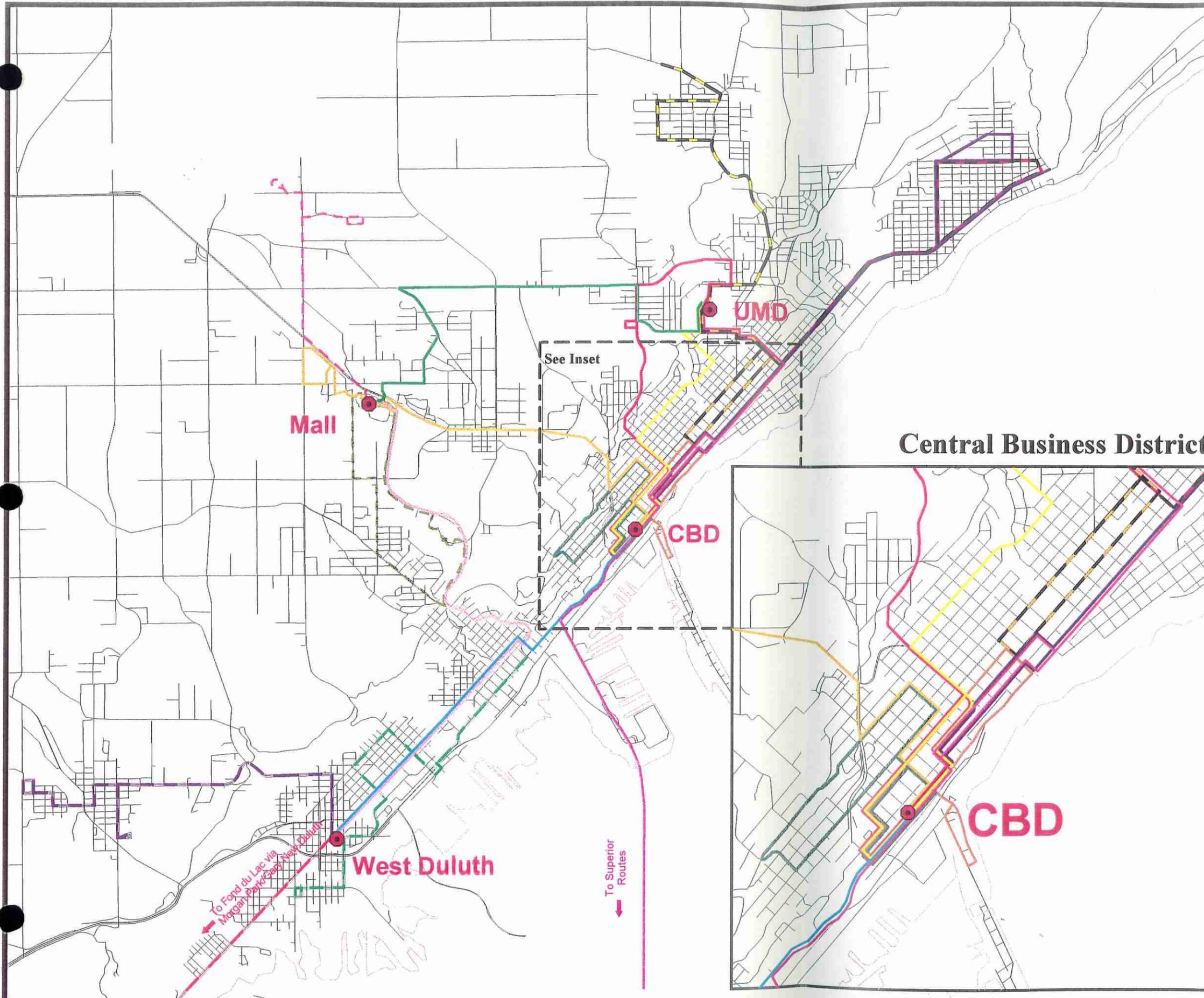
Changing to a hub and spoke system in the midday, evening and weekend periods would be a significant departure from current service delivery.

Changing to a Hub and Spoke system in the midday, evening and weekend periods would be a significant departure from current service delivery. DTA staff has put together a preliminary analysis for the Hub and Spoke network from which the feasibility of a Hub and Spoke system can be determined.

Scenario One Hub and Spoke Network

2015
Midday Peak
Model Count

- | Interhub Connectors | |
|-----------------------|--------------------------------|
| 348 | West Duluth to CBD |
| 221 | Mall to UMD |
| 228 | West Duluth to Mall |
| 637 | Mall to CBD |
| 184 | Reg. Rte. 11 (UMD to CBD) |
| 174 | Reg. Rte. 12 (UMD to CBD) |
| 233 | UMD to CBD |
| CBD Hub Loops | |
| 236 | Regular Route 6 |
| 178 | West 4th Loop |
| 191 | Downtown-Canal Park Circulator |
| UMD Hub Loops | |
| 139 | Woodland Loop |
| 180 | UMD Circulator |
| 144 | UMD Lakeside Loop |
| West Duluth Hub Loops | |
| 94 | Ramsey Loop |
| 127 | Fond du Lac Loop |
| 112 | Proctor Loop |
| Mall Hub Loops | |
| 90 | Airport Loop |
| 98 | Piedmont Loop |
| Superior | |
| 627 | Duluth to Superior |



The current Lakeside/Mall route, as presently designed, has relatively low ridership.

SCENARIO 2: RECONFIGURED LAKESIDE/MALL ROUTE

The current Lakeside/Mall route was created to provide more direct service to the Miller Hill Mall in an effort to better accommodate changing travel patterns. This cross-town route is the only Duluth route that does not feed into the downtown Transit Center. The existing route runs three trips in the AM peak terminating at UMD (35 minute average headway) and four trips in the midday and PM peak to the mall (80 minute average headway); it also runs three trips to the mall on weekends. Unfortunately, the route, as presently designed, has relatively low ridership (See System Analysis Section).

Demand for service to Lake Superior College (LSC) has grown in recent years. Despite less transit service than UMD and St. Scholastica, LSC sells approximately the same percentage of collegiate passes as UMD and more than St. Scholastica. Given this fact, the DTA staff believed that demand for more direct service to LSC may be warranted. In addition, it was thought that providing LSC students with a convenient transit connection to the mall would increase the attractiveness of transit use among LSC students.

Given the increased demand at LSC and the lack of ridership on the current Lakeside/Mall route, DTA and MIC staff determined there may be an opportunity to alter this route to enhance service to LSC and between LSC and the Miller Hill Mall. As a result, a new Lakeside/Mall route was formulated and modeled. The route was changed in the AM peak to proceed directly to LSC and bypass the mall which does not open until after 9 a.m. The midday, evening, and PM peak period route would run similarly to the exiting Lakeside/Mall Route starting in the Lakeside and Lester Park neighborhoods running through UMD, the Miller Hill Mall, and terminating at LSC (see Scenario 2 Map). Headways for this route were set at 60 minutes in the peak and 60 minutes in the off peak period.

The model results show an increase in ridership between the existing system and Scenario 2 by eight percent in the AM peak and five percent in the midday. It is important to note that while this scenario changed the routing to some degree, it provides significantly more service by having shorter midday headways. However, the AM peak headways for Scenario 2 were set longer than currently exist for the AM peak Lakeside/ Mall Route as it terminates at UMD.

Table 6d: Scenario 2; 1995 Reconfigured Lakeside-Mall Route

Passenger Trips	Existing Network	Scenario 2	Difference	Percent Change
AM Peak	2,901	3,143	242	8%
Midday	3,810	4,004	194	5%

Source: BRW, Inc. MIC, and DTA

The Scenario 2 Map illustrates the reconfigured route scenario and the passenger trips loads along the route for both the AM peak and the midday period. The model estimates 166 westbound passenger trips and 76 eastbound passenger trips during the AM peak period; most of which terminate in the UMD area. The model estimates 138 westbound passenger trips and 113 eastbound passenger trips during the midday (see Table 6e). It is important to keep in mind that the total passenger trips for the new route are different from the difference between the existing system and Scenario 2 system because the additional service may increase the attractiveness of the entire system and attract more passenger trips to other routes.

As noted, these numbers represent the total passenger trips during the AM peak period and the midday period, representing a three and six hour time period, respectively. In order to put these numbers into context, a second italicized number is included in parenthesis indicating the number of passenger trips for any one bus route trip. Passenger trips per bus route trip were estimated by dividing the headway time by the total time period. For example, the six hour midday period was divided by the 30 minute headway to produce a total of 12 bus route trips; the total midday passenger trips were then divided by these 12 bus route trips to give the estimated ridership per bus route trip.

Table 6e: 1995 Passenger Trips for Reconfigured Lakeside-Mall Route

	AM Peak	Midday
Westbound Total Route Ridership	166 (55)	138 (23)
Eastbound Total Route Ridership	76 (25)	113 (19)
Total Passenger Trips	242 (80)	251 (42)

Source: BRW, Inc. MIC, and DTA

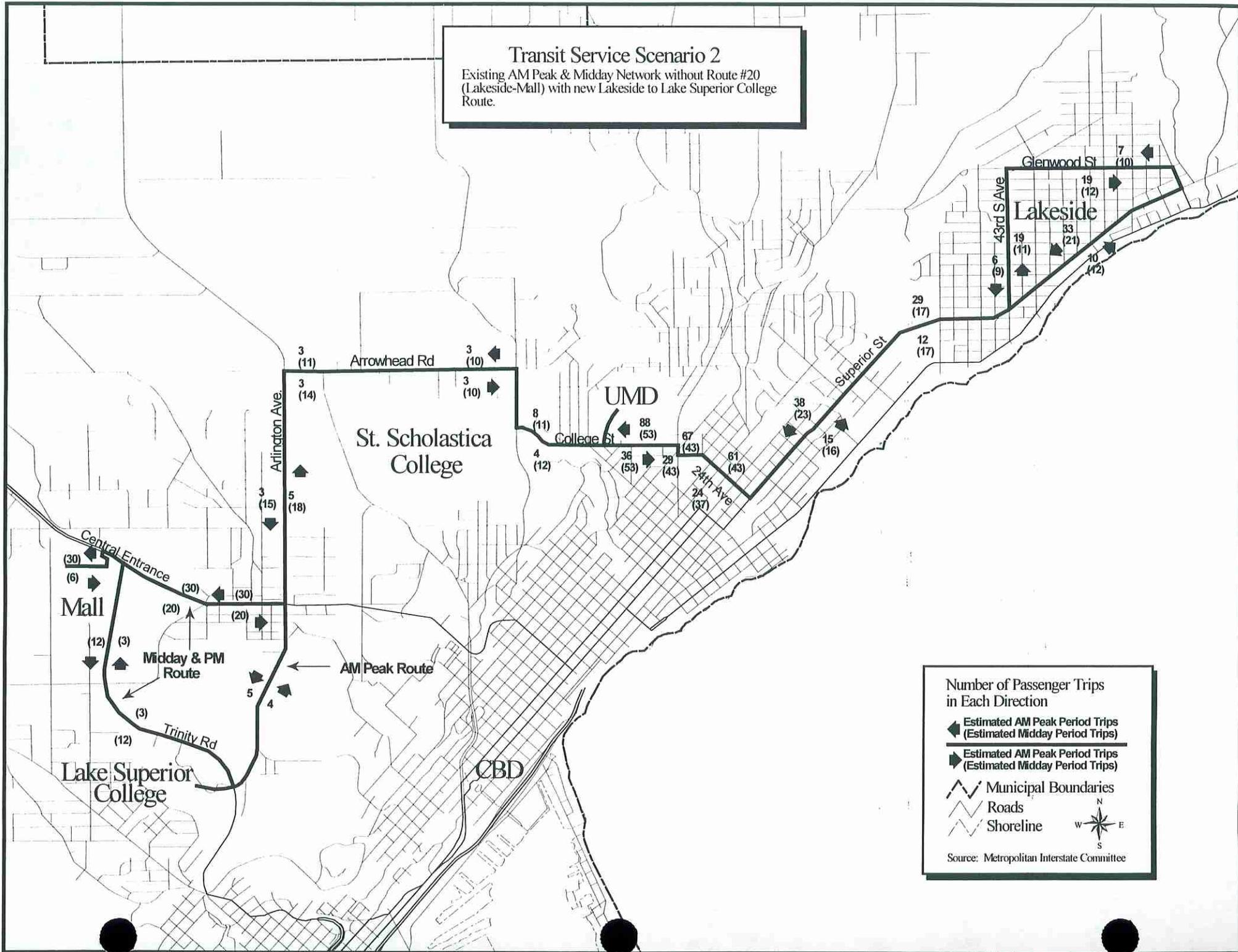
() = Ridership Per Bus Route Trip.

Number of Route Trips equal headway divided by time period.

Insert Scenario 2 Map Here

Transit Service Scenario 2

Existing AM Peak & Midday Network without Route #20 (Lakeside-Mall) with new Lakeside to Lake Superior College Route.



Number of Passenger Trips in Each Direction

- ◀ Estimated AM Peak Period Trips (Estimated Midday Period Trips)
- ▶ Estimated AM Peak Period Trips (Estimated Midday Period Trips)
- ▬ Municipal Boundaries
- Roads
- ~ Shoreline

Source: Metropolitan Interstate Committee

SCENARIO 3: WEST DULUTH TO MILLER HILL MALL

A direct connection providing service between West Duluth and the Miller Hill Mall was the third scenario modeled. This route was designed to provide West Duluth passengers destined for the Miller Hill Mall area a direct route to avoid having to transfer through the downtown Transit Center. The computer route network was designed with a starting point near the intersection of 57th and Grand Avenue at the Spirit Valley Shopping Center. The new “Spirit Valley-Mall” route would proceed down 3rd Street, up the hill on 21st Avenue West onto Piedmont Avenue to Trinity Road and terminate at the Miller Hill Mall (see Scenario 3 Map). The Spirit Valley-Mall Route was modeled with 30 minute headways for both the AM peak period and the midday period.

Table 6f, below, indicates that the Scenario 3 system model estimated an 11 percent passenger trip increase over the existing system for the AM peak period. Scenario 3 midday ridership increased by five percent over the existing system. The Scenario 3 Map on the following page shows the route layout and the passenger trip loadings along the modeled Spirit Valley-Mall route. These results show a significant number of passenger trips accessing the route near the Lake Superior College area in route to the Miller Hill Mall.

Table 6f: Scenario 3; 1995 Spirit Valley-Mall Route

Passenger Trips	Existing Network	Scenario 2	Difference	Percent Change
AM Peak	2,901	3,224	323	11%
Midday	3,810	4,017	207	5%

Source: BRW, Inc. MIC, and DTA

The model estimated 88 passenger trips in the AM peak and 76 passenger trips in the midday traveling from the Spirit Valley Shopping Center area outbound to the Miller Hill Mall. From the Miller Hill Mall inbound to the Spirit valley Shopping center, the model estimates a total of 67 passenger trips in the AM peak and 57 passenger trips in the midday period (see Table 6g).

Table 6g: 1995 Passenger Trips for Spirit Valley-Mall Route

	AM Peak	Midday
Spirit Valley to Miller Hill Mall	88 (15)	76 (6)
Miller Hill Mall to Spirit Valley	67 (11)	57 (5)
Total Passenger Trips	155 (26)	133 (11)

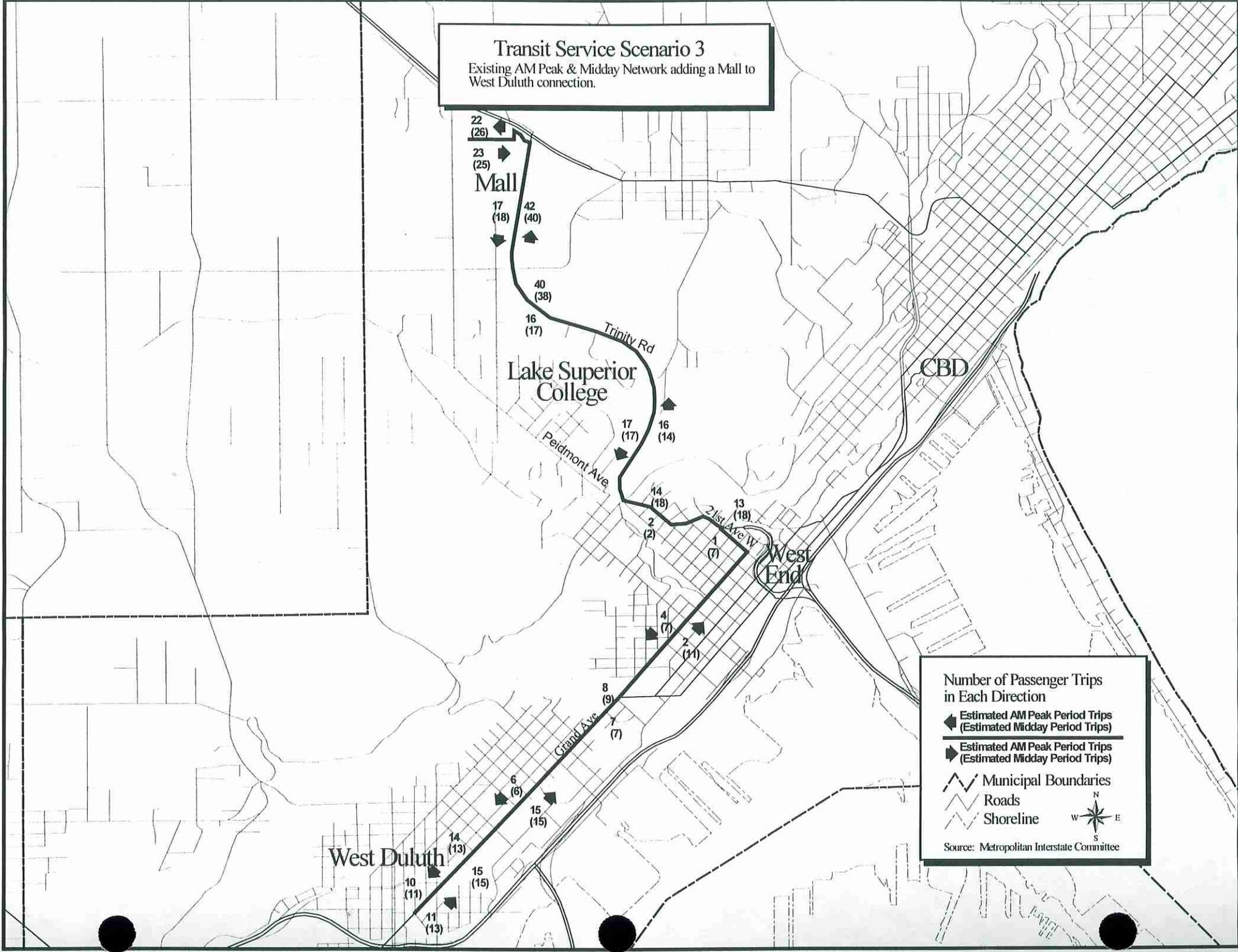
Source: BRW, Inc. MIC, and DTA

() = Ridership Per Route Trip. Number of Route Trips equal headway divided by time period.

This route was designed to provide West Duluth passengers destined for the Miller Hill Mall area a direct route to avoid having to transfer through the downtown Transit Center.



Transit Service Scenario 3
 Existing AM Peak & Midday Network adding a Mall to West Duluth connection.



Number of Passenger Trips in Each Direction

- ◀ Estimated AM Peak Period Trips (Estimated Midday Period Trips)
- ▶ Estimated AM Peak Period Trips (Estimated Midday Period Trips)
- ▬ Municipal Boundaries
- ▬ Roads
- ▬ Shoreline

Source: Metropolitan Interstate Committee

SCENARIO 4: CIRCULATOR ROUTES

The final scenario examined two possible circulator routes, a downtown circulator, and a UMD circulator.

Downtown Circulator

Downtown circulators are becoming more common throughout the country. The idea behind downtown circulators is to provide a better alternative for short trips in and around the CBD. A Duluth Downtown Circulator would offer shoppers and commuters a more user-friendly option for connecting to jobs, restaurants and stores in and around the Downtown and Canal Park area. Currently, the Port Town Trolley serves the Canal Park area, the Fitgers Complex, and some sections of downtown. However, the Port Town Trolley only runs during the summer months and is targeted toward the tourist market. A downtown circulator could build on the Port Town Trolley route and expand its service area to include the hospital area and more of the downtown area. The circulator route service area that was modeled is shown on the Scenario 4 Map.

UMD Circulator

A UMD circulator is not a new idea; at one time a UMD service existed, supported in part by funding from UMD. The UMD circulator served areas with large amounts of rental units serving the student market. However, the UMD administration ended funding for the route and the service was discontinued.

Transit agencies in several cities around the country are partnering with colleges and universities to promote transit ridership among their student populations. Many colleges fund transit service through student fees and then offer students unlimited transit service at no additional charge. These types of partnerships can be beneficial for both students and colleges where parking and vehicular traffic is a problem. By increasing the attractiveness of transit use, colleges can limit the amount of parking.

The University of Minnesota-Duluth is currently studying options for addressing a decrease in parking spaces due to a library expansion. Increasing transit accessibility to UMD could offer a cost-effective alternative for addressing parking demand problems while preserving land resources for building expansion with more aesthetically pleasing spaces. Given the market size and demographics, DTA and MIC staff determined a new UMD circulator was an idea worth revisiting and modeling. The modeled UMD circulator route was designed to traverse the eastern hillside area providing an attractive option for UMD and St. Scholastica students living in the area. The Scenario 4 Map shows the layout of the UMD circulator route that was modeled.

*A Duluth
Downtown
Circulator
would offer shoppers
and commuters a more
user-friendly option
for connecting to
jobs, restaurants
and stores in and
around the
Downtown
Canal Park area.*

The Downtown and UMD circulators were run in the same model since these routes would not significantly impact or interact with the other. The Downtown circulator was modeled with 30 minute headways for both the AM peak and the midday. The UMD circulator was modeled with 60 minute headways for the AM peak and midday.

Table 6h shows the system results of Scenario 4. The addition of both these routes shows a growth of 433 passenger trips in the AM peak period; a 15 percent increase over the existing system. The circulator model estimated an additional 213 passenger trips in the midday period; a six percent increase.

Table 6h: Scenario 4; UMD and Downtown Circulators

Passenger Trips	Existing Network	Scenario 4	Difference	Percent Change
AM Peak 1995	2,901	3,334	433	15%
Midday 1995	3,810	4,023	213	6%

Source: BRW, Inc. MIC, and DTA

The Downtown circulator generated more passenger trips than the UMD circulator with 208 in the AM peak and 205 in the midday. The UMD circulator generated 116 and 153 for the AM peak and midday, respectively. These two circulators impact the remaining system in different ways. Both routes to some extent would take away ridership from routes that cover areas close to the new routes; this may be particularly the case with the Downtown circulator where short downtown trips were previously taken on existing routes. On the other hand, by adding service, the system as a whole, becomes more attractive which may explain why the sum of the two routes is less than the total system AM peak increase.

Table 6i 1995 Passenger Trips for Circulator Routes

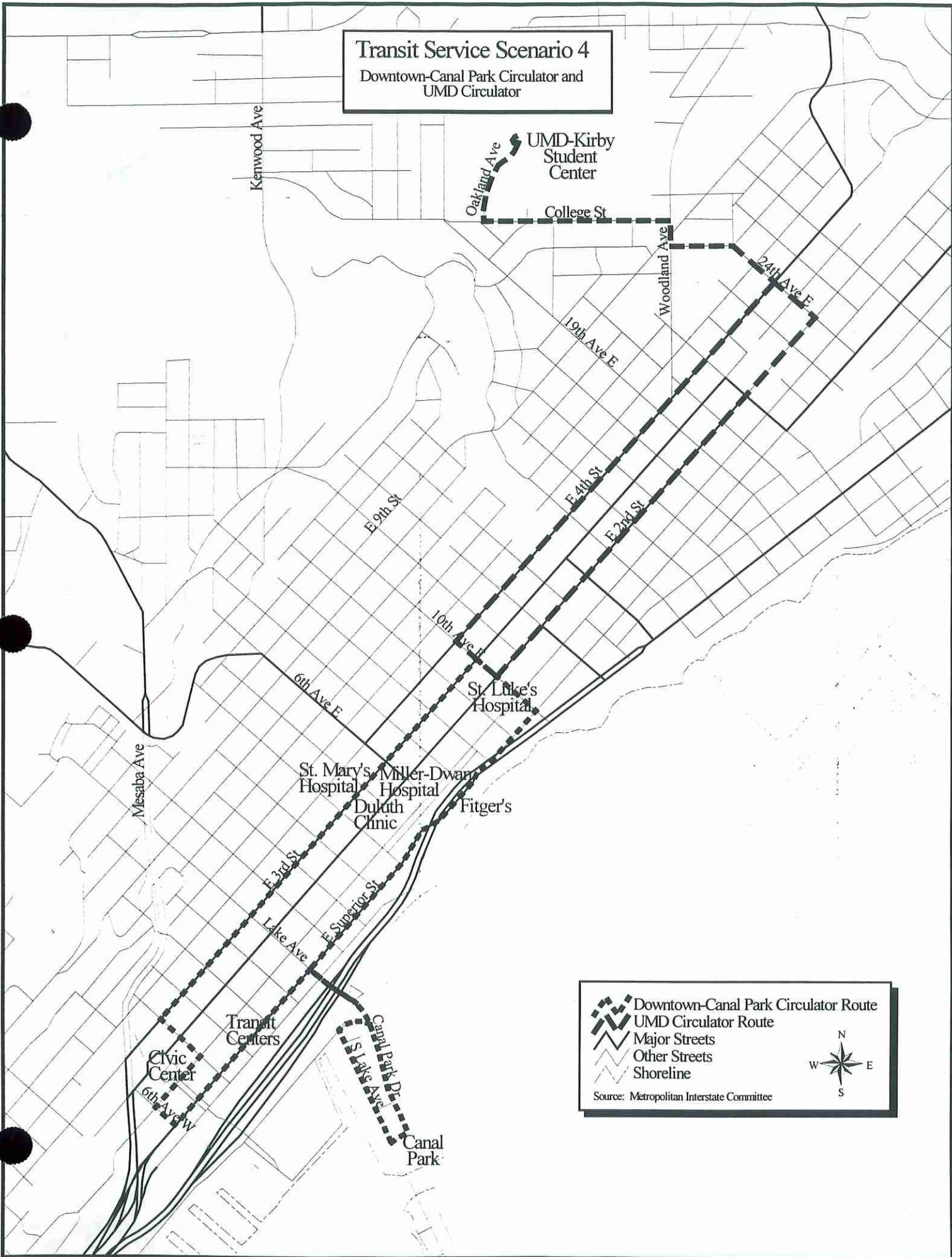
	AM Peak	Midday
UMD Circulator	116 (39)	153 (26)
Downtown Circulator	208 (35)	205 (17)

Source: BRW, Inc. MIC, and DTA

() = Ridership Per Route Trip. Number of Route Trips equal headway divided by time period.

Transit Service Scenario 4

Downtown-Canal Park Circulator and UMD Circulator



 Downtown-Canal Park Circulator Route
 UMD Circulator Route
 Major Streets
 Other Streets
 Shoreline

Source: Metropolitan Interstate Committee



Transit model results, by themselves, do not provide enough information to determine the best route option.

FISCAL ANALYSIS OF SCENARIO OPTIONS

Because the transit model results only give ridership estimates by themselves, they do not provide enough information to determine the best scenario option. A route that may attract a significant amount of riders may require significantly more resources and be less cost effective as a route that attracts less ridership and requires significantly fewer resources. As a result, the costs, as well as the benefits, need to be identified to determine what route options will be the most beneficial to the DTA.

The following table provides an overview of the scenarios financial impacts based on the model results. These figures show the DTA's estimated costs of the service changes required for each scenario and the revenues generated from the estimated passenger trips. The table provides a valuable comparative assessment of the scenarios.

Ridership increases from service changes impact not only Passenger Revenues but also the amount of state and city subsidy shares. Likewise, scenario service changes impact the DTA's Operations Expenses. Scenario 4, which included both circulator routes, shows the largest increase in Passenger Revenue over the 1998 base network. However, this scenario also requires the greatest increase in operation expenses. Scenario 2 has the smallest increase in Passenger Revenue; yet, it requires a significant increase in expenses and creates the largest Operating Deficit. Scenario 3 is in between Scenario 1 and 2 with regards to Passenger Revenue; although, it requires the smallest increase in added Operation Expenses and Operating Deficit.

All Scenarios, except for Scenario One, have a Revenue to Cost Ratio lower than the base network. Scenarios 2, 3, and 4 have Cost Per Miles below the base year (see Table 6j).

Table 6-j: Regular Route Financial Analysis of Scenario Options

	1998 BASE	Scenario 1 Hub and Spoke	Scenario 2 Lake-side to LSC/Mall	Scenario 3 West Duluth To Mall	Scenario 4 UMD & CBD Circulators
OPERATING REVENUES					
Passenger Revenue	\$2,197,647	\$2,226,339	\$2,217,23	\$2,219,067	\$2,229,783
Charter Revenue	\$5,004	\$5,004	\$5,004	\$5,004	\$5,004
Other Revenue	\$759,042	\$759,042	\$759,042	\$759,042	\$759,042
Total Revenue	\$2,961,693	\$2,990,385	\$2,981,289	\$2,983,113	\$2,993,829
OPERATING EXPENSES					
Operations Expense	\$5,182,928	\$5,338,813	\$5,271,396	\$5,250,243	\$5,278,818
Maintenance Expense	\$1,614,440	\$1,614,440	\$1,614,440	\$1,614,440	\$1,614,440
General Administration	\$1,341,516	\$1,341,516	\$1,341,516	\$1,341,516	\$1,341,516
Total Expenses	\$8,138,884	\$8,294,769	\$8,227,352	\$8,206,199	\$8,234,774
Operating Deficit (loss)	\$5,177,191	\$5,304,384	\$5,246,063	\$5,223,086	\$5,240,945
SUBSIDY SHARES					
Federal (section nine)	\$358,000	\$358,000	\$358,000	\$358,000	\$358,000
State of MN Subsidy	\$3,304,498	\$3,374,646	\$3,344,309	\$3,334,790	\$3,347,648
City of Duluth Subsidy	\$1,514,693	\$1,571,738	\$1,543,755	\$1,530,296	\$1,535,296
Total Subsidy Shares	\$5,177,191	\$5,304,384	\$5,246,063	\$5,223,086	\$5,240,945
REGULAR ROUTE STATISTICS					
System Miles	1,959,296	1,940,506	1,995,904	1,987,149	1,998,976
Cost Per Mile	\$4.16	\$4.28	\$4.12	\$4.13	\$4.12
Revenue to Cost Ratio	36.4%	36.0%	36.2%	36.3%	36.3%

Source: Duluth Transit Authority

CONCLUSION

The financial analysis provides a useful tool in determining the impacts of new service changes compared with the existing system and in assessing the differences among the scenarios. This analysis shows that there are some differences among the four scenarios. However, further analysis to test some of the assumptions of the transit model may be useful. Some service options may be more compatible with the DTA's current system and future goals, which will warrant greater consideration.

Some service options may be more compatible with the current system and future goals, which will warrant greater consideration.

It is beneficial to target marketing toward customers that the DTA has the greatest opportunity of attracting rather than scattering its marketing efforts in a “shotgun” approach to a large general audience.

TARGET MARKET SEGMENTATION

In order to maximize marketing resources, it is useful to identify markets or groups of transportation consumers which the DTA can most effectively serve. By evaluating major market segments, products and marketing programs can be tailored to meet the needs of those markets. Furthermore, it is beneficial to target marketing toward customers that the DTA has the greatest opportunity of attracting rather than scattering its marketing efforts in a “shotgun” approach to a large general audience.

Generally, people who are not within a two block walking distance of a bus stop from their home and final destination are not likely to consider transit, if a more attractive alternative is available (e.g. a car). Furthermore, bus transferring diminishes the likelihood of transit use. As previously mentioned, a number of factors provide incentives for driving, and thus, decreases the attractiveness of transit. Therefore, the challenge lies in identifying the markets which would benefit most from transit.

Utilizing data and information obtained from focus groups, surveys, DTA staff, and the marketing subcommittee, MIC staff identified several distinct groups of customers. Generating profiles of these groups allows us to analyze the market attractiveness of these segments. Market segment attractiveness is based on how likely groups are to use the DTA’s services and how cost-effective it is to attract these customers. Upon identifying groups possessing the greatest market opportunity, marketing strategies for each of those target segments need to be examined.

In order to examine different market segments, it was useful to divide market groups into three general classifications; Behavioral, Demographic and Geographic. These classifications provide a means of analyzing potential riders who may fall into more than one classification.

Behavioral Market Segmentation

The behavioral market segment focuses on groups of customers and potential customers based on knowledge, attitude, use, or response to the product. From the research initiatives discussed earlier, fairly good sources of information existed from which to extrapolate why some people ride the bus and others do not. The on-board survey data alone provides a reasonable picture of the attitudes of existing riders toward DTA service and why they choose to ride transit. The on-board survey also provided information about who rides the bus, when and where they are going, their average rate of use, how they pay, and their transportation options. This data is extremely useful in helping identify characteristics of current customers and what the DTA could do better to serve them.

Current Users Market Profile

The on-board survey provides a good source of information about the DTA's current customers. From these surveys, it was found that 55 percent of DTA customers reported not having a vehicle available to them with 26 percent reporting sometimes having a vehicle available to them. Only 16 percent reported that they would drive if the bus were not available. Furthermore, 51 percent reported annual household incomes of less than \$10,000 with another 24 percent reporting annual household incomes between \$10,000-\$20,000. These numbers strongly suggest that a majority of DTA customers are transit dependent.

The majority of DTA riders use the transit system to commute to work in the downtown area. More than half of the on-board survey respondents (51%) listed Miller Hill Mall as their shopping destination. It is also interesting to note that more females ride transit than males. When asked how service had changed from the previous year, 30 percent responded that service had improved, 48 percent responded there was no change in service and only 6 percent thought service was worse; suggesting that the DTA is successfully maintaining and improving customer satisfaction.

Several pros and cons should be considered when evaluating what resources should be targeted toward the current-user market. The following provides a summary of those advantages and disadvantages.

Market Advantages:

- It is much easier to maintain existing customers than to generate new ones.
- Current customers pass on positive experiences to others.
- Current customers have experience and knowledge of the DTA.
- The average rider takes 7.7 trips per week.
- Thirty-four percent of current riders use the People Pass which provides a stable revenue stream for the DTA.
- DTA has greater ability to communicate with customers (via information on buses and at bus stops) and have access to rider's perceptions of service and other information (i.e., on-board surveys).

Market Disadvantages:

- Given the limited resources of most current riders, there may be limited ability to pay for better or increased services. However, current riders are clearly able to pay current fares and 85 percent of DTA customers said the fares are reasonable.
- The potential for current riders taking more trips may be limited.

Maintaining and increasing satisfaction among current customers should be a key priority.

The DTA's goal should be to create an environment that promotes current users to feel good about their decision to ride the transit.

Market Assessment: Current customers are and will continue to be the lifeblood of the transit system. As noted, a large portion of current riders are limited in their choice of transportation alternatives. A goal of the DTA is to "Provide the best service possible within financial constraints to transit-dependents; those with no alternative mode of travel (the elderly, young and poor)." Maintaining and increasing satisfaction among current customers should be a key priority. As noted, it is easier and thus, more cost-effective, to maintain an existing customer than to generate a new one. Furthermore, marketing studies show that a customer will tell three people about a positive experience while telling 11 people about a negative experience. Creating satisfied customers results in getting the customers to "advertise" for the DTA by relaying their positive experiences to others. Therefore, it is in the DTA's best interest to target some resources toward maintaining the customer base, increasing customer satisfaction, and soliciting customer recommendations. Furthermore, many of these activities would not require a significant amount of additional resources.

The DTA's goal should be to create an environment that promotes current users to feel good about their decision to ride the transit. The DTA can do this by becoming a more "customer-oriented" service provider. The following communication objectives provide messages that should be conveyed to current customers.

Communication Objectives:

1. Customers are important to the DTA and the transit system is here to serve them.
2. Customers should feel good about their decision; it's the "smart" thing to do.
 - Affordable; compared to auto ownership. People feel good about the money they are saving using the bus. Money that can go for better things than transportation.
 - The community benefits when you take the bus; reduces congestion, reduces pollution & requires less natural resources, requires less automobile infrastructure such as road lanes and parking facilities
 - Don't have to worry about finding or paying for parking
 - Bus is reliable; "cold and snow, we still go"
 - Convenient to all major destinations
3. Using the bus system is safe (personal security).

Strategy options:

1. Enhance system for receiving customers complaints by focusing on "customer satisfaction"

- Obtain the name, address, mailing address, phone number and complaint specifics. This information can then be entered into a database in order to monitor complaints or add to a customer database. If the operator cannot address the issue then it will be given to appropriate staff member to address.
 - Guarantee a response (phone/mail) within five working days.
 - The unsatisfied customer should be sent a couple of free passes or a discount on the next bus pass purchase and/or some other gift, also a message thanking them for bringing the issue/problem to the DTA's attention. The letter, of course, should apologize for any inconvenience and express the message that they are a valued DTA customer.
2. One way of letting customers know that they are valued is to seek their input. Therefore, the DTA should solicit comments, suggestions, and complaints regarding the service provided. Soliciting customer feedback could take a variety of forms from a very ambitious public participation process to something less complicated such as displaying signs asking "how are we doing?" with a phone number to call (e.g., promote 722-SAVE as a means of "being heard" by the DTA). Such a strategy does two things. First, it provides the DTA with information from their customers; and secondly, it lets customers know they are valued.
 3. Develop a database of current transit users. This data could be used to issue mailings, assist in determining routes and schedules, or provide opportunities to solicit responses on services.
 - Useful information would include:
 - Name, address, mailing address, phone number.
 - Common destinations and trip purpose (e.g., work, shop, school).
 - How often they use the DTA.
 - Would they be willing to be contacted by DTA to participate in a survey or focus group.
 - Several options could be used to obtain this information; for example, providing discounts when purchasing passes and/or sending pass incentives for returned postcard surveys or registering for prizes through drawings at transit centers.
 4. A wide variety of rider appreciation activities could be implemented, ranging from a free-ride day to providing live music at transit centers during the afternoon peak. Some of these strategies could coincide with National Transit Week. The following provides a list of various activities that fall under this category.

One way of letting customers know that they are valued is to seek their input.

- Distribute the following “free-bees” part of a rider appreciation program.
 - Paper or plastic shopping bags with the DTA’s logo and phone number on them.
 - “Post-it note” dispensers with logo and slogan.
 - Computer mouse pads with picture and logo.
 - Magnet with logo and phone number.
 - Coffee/travel mugs.
 - T-shirts with route map on it.
 - Bumper stickers.
 - Key rings.
 - Bus pass holders.
 - Promotional strategies:
 - Everyday free rides. Pay one regular fare and get a “free ride” button good for free rides all week long.
 - Free ride during rush hour to entice commuters to become familiar with using the bus.
 - Monday & Tuesday donuts and coffee at different transit centers.
 - Wednesday driver appreciation day.
 - Thursday & Friday rider appreciation day.
 - Live radio broadcast from the bus, invite radio personalities to live remotes and hand out prizes from the bus.
 - New rider orientation day...people on hand to answer questions...volunteers on board to help those unfamiliar with where to get off.
 - “Clean Commute Day”...10 percent of the day’s fare are donated to the Lung Assoc.
 - “Friends Ride Free Day”...2 for 1.
 - Award free passes at random bus stops...drawing for one year/month of free pass.
 - Encourage the mayor to ride the bus and make it a Public Relations event.
 - Present bicycles to winners of youth essay contest.
 - Live music in transit center during each afternoon.
- Variations of any of these activities could be implemented and presented in an atmosphere of customer appreciation. However, care should be taken so that strategies do not seem “gimmicky”. The emphasis needs to be on developing a positive relationship with people whom the DTA serves and express that the DTA values its customers.
5. Improve information dissemination to make riding the bus easier for current users. These strategies will be discussed later in the *General*

Public section since these strategies have the potential for increasing ridership among the entire market population. For existing riders, an easy method of providing information on system changes, upcoming events, or promotions is to provide “take-outs” (a pamphlet or postcard sized handout) that would be available from a conveniently placed holder on the bus. These could be used for information updates, marketing promotions, or other points of interest to riders and updated on a semi-regular basis. The “take-outs” would provide interesting reading material for passengers while serving as a marketing tool.

6. Provide customers with a list of expectations identifying the quality of service that customers can expect to receive; such as on-time performance, friendly and helpful drivers, clean buses, comfortable rides, etc. The list should create confidence in the service and illustrate the value that the DTA places to its customers.

The key to maintaining ridership is to focus on providing valuable services to the customer. In order to do this, customer information and interaction should be a key factor. By developing a meaningful customer database, the DTA will be able to better communicate with customers and respond to their needs. In addition, it is desirable for customers to feel good about their decision to ride the bus and to share their positive experiences with others. It is important to reinforce the positive benefits of riding the bus (e.g., environment, cost savings, livable communities) while offering the customer an increased sense of satisfaction.

Demographic Market Segmentation

The demographic segmentation consists of identifying markets on the basis of demographic variables such as age, sex, income, etc. One reason for utilizing demographic segmentation is that consumer needs, preferences, and usage rates are often highly associated with demographic variables. These associations can be seen in the on-board survey results. Another reason is that these variables are easier to measure than other types of variables. Even when the market is described in non-demographic terms (e.g., personality types or personal tastes), the link back to demographic characteristics is necessary in order to know the size of the target market and how to reach them.

The on-board survey provided a good source of demographic information on current riders. Several demographic groups were identified from the surveys, focus groups, DTA staff, and the marketing subcommittee as potential markets that may provide opportunities for increased ridership. Each demographic market is discussed below.

Senior Market Profile

According to the On-Board Survey, senior riders (persons over age 65)

constitute 13 percent of current riders. The Duluth Urbanized Area by contrast has a senior population of 16 percent. While this may seem like a minor variance, this age group has the lowest proportion of DTA riders than any other age group; making seniors a “proportionately underrepresented” group of riders.

It was interesting to find that approximately 33 percent of householders 65 years of age or older do not have a vehicle available to them; whereas only 17 percent of all householders in the urbanized area reported not having a vehicle available to them. Also, a disproportionate number of females fall within this 65 years of age or older group. Females represent 57 percent of those between the ages of 65 and 74; whereas only 52 percent of the total Duluth urbanized population is female. As noted earlier, females ride the bus more than males. This information suggests there may be an opportunity to attract more senior riders if promotions and services are more tailored to their needs.

The senior focus group proved to be a valuable resource when evaluating the senior market. However, it is important to remember that the focus groups included persons who do not currently ride the bus. As a result, some issues which were not concerns of focus group participants such as transit cost may be a concern to current senior riders. The list of issues below illustrate those areas which may need to be addressed if an increase in senior ridership is to occur.

- Route schedule on-time performance is more critical for seniors (particularly in the winter months) and seating areas providing comfort and protection from the elements.
- An increased sense of personal security, especially at downtown transit centers. Seniors find behavior of teens and other inconsiderate riders objectionable and intimidating.
- More complete and easily understood route and schedule information (perhaps larger print items targeted toward seniors’ needs)
- Special tailored service to increase convenience. Focus group participants noted that convenience more than cost affected their choice of transportation. Also, seniors focus group participants noted that bus routes did not reflect their travel behaviors and that they had transportation alternatives which better suited their needs.

Senior housing facilities create pockets of high density senior populations throughout the metropolitan area. Duluth alone has eight senior housing complexes each with 100 or more units. Several more senior complexes have between 40 and 100 units each (see Appendix). Most of the senior housing facilities are located relatively close to existing bus routes. Downtown senior housing is served particularly well by transit. Specific information regarding senior housing facilities are provided in the

Appendix.

Targeting the senior market has several pros and cons. The following list provides a summary of those advantages and disadvantages of focusing marketing resources on this market.

Market Advantages:

- Have ability to pay (i.e., lower poverty rates than other age groups).
- Trip time flexibility (off peak demand).
- Less likely to have access to alternative travel modes (33 percent of households over the age 65 do not have a vehicle available to them).
- High density residences (retirement/senior housing facilities) are more conducive to transit.

Market Disadvantages:

- More difficulty walking and waiting for bus.
- Intimidated by or uncomfortable with objectionable behavior of youth and other discourteous riders.
- Fewer trips than other groups.
- Off peak ridership is a discounted fare.

Market Assessment: The senior market has the potential for increased ridership. The number of persons in this age group will continue to grow as life expectancy rates increase and the “baby boom” generation ages. In Duluth, this population will become a larger proportion of the total community makeup given the medical facilities available to seniors and the lack of significant economic growth to keep young people in Duluth and attract others to the area.

The senior market has the potential for increased ridership.

Keys to increasing senior ridership may, in part, reside in the ability to make riding the bus a more comfortable experience. Increasing this comfort-zone level will require enhancing the perception of personal security both on and off the bus as well as increasing the accessibility to stops (particularly during winter months) and bus stop amenities (e.g., benches, shelters, etc.). Included in enhancing senior comfort level for riding transit is increasing the dissemination of easily understood, yet comprehensive, ridership information.

It may be difficult to initially attract seniors onto regular route buses. Therefore, there needs to be incentives to encourage senior riders to try the service via a special event or a tailored senior service. The following provides the messages that need to be conveyed to the senior market if the DTA is going to increase ridership among this group.

Communication Objective:

1. The bus is safe (personal security).
2. Bus provides independence from relying on relatives and friends.
3. The bus is reliable.
4. We want your business and will provide special services to get it (senior routes serving retirement housing and key destinations for specific days/times).
5. A senior service program provides opportunity for social interaction with other seniors.

The following are examples of strategies that have the potential for increasing ridership among seniors.

Strategy Options:

1. Personal security strategies are identified and discussed in the General Population section.
2. Shelters and benches should be considered for high senior population areas.
3. Special event service (e.g., Dukes games, Holiday Light tours) targeted to senior groups and housing facilities to encourage “first-time” riders.
4. A senior service route that would operate at special hours or days and serve large density senior housing areas and provide service to senior-oriented destinations. Several considerations would need to be addressed prior to any service of this type being implemented (e.g., analysis of similar existing services, demand analysis, the potential for contractual agreements to offset expense, etc.) It is beyond the scope of this project to conduct the type of detailed analysis. However, there appears to be evidence that such a service warrants more investigation.

Disabled Market Profile

The disabled population is currently receiving transportation service by the Special Transit Ride (STRIDE) program. However, the Americans with Disabilities Act of 1990 requires that all new buses be wheelchair accessible; providing more choices to the disabled population and a greater opportunity to serve this population with regular route service. Currently, 45 buses are wheelchair accessible. According to the 1990 census, there were 1,300 persons between the ages of 16 and 64 (1.1%) with mobility limitations in the Duluth Urbanized Area. Of persons 65 years of age and older, there were 2,400 people with mobility limitations. Together, this group represents about three percent of the total population.

According to the DTA, the 1995 farebox recovery rate was 31 percent for regular route service and 14 percent for STRIDE service. Government funds cover a greater portion of STRIDE’s operating costs. By

encouraging disabled riders to use regular route buses, the transit system could experience greater cost-effectiveness. However, there are several issues which would make transferring disabled riders from STRIDE to regular route buses impractical or unrealistic.

Several key issues were raised through the disabled persons focus group. Group participants reported relying on a variety of transportation alternatives including; friends, volunteer drivers, Northern Access Transportation, Care Cab, Twin Ports Transportation, personal wheelchair accessible vans, as well as STRIDE. Some participants raised concerns about using regular route buses because of their lack of knowledge using the lifts, and the reactions from regular route drivers and passengers. Many expressed satisfaction with STRIDE's service and reported not feeling welcome by regular route drivers. The focus group identified some of the barriers to riding regular route service such as lifts not always working or drivers not knowing how to use them, poor attitude of drivers toward disabled persons, and uncertainty regarding schedules and routes. It was noted that regardless of service changes, some disabled persons would be unable to use regular route service. Many focus group participants also emphasized the added difficulties associated with disabled persons using regular route buses during the winter months.

In order to increase ridership among the disabled, it would be necessary to address the following issues:

- Increased sense of acceptance and friendly service from drivers.
- Clear information on procedures for utilizing lifts and related equipment.
- Confidence that lifts work and drivers know how to operate lifts and kneeling buses.
- Increased information on routes and schedules for wheelchair accessible buses/routes.
- Address difficulties of bad-weather access (i.e., access to stops, snow removal, protection from elements; focusing on stops with significant numbers of disabled riders).

The following list of advantages and disadvantages identifies some of the positives and negatives associated with targeting the disabled market to increase regular route ridership.

Market Advantages:

- Would shift demand from STRIDE service (more cost-effective for system).
- STRIDE requires reservations be made no later than 2 p.m. for next day service; providing an incentive to use regular route service for unplanned trips.

**Disabled
passengers should
feel welcome and
encouraged to use
regular route
buses.**

Market Disadvantages:

- Have access to STRIDE and other more customized services (i.e., dial-a-ride, door to door service) which regular routes may have difficulty competing against. May be more opportunities in improving STRIDE services (e.g., lessening reservation period).
- Difficult to provide bad-weather access to stops.
- Relatively small market of riders (3.2% of Duluth-Superior population).

Market Assessment: At this time there does not appear to be much ridership potential among the disabled market. Currently, the STRIDE program provides a much more personalized service with which regular route service would find difficult to compete. The disabled community makes up a relatively small population in the Duluth Urbanized Area even though this group is much more reliant on transportation assistance. While the disabled market may not warrant a large marketing investment, some issues impacting disabled persons should still be addressed to insure that disabled passengers feel welcome and are encouraged to use regular route buses. The following list of communication objectives and strategies was generated to address some of these issues.

Communication Objectives:

1. DTA Regular Routes have friendly and helpful drivers who want to serve you.
2. Regular Bus Routes offer the freedom and independence to go where and when you want (no reservation needed).
3. DTA Regular Route buses have reliable equipment and service.
4. You can have confidence in schedules and routes.
5. Convenience and comfort (Bus stops/shelters are accessible for wheelchairs).

Strategy Options:

1. The STRIDE program may want to increase its promotions to ensure that information of its services are fully reaching the disabled population.
2. Insure drivers know how to use lifts and kneeling buses.
3. Insure lifts are in working condition.
4. Provide sensitivity training to drivers on customer relations with disabled passengers.
5. Insure schedules have up to date information on wheelchair accessible buses.
6. Provide information in rider guide targeted toward disabled passengers on how to use lifts and regular route buses.

College Student Market Profile

The College Student population in the Twin Ports area provides an attractive market for the DTA to pursue. Currently, DTA provides service to the University of Minnesota Duluth (UMD), the University of Wisconsin Superior (UWS), the College of St. Scholastic (CSS), Lake Superior College (LSC), the Duluth Business University (DBU) and the Wisconsin Institute of Technology College (WITC).



College settings generally work well for transit because they generate large numbers of trips typically within a densely populated location. UMD has approximately 7,500 students and 1,500 employees. The College of Saint Scholastica, University of Wisconsin Superior, and Lake Superior College have student populations of 2,100, 2,400 and 2,760, respectively. College students are generally less likely to own a car than the general population and more likely to have financial constraints placed on them, making cost-effective transportation alternatives more crucial. Also, college students are likely to live in dormitories and apartment complexes which are higher density and served more efficiently by transit.

College settings generally work well for transit because they generate large numbers of trips typically within a densely populated location.

The on-board survey did not specifically identify college students. Yet, by looking at traditional student ages the number of college age riders could be inferred. Roughly 21 percent of DTA riders are within the 19 to 25 age group whereas only 13 percent of Duluth’s urbanized population are within this age group; suggesting greater proportion of young adults using the transit system. However, it is unclear how many of those riders are college students. From the on-board survey, 22.5 percent of respondents listed school as one of the purposes of their transit trip; although, the on-board survey did not differentiate between secondary and post secondary trips.

A better method of assessing college student ridership is to look at those riders that purchased the College Quarterly Pass. In 1996, the DTA sold a total of 451 College Quarterly Passes; 301 were purchased by UMD, 43 by St. Scholastica, and 107 by Lake Superior College students (see Table 7a). UWS, DBU and WITC do not participate in the College Pass Program.

*significant
number of
quarterly passes
are sold
at Lake
Superior
College.*



Table 7a: College Pass Program

	Passes sold for 1996*	Student Population	Percentage
UMD	301	7,500	4%
St. Scholastica	43	2,100	2%
Lake Superior College	107	2,763	4%
UWS	n/a	2,423	n/a

Source: Duluth Transit Authority

* Data does not include number for December

n/a = not applicable

Perhaps most surprisingly, is the number of passes sold through Lake Superior College given the college has far fewer students and less bus service than UMD; yet, a significant number of passes are being purchased. These numbers may suggest that increased service to Lake Superior College is warranted. While UWS does not currently participate in the College Pass Program, there may be willingness to consider it given recent interest in exploring traffic demand management strategies to address parking issues.

The college student focus group which was conducted highlighted several issues that affect transit ridership among the area's university students. The following list highlights some of those issues which could be addressed to enhance university ridership.

- Increased and clearer information on routes and schedules.
- Clear information on fare prices and procedures for how to use the bus and bike racks (targeted toward new students).
- Adjust departing and arrival times based on class schedules.
- Increase the positive perception of riding the bus less "scary, smelly, noisy, unappealing," focusing on environmental benefits and money savings.

The following list provides the pros and cons of targeting the college student market for greater marketing resources.

Market Advantages:

- Campus parking constraints exist.
- Students are less likely to own a car.
- Likely to live in a densely populated area.
- Central drop-off and pick-up area.

Market Disadvantages:

- Colleges and University not located downtown; which increases the need for transfers.
- Inexpensive parking compared to transit pass.

- Bus schedule times not compatible with class times.

Market Assessment: There appears to be some opportunity to increase ridership among university students. However, service change options may determine if a greater percentage of marketing resources should be targeted toward the university market. If, for example, a UMD Circulator is developed, a strong marketing campaign would be necessary to inform and promote the service. If any service changes are made, the new marketing campaign should promote the overall system as well as the new service so that the DTA could maximize system exposure (“a great service just got better”). Some of the service options that are being considered are:

1. *a UMD circulator that loops through the east-hillside area.*
2. *developing a UMD hub.*
3. *adjusting UMD arrival/departure times.*

Even if the current system remains intact some additional marketing efforts targeted toward university students should be considered. The following list provides communication messages that may be needed if this market is going to see increased ridership.

Communication Objectives:

1. Transit is smart and for you.
 - Affordable; compared to auto ownership
 - Don't have to worry about finding or paying for parking
 - The community and your college campus benefits when you take the bus; reduces congestion, reduces pollution & requires less natural resources, requires less on-campus automobile infrastructure such as parking facilities, leaving more room for aesthetically pleasing spaces and growth of university facilities.
 - Convenient times and routes to colleges and other major destinations (we're on your schedule).
 - No reason to be apprehensive and the DTA is willing to help you get on the bus.
 - Using the bus is safe (personal security).
 - Transit is easy to use (bike racks), clean, comfortable, reliable, convenient & inexpensive.

The DTA currently provides several marketing strategies targeted toward college students such as the Collegiate Pass Program, a service information packet for the beginning of the school year, an information kiosk at UMD, and the construction of an internet web-site which most

college students have easy access to. However, some of the following examples may provide some additional marketing benefits.

Strategy Options:

1. In developing the web-site:
 - include information targeted toward college students (e.g., how to use bike rack, special events serviced by DTA),
 - include links to web-sites of special interest to university students,
 - sell web-site advertising space to “student-oriented” merchants on special college information page which could list various activities occurring at the university and in the city that can be accessed by transit (information about downtown nightclubs, local concerts and sporting events, etc.),
 - include web-site address on all promotions targeted toward college students.
2. Increase Collegiate Pass attractiveness by developing partnerships with merchants to offer discounts for pass holders, targeting merchants with a large student customer base.
3. Explore and encourage university partnerships (with student government, groups and administration officials) to develop a U-Pass that is free to students and funded through student fees or administration and/or encourage administration policies which would increase incentives for using transit(e.g., parking policies, increased pass funding for Collegiate pass program).
4. Increase campus presence by setting up DTA purchase/information booth at the beginning of every quarter. Include DTA information in “new student” packet.
5. Explore contract services for students attending special events (e.g., UMD Bulldog hockey bus). Perhaps, explore a painted bus promotion with UMD.
6. Explore evening bus service from UMD area to nightspots (Canal Park, Fitger’s, etc.)
7. Promote adopt-a-shelter program among fraternities, sororities, and college organizations.

Youth Market Profile: 12 to 18 years of age (7th-12th grades)

Only five percent of regular route riders reported being 18 years of age or under in the on-board survey. Twenty-five percent of the Duluth Urbanized Area population is within this age group. However, a more appropriate age group comparison would be those age 12 to 18 which make up approximately 11 percent of the urbanized population.

Through a contractual agreement with the Duluth Public School system, last year the DTA provided student transportation service for Middle

School and High School students within the DTA service area. For the 1997-1998 school year the DTA is contracted to provide student service for all High Schools and two of the four Middle Schools. Given the limited transportation alternatives generally available to this group and their familiarity using the DTA to get to school, one could assume that this group would provide a good market for regular route transit service, particularly in the summer. However, this market does not generate as many riders as might be expected.

The summer/teen pass program initiated by the DTA proved to be a successful revenue generator. It did not, however, result in noticeable ridership increases. DTA staff believe that many parents bought the passes for their teens and many teens use the pass for the discount on Whopper hamburgers offered through Burger King restaurants but not for transportation purposes. From a fiscal perspective, this benefits the DTA since revenue is generated without additional bus capacity being consumed; although, at some point, parents may stop purchasing passes if they feel it is not being utilized for transportation.

A focus group was not conducted for this age group. However, several topics concerning youth riders were identified by the DTA staff, MIC staff and the Transit Vision Marketing subcommittee. The following list identifies those issues which may attract more youth ridership;

- provide easily understood and complete information on routes and schedules
- identify destinations where teens want to go
- utilize the schools to disseminate information
- provide convincing arguments of the benefits of transit use
- educate and inform parents on the benefits of transit for teens
- promote appropriate/considerate rider behavior
- promote bike rack program

The following is a summary of the pros and cons of the youth market that should be considered when evaluating whether or not to increase marketing resources for this group.

Market Advantages:

- Have disposable income.
- Provide off peak riders (i.e., evening, weekend, and summer midday).
- Have limited transportation alternatives, particularly during summer.
- Have knowledge and experience using DTA buses.
- Excellent opportunity to educate and develop life-long positive perception of transit.

Market Disadvantages:

- Other passengers find behavior of some teens objectionable and/or intimidating.
- With the exception of summer, there is not a large market outside of school contract buses (weekends and evenings).



The Holiday Transit Center Downtown Duluth

A common

Assessment: The youth market offers a large attractive ~~complaint about the~~ limited transportation alternatives. This market also has ~~DTA from an~~ knowledge of DTA services. However, a common ~~complaints relate to~~ DTA from area citizens relates to the problematic behavior ~~problem behaviors~~ associated with young people. The question should then be ~~focused on young~~ attracting and encouraging more young riders, will older ~~people~~ customers be driven away?

In the case of the DTA, the benefits of increasing youth ridership outweigh the potential costs. Existing marketing efforts (e.g., teen pass) should continue and be increased. However, increased youth marketing efforts should be conducted in conjunction with efforts to address the security concerns and problem behaviors discussed previously.

The communication objectives below represent messages that may have a positive effect on youth market ridership.

Communication Objective:

For Youth

1. Freedom and independence (Summer Mobility).

2. Convenient for getting you to the fun places you want to go.
3. Easy to use (Simple “How to” use info on schedules/routes/Bike racks).

For Parents

1. Convenient for parents.
2. Parents feel comfortable knowing kids have transportation to summer destinations (parks, mall, zoo, etc.,) that is both safe and reliable.
3. Easy for kids to use.

The following list of strategies should provide a means of promoting transit use among young people.

Strategy Options:

1. Promote passenger code of conduct and positive passenger behavior with simple “How to ride the bus” information within rider guides and signs on buses targeted toward youth riders (include reasons why this is important).
2. Special summer ride guide (i.e., “summer fun book”) targeted toward youth market. Booklet should include a list of special summer events, Dukes game schedule, map of key youth destinations, relevant “how to ride” and bike rack information. The guide should provide transit route information on how to get to key destinations. The guide could be funded by soliciting sponsorship from local business catering to young consumers. The guide should coincide with summer teen pass sales and be distributed through schools at the end of the school year. (cost: fairly inexpensive to produce; however, it would take significant energy and staff time to set up sponsorships, coordinate and distribute.)
3. Promote special event services targeted toward youth market.

Geographic Market Segmentation

The geographic market segment looks at customers as they relate to some common geographic area. These areas could be neighborhoods, employment centers, towns, or retail commercial areas. Any place that produces trip origins or destinations that provide a potential market for the DTA. People coming from or to certain areas may provide opportunities for increased transit ridership depending on such factors as the area’s density, demographic characteristics, and transit friendly infrastructure. The following discussion looks at several geographic areas which may provide marketing opportunities.

Central Business District (CBD)

The Central Business District (CBD) serves as the “Hub” for the DTA



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system. Downtown employee's represent a large potential market for transit use. The CBD receives the greatest concentration of direct service which minimizes the inconvenience that transfers pose for riders with a downtown destination. While no longer the center of retail and business that it once was, the CBD is still the most significant trip generator for the area. The concentration and density of employment and retail activity in this single central location has a strong positive impact for transit.

CBD Employee Issues

In 1990, the CBD employed 14,185 people with approximately 80 percent working in the non-retail sector. This large number of non-retail employment is beneficial given that these types of jobs (i.e., office) are generally scheduled as traditional eight hour, eight-to-five shifts which are better served by transit. Persons working in the CBD offer perhaps the greatest potential non-transit-dependent market available to the DTA.

The Central Business District employed 14,185 people in 1990 with approximately 80 percent working in the non-retail sector.

Attempts have been made to encourage downtown commuters to switch to transit. These efforts have had limited success. Of the ten organizations participating in the employer partially funded commuter pass program, an average of 2.5 percent of eligible employees purchase the passes (see Table 7b). Minnesota Power, St. Louis County, the City of Duluth and Norwest Bank have the highest percentages of eligible employees utilizing the commuter pass program; all of which are CBD employers. Employers in the hospital region have lower commuter pass participation rates. The lowest commuter participation rate is for the University of Minnesota Duluth (UMD) which had a only 0.5 percent of its eligible employees utilizing the program in 1996.

Table 7b: Commuter Pass Program Participation

Organization	1995 Employees	1996* Ave Monthly Use	Percent
Minnesota Power ¹	500	30	6.1%
St. Louis Co. ¹	1,000	51	5.1%
City of Duluth ¹	950	48	5.0%
Norwest Bank Duluth ¹	250	10	3.9%
Duluth Clinic ²	1,000	25	2.5%
Miller Dawn Medical Center ²	800	18	2.3%
St. Lukes Hospital ²	1,300	24	1.8%
Polinsky Medical Center ²	250	4	1.6%
St. Mary's Medical Center ²	2,400	37	1.5%
University of Minnesota Duluth	1,600	8	0.5%
Total	10,050	255	2.5%

* Average is based on January-November 1996

¹ Central Business District

² Medical Campus

According to the on-board survey, 35 percent of riders identified



Downtown Duluth as their normal destination. Of those respondents, 50 percent (1,173) cited work as one of the purposes of their trip. The on-board survey did not differentiate between the Central Business District and the Medical Campus, therefore, MIC staff assumed that survey respondents interpreted downtown Duluth as including both the CBD and Medical Campus.

A common concern mentioned throughout this project is the perception of security and the discomfort associated with the downtown transit hubs. In addition, riding the bus has the image of being the transportation of last resort and not for those with transportation options. Third, trip/time flexibility and trip-chaining are concerns for many downtown workers, particularly working parents who have more complicated travel needs and schedules (e.g., parent related trips such as daycare, school and sporting events, etc.).

The following list of market advantages and disadvantages need to be assessed when considering directing more marketing resources toward the CBD commuter market.

Market Advantages:

- Area receives good service. Transfers less necessary.
- Extremely high number of trip attractions (i.e., high density employment and retail activity).
- A substantial amount of mixed land uses at pedestrian scale making trip-chaining easier for transit users. Skywalk system increases pedestrian accessibility.
- Office employment has more stable working hours (i.e., 8 to 5 employment) compatible with current peak hour transit service.
- Parking constraints are more apparent in downtown area.
- Some downtown employers are willing to fund part of the cost of monthly passes.

Market Disadvantages:

- Mixed land uses don't necessarily guarantee the "right" mixes (e.g., daycare, groceries, dry-cleaners, etc.).
- Compared with other metro areas, relatively inexpensive and abundant parking.
- Little traffic congestion.
- Auto drivers unwillingness to give up security and comfort of personal vehicle.

Market Assessment: Because of the parking constraints and the concentrations of employment and retail activity, CBD commuters offer the largest market opportunity for non-transit dependent persons. The

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CBD transit commuter is the next largest rider group after the transit dependent population. The amount of direct downtown transit service, and the pedestrian friendly environment, puts transit in a much better position to compete with the automobile for persons destined for the CBD. However, as already discussed, there are several factors that discourage CBD commuters from considering transit. These issues will have to be addressed if the DTA is going to be able to compete for CBD commuters.

If CBD commuter ridership is to increase, several issues need to be addressed. First, the perception of security using transit; particularly at the downtown transit hubs. If commuters are going to look at transit as a transportation option, the transit hubs need to provide an attractive, comfortable, and safe atmosphere. The transit hubs should be places that invite people, not repel them. Second, the negative image of riding must be corrected. Last, strategies for addressing trip/time flexibility and trip-chaining should also be considered.

Transit is limited in its ability to compete with the trip and time flexibility which the automobile provides commuters. However, if the perception and image of riding the bus can be altered, transit will be in a better position to compete for commuter customers based on cost savings and increased convenience. In addition, this market may be more receptive to the social and environmental benefits of transit use (e.g., less pollution, less congestion, less need for automobile infrastructure, promoting livable communities) which may induce some to “volunteer” to use transit even though personal self interest would be maximized by another transportation alternative. This approach would be similar to the recycling movement in which people are willing to forego personal convenience and sacrifice time and energy to recycle for the benefit to the environment.

In order to attract commuters, more effort may be needed to develop relationships with downtown businesses. As noted, The DTA currently has many downtown businesses participating in the commuter pass program. However, greater marketing resources may be needed to educate businesses on the benefits of employee transit use (e.g., more available customer parking) and encourage them to promote transit friendly



DTA Customers Waiting at Downtown Transit Shelter

policies (e.g., cash out parking where employers give workers the option of receiving free parking or its equivalent monetary value). In addition, the DTA may need to focus more marketing resources on the employees themselves in illustrating the personal benefits (e.g., benefits of cost savings and avoiding parking difficulties) as well as the community and environmental benefits of transit.

The following communication objectives focus on the needs and concerns of the commuter market.

Communication Objectives for Employees:

1. Transit is for you.
 - Safe; personal security
 - Easy to Use (How to ride)
 - Reliable (Arrivals/departures are on-time, “cold and snow, we still go,” guaranteed-ride-home)
 - Convenient; (clock face schedules where buses would always arrive at a set time after the hour; e.g., every 15 minutes after the hour) CBD area has exceptional service and pedestrian-friendly facilities (i.e., skywalk).
 - Inexpensive (Commuter Pass subsidized by many employers)
 - There is no reason to be apprehensive using the bus; the DTA is willing to help you.
2. Transit is the “smart” choice
 - Affordable; compared to auto ownership (Commuter Passes subsidized by some employers; using transit can save money by forgoing a 2nd or 3rd car)
 - Don’t have to worry about finding or paying for parking
 - The community benefits when you take the bus; reduces congestion, reduces pollution and requires less natural resources, requires less expensive automobile infrastructure such as roads and parking facilities (land used for parking can be used for more economically beneficial uses, frees up parking for retail related activity).
3. Transit helps create a vibrant and dynamic downtown.
4. Everything you need is within walking distance right downtown.

Communication Objectives for Employers:

1. Employees’ using transit is good business.



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- Employee transit pass is tax exempt (Provide employees choice of parking or equivalent monetary value for taking transit.)
 - Transit commuters free up parking for customers.
2. Greater transit use lessens need for expensive parking structures making room for more productive land uses and a more vibrant business district.

The following examples provide some strategy ideas that deal with commuter issues.

Strategy Options:

1. Personal security strategies are discussed under General Population section.
2. Image building strategies discussed under General Population section.
3. Increasing marketing efforts of Commuter Pass program
 - Commuter packet to include rider guide, automobile savings worksheet, benefits of transit use (e.g., community and environmental) and other relevant information targeted toward commuter.
 - Promote participation and “buy-in” by area businesses.
 - Expand Commuter Pass program to include small businesses (beginning focus on CBD).
 - Allow businesses to buy and receive Commuter Passes by Mail.
 - Offer “Guaranteed Ride Home” program for Commuter Pass holders.
4. Provide downtown circulator service that would route through downtown area and Canal Park.

CBD Shopper Issues

Of the 14,185 CBD employees identified in 1990, 2,800 were in the retail sector. By comparison, the transportation analysis zone (TAZ) that encompasses the Miller Hill Mall had approximately 1,450 retail jobs and less than 200 non retail jobs. The number of retail employees suggests a substantial consumer attraction to the CBD. However, the on-board survey found that only 24 percent cited downtown Duluth as an area where they shop. By comparison, 51 percent listed the Miller Hill Mall as the area they shop. West Duluth was listed as the third most mentioned area to shop with seven percent.

Downtown retail is important for several reasons. First, trip-chaining, or making several trips en route to a final destination is increasing. A common example of trip-chaining is a working parent who stops at the grocery store, the daycare center and the dry cleaners on the way home

from work. Trip-chaining is generally more difficult with transit, particularly when those destinations are not conveniently located or require bus transfers. When a variety of retail is conveniently located within short walking distances from transit centers, riding transit becomes a more realistic option for persons combining trips. By having a vital retail area downtown, the area becomes more attractive to shoppers and workers alike providing the type of downtown which is mutually beneficial for transit-users and the CBD as a whole.

The following list provide the market pros and cons of the CBD shopper market.

Market Advantages:

- Area receives good service making transfers less necessary.
- Significant amount of retail activity.
- A substantial amount of mixed land uses at pedestrian scale. Skywalk system increases pedestrian accessibility.
- Convincing argument against parking and congestion

Market Disadvantages:

- Not easy to transport packages on bus
- Relatively inexpensive and abundant parking.
- Little congestion.
- Unwillingness to give up security, comfort, and convenience of personal vehicle.

Market Assessment: CBD shoppers are not an attractive market. However, retail sector activity is vital in serving downtown employees. As discussed in the CBD commuter section, a variety of retail and service activities in the CBD's pedestrian-friendly environment increases the convenience to commuters using transit. If a worker can walk to the post office, dry-cleaners or other retail or service facilities during lunch or after work, riding the bus is a viable option. However, if the right mix of service and retail options are not within a reasonable walking distance, driving becomes a necessity. While targeting specific marketing resources toward CBD shoppers may not be warranted, it is useful to promote and encourage retail and service activity within the CBD and to work in partnership with downtown businesses to promote a vibrant and prospering downtown area.

The following communication objectives provide examples of messages that would encourage shoppers to consider riding transit. These messages would be best served if used in conjunction with targeting the commuter market.

Access to a variety of retail and service activities in the CBD's pedestrian-friendly environment increases the convenience to commuters using transit.

CBD Shoppers Communication Objectives:

1. Everything you need is within walking distance right downtown.
2. Avoid worrying about paying for or finding parking.
3. Avoid traffic hassles (“leave the driving to us”).
4. Transit helps create a vibrant downtown.
5. The Community benefits when you take the bus (volunteerism); transit reduces congestion, reduces pollution, and requires less natural resources; it requires less expensive automobile infrastructure such as roads and parking facilities (land used for parking can be used for more economically beneficial uses), and frees up parking for retail related activity.

Strategy Options:

1. Promote a downtown circulator as service to shoppers.
2. Promote downtown commercial activity as advantage to downtown transit commuters.

Medical Campus Area

The medical campus is the area north and east of the Central Business District between First and Fifth Streets and Fourth and Sixth Avenues East and the area around Tenth Avenue East and First Street. This area encompasses the Duluth Clinic, Miller Dawn Medical Center, Polinsky Medical Center, St. Mary’s Medical Center and St. Luke’s Hospital.

Medical Campus Employees

The Medical Campus area has many of the same features as the CBD; it is relatively dense and centrally located. The hospital region has approximately 5,600 workers with about 1,000 (i.e., approximately 19%) in the retail sector. As noted earlier, employers in this region have not had much success in getting employees to use transit (as measured by the commuter pass program’s participation rate). Saint Mary’s Medical Center and St. Luke’s Hospital, the two largest medical employers participating in the commuter program, have an average of 1.5 and 1.8 percent of their employees utilizing the program respectively. The third largest medical employer, the Duluth Clinic, has succeeded in getting 2.5 percent of its employees to purchase the commuter pass (refer to Table 7b). It is important to remember that by looking only at commuter pass program participants, those employees who ride transit on a less regular basis are not represented.

Several factors affect an employee’s decision whether or not to use transit to the Medical Campus. First, hospital employees are more likely to work irregular hours that may not coincide with bus schedules. Second, there are concerns about personal security among riders who must use transit at these irregular hours. Third, as previously mentioned, there are fewer

Hospital employees are more likely to work irregular hours that may not coincide with bus schedules.

direct connections from bus routes to the medical campus, thus, requiring transfers or a long walk to and from the work place. Fourth, significant resources have already been allocated to provide plentiful and inexpensive parking which make transit a less attractive alternative. Currently, the price of parking for employees is generally equal to or less than the price of an employer subsidized Commuter Pass. However, perceived parking constraints such as the time and effort required to locate available and inexpensive or free parking usually on neighboring streets, may provide an incentive to encourage transit use. Finally, the medical campus has a less concentrated retail sector than the CBD which makes trip-chaining more difficult for transit riders.

The medical campus focus group identified several issues and concerns which may need to be addressed in order to attract more ridership for commuters working for the medical sector. The following is a listing of those issues which may warrant consideration.

- Improved schedules and time tables that better illustrate types and times of service (e.g., express, evening, etc.).
- Eliminate or minimize clause “schedules subject to change without notice” this disclaimer does not encourage confidence in reliability.
- Increase cost savings of passes. (however, focus group participants listed convenience as a greater factor than cost).
- Increase convenience with less “waiting time”, particularly in winter. Riding requires an adjustment in lifestyle (greater planning).
- Add video cameras in buses to increase perception of security.
- Increase perception of security at bus shelters.

The following list identifies the market advantages and disadvantages that should be examined when determining whether to target the medical campus market.

Market Advantages:

- Area received fairly good service (transferring is necessary for some routes.)
- A substantial number of trip attractions (i.e., employment) with high density activity
- A significant amount of mixed land uses at a pedestrian scale.
- Convincing argument against parking and traffic congestion
- Medical employers are willing to fund part of the cost of commuter passes.

Market Disadvantages:

- Mixed land uses don't necessarily guarantee the “right” mixes (e.g., daycare, etc.)
- Hospital employment often has non-traditional work hours.

The medical campus has many of the same attributes as the CBD.

- Trip-chaining difficult on transit
- Relatively inexpensive and abundant parking.
- Little congestion.
- Unwillingness to give up security, comfort and convenience of personal vehicle.

Market Assessment: The medical campus has many of the same attributes as the CBD. The strategies that are suggested for CBD commuters would cover many of the medical campus issues as well. As with the CBD, the commuter pass program could be enhanced to promote the transit use among employers as well the employees. Developing partnerships with the medical campus should be pursued as an attempt to encourage transit friendly policies from medical employers and to help the medical campus avoid the tremendous expense associated with constructing parking facilities.

Increases in marketing resources targeted specifically toward the medical campus is not recommended at this time unless a service increase is initiated such as a downtown circulator. The medical campus should, however, be included in any increases in promotions targeted toward downtown commuters.

Strategy Options:

1. Promote a downtown circulator as service to hospital workers. Would have to be timed appropriately to connect routes terminating downtown to medical campus.
2. Increase Commuter Pass program promotions (“Guaranteed ride home”) similar to CBD commuter strategies.

Medical service recipients/customers

Persons receiving medical services represent a segment which the DTA may wish to give greater consideration. Those seeking medical services or conducting other activities related to area medical facilities may have transportation needs that could be met by the DTA. This segment may include larger proportions of seniors which tend to require more medical care than younger persons. Given the needs of the senior population, better transportation services to medical providers may be warranted.

Eleven percent of those responding to the on-board survey listed medical as a purpose for their transit trip. The On-Board Survey did not designate the medical campus as a specific destination, making it difficult to determine specifically how many riders are destined for the medical campus.

Market Advantages:

- Area received fairly good service (some transferring necessary).
- A significant amount of mixed land uses at pedestrian scale.
- Convincing argument against parking and congestion.

Market Disadvantages:

- Relatively inexpensive and abundant parking.
- Little congestion.
- Unwillingness to give up security and comfort of personal vehicle.
- Would not be consistent riders.

Market Assessment: This market does not appear to warrant increased marketing resources at this time due to low numbers of potential customers and the small number of trips the market would likely generate. However, there may be a significant demand among the senior market that might warrant some special service to the medical campus.

Miller Hill Mall Area

The Miller Hill Mall is the region’s major retail center. Over 51 percent of on-board survey respondents listed the mall as the area they normally shop (see Table 7c). Downtown, in comparison, only had 24 percent of survey respondents reporting it as the area they shopped. The mall area was reported as one of the most frequent destinations by survey respondents (26 percent), second only to the Downtown Duluth area (35 percent). West Duluth was third in reported destination (seven percent).



DTA Serving Customers at the Miller Hill Mall

It is important to note that the on-board survey did not ask what mode of transportation was used to get to these destinations. Therefore a survey respondent who listed downtown as a normal destination and the Miller Hill Mall as the area they shop could be using transit for their downtown

commuter trips during the week and using a car to get to the mall on the weekends. It is noteworthy to mention that of those surveyed, 50 percent listed work trip as their transit purpose and 43 percent listed shopping as their trip purpose; representing the two highest purposes reported. These figures suggest that a large percentage of transit riders are using transit for shopping and therefore the Miller Hill Mall may provide an area for

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increased service and marketing activity.

Table 7c: Top Three Reported Transit Destinations

Destination	Overall Destination ¹		Shopping Area ²	
	Number	Percent	Number	Percent
Downtown	1,957	35%	589	24%
Miller Hill Mall	1,443	26%	1,277	51%
West Duluth	499	9%	182	7%

Source: 1995 On-board survey results

¹ Question = What areas of the Twin Ports do you normally travel to?

² Question = What areas of the Twin Ports do you shop at?

While the Mall area is a popular shopping destination, the area's design and facilities are not very transit friendly.

Transit service to the Mall is fairly good. There are two direct routes connecting the mall to residential areas, originating Downtown, and Route 20 which connects the Lakeside neighborhood and UMD area directly to the mall without going through downtown.

While the Mall area is a popular shopping destination, the area's design and facilities are not very transit friendly. First, the mall and "big box" retail (i.e., large discount stores) developments were designed to provide

easy access to the automobile driving public and not to pedestrian and transit users. Stores are dispersed among large parking lots with few, if any, pedestrian linkages between them, making transit use an unattractive option compared to driving. In addition, buses have to maneuver through busy parking lots or drop off passengers on less than pedestrian-friendly roadways. In an attempt to address the difficulties associated with getting shoppers to surrounding retail establishments, the DTA developed the Mall Area Circulator (MAC). The MAC has not been as successful as the DTA had hoped. Because it has to navigate through sometimes congested parking lots, the MAC has difficulty maintaining a set schedule. There also appears to be some confusion regarding who the MAC serves.

The following provides a summary of market advantages and disadvantage of increasing marketing resources for the Miller Hill Mall market.

Market Advantages:

- Large trip attracting retail center.
- Significant number of employees.

Market Disadvantages:

- Auto-oriented development which is both difficult for transit to service, and not pedestrian-friendly making access to nearby stores difficult.
- An overabundance of free parking.
- Limited number of direct routes from neighborhoods making transfers necessary.

Market Assessment: Given the Miller Hill Mall's trip attraction, there appears to be increased rider potential for either more direct route service or other service enhancements. One possible direct route could connect West Duluth to the mall. This route would benefit from a time transfer with other west side routes at a central location (i.e. hub). However, given the lack of pedestrian facilities, the dispersed auto-oriented design of stores, and the small employment population (compared with the CBD) which do not follow traditional work shifts, transit will have significant difficulty competing with the automobile in this market. Therefore, any ridership potential will most likely come from the transit dependent population. If increased mall transit service is determined to be feasible, marketing resources should, of course, be utilized to properly promote the changes. However, given the markets limited potential for non-transit dependent riders, great increases in marketing dollars targeted toward mall shoppers and/or employees does not appear to be warranted at this time.

Given the mall's trip attraction, there appears to be increased rider potential with either more direct route service or other service enhancements.

While summer has traditionally drawn more tourists, winter provides its own tourism attractions.

Communication Objectives:

1. Transit is for you.
 - Safe; personal security.
 - Easy to use.
 - Reliable (Arrivals/departures are on-time, “cold & snow, we still go”) (guaranteed-ride-home).
 - Convenient; clock face schedules; Mall area has greater service; MAC connects you within area.
 - Inexpensive (business will pay for your ride with purchase)
 - No reason to be apprehensive and the DTA is willing to help you get on the bus.

Special Markets

Special Markets are groups or situations which offer unique marketing opportunities different from the markets already discussed. Included among these markets are tourists, special events, winter driving conditions and revenue generating options.

Tourist Market Profile

Several seasonal market opportunities were identified from the focus groups, the driver surveys, and the marketing subcommittee. Duluth’s growing tourism industry is a special market that may warrant exploring. From the tourists survey, it was found that half of the respondents were not even aware that Duluth had a transit system and almost all of them had no knowledge of the Port Town Trolley. The respondents did identify several locations to which they would be willing to ride the bus; these locations included Canal Park, the Lake Superior Zoo, Park Point, and the Miller Hill Mall. They also said they would have used the Port Town Trolley had they known about it. However, any conclusions drawn from the tourist survey are suspect given the low response rate.



In the Summer Months, The Port Town Trolley Generally Serves Tourists.

While summer has traditionally drawn more tourists, winter provides its own tourism attractions. Winter activities such as downhill skiing, cross-country skiing, snowmobile riding, and other

winter activities have increased in popularity among tourists. As noted above, the lack of knowledge of the transit system by tourists may be an issue. Other difficulties may exist for winter tourists as well. First, destinations are different than summer destinations and not served as well by transit. In addition, skiers using transit have to deal with the problem of transporting cumbersome equipment on a bus.

The following list offers market advantages and disadvantages of pursuing the tourist market with additional marketing resources.

Market Advantages:

- Ability to pay.
- May be uncomfortable driving in unfamiliar area.
- Provides recreation alternatives for family members wanting to go their own way (i.e., teens).
- Parking is more of a problem during peak tourism times.

Market Disadvantages:

- Tourists usually arrive by automobile making it readily available to use to get to tourist attractions.
- Can set own schedule using car.
- Relatively plentiful and inexpensive parking.
- Duluth area is easy to get around with personal vehicle.
- Unsure of population size and their willingness to use transit.

Market Assessment: The tourist market may warrant more effort in getting transit information to tourists, particularly Port Town Trolley information. However, it is believed that this market would not warrant significant increases in marketing resources at this time given the uncertainty of the size of the tourist market, and the little incentive tourists have to switch to transit.

The following communication objectives were identified for any additional marketing literature targeted toward the tourism market.

Communication Objectives:

1. Port Town Trolley (“DTA can show you Duluth”)
2. Transit service is available to you.
3. Easy to use
4. Convenient: Tourist destinations are served well (“leave your car at the hotel and let us take care of the driving”).

The following strategies could be implemented without devoting a large proportion of the marketing budget toward the tourist market.

Large events, such as the Blues Festival and Grandma's Marathon, often cause increased traffic congestion and demand for parking.

Strategy Options:

1. Greater dissemination of the Port Town Trolley and Regular Route schedule information. Adding DTA/Trolley information to Duluth tourism publications in hotel/motel rooms and other tourist information sites.
2. Highlight tours attractions and likely destinations on route maps and trolley maps. (e.g., Lake Superior Zoo, Park Point, Canal Park, Miller Hill Mall, Fitzgeralds complex, and Historic sites).
3. Possibly expand Port Town Trolley hours; particularly in the evening.

Special Events

Large events, such as the Blues Festival and Grandma's Marathon, often cause increased traffic congestion and demand for parking. Working with event organizers, the DTA could help address these automobile related problems while at the same time encouraging first time users and increasing DTA visibility. These events could be targeted to the general population or to specific markets such as seniors or the disabled.

Events to pursue:

- Blues festival (existing program in place)
- Grandma's Marathon
- Fourth of July fireworks display
- Duluth Dukes baseball Games
- Beargrease sled dog race (existing program in place)
- UMD hockey games
- Winter holiday light tours (existing program in place)

Winter driving conditions

Winter conditions may provide an opportunity for the DTA to increase ridership. Automobile use in winter weather provides unique challenges in Duluth's severe cold and snow. The extreme cold makes starting cars difficult and snow forces drivers to spend time clearing cars and driveways; whereas, the DTA is seldom shut down because of weather and provides a warm vehicle free of the driving stress associated with driving in winter conditions. However, bus riders may have to walk further in winter conditions than auto drivers and must wait for buses which may be behind schedule as a result of poor weather conditions. As a result, there is a tradeoff for potential customers between winter weather driving and riding transit.

Revenue Generating Options

Given the economic challenges facing transit system, many are searching for additional sources of revenues to support services, and the DTA is no exception. Selling advertising space inside and outside of buses has long been a means of generating revenue. The DTA has also exchanged advertising with other companies such as radio stations and newspapers. Traditionally, the space available for advertising space was limited to

placards on the sides of the bus. However, new technologies have expanded the coverage area to include almost the entire bus. This new advertising can be done by painting the bus, including over windows, or applying a more inexpensive “wrap” that provides the illusion that the bus is painted. The DTA currently has one painted bus, “the Subway bus”, which depicts an enormous submarine

sandwich. While painting or wrapping a bus is relatively expensive, the potential for generating revenues is significant. Furthermore, as the technology improves, the production price should decline, making this form of advertising much more attractive to advertisers.

There are several advantages and disadvantages to this practice that should be considered if the program is continued or expanded.

Advantages:

- Potential to generate greater advertising revenues.
- May attract greater attention to the DTA

Disadvantages:

- May negatively impact the professional image of the DTA .
- May create confusion for passengers (some focus group participants thought that the Subway bus was not a regular route bus).
- May not be enough demand for painted buses in the Duluth market.

It was noted by DTA staff that the current contractor in charge of selling painted bus advertising has not had much success in attracting advertisers. More aggressive selling of this space may be necessary. It may also be beneficial to promote painted buses with special events or promotions involving increased DTA service (e.g., Blues Festival, Dukes games, UMD Hockey). To maintain the integrity and professional image of the



Selling Painted-Bus Advertising Like The “Subway Bus” Provides An Additional Revenue Source.

Several common themes came out of the focus groups that are of concern to the general population.

system, the DTA should consider limiting painted buses to five or ten percent of the fleet.

General Population

The discussion so far has focused on unique market segments. However, this process has identified many issues and needs that are shared throughout a general market. Several common themes came out of the focus groups that are of concern to the general population. The following provides a summary of those issues that may be affecting the general population's transportation decision-making choice.

- Perception/image of the bus being only for school kids and/or low income persons who can not afford a personal vehicle. Transit is seen as the transportation alternative of last resort.
- Perception/image that personal security is at risk when riding the bus and/or waiting at bus stops (particularly at Transit Centers).
- Image of buses as noisy, dirty, and foul-smelling.
- Transit is an inconvenient alternative for customer travel needs (e.g., trip-chaining) because of incompatible time schedules and inadequate service.
- Difficult to understand information on time and route schedules, how to ride, and fares, producing a system that is not "user-friendly" enough.

As stated before, the focus groups targeted persons who were not current DTA customers. Therefore, much of the information derived from these groups were based on past experience, second-hand knowledge, or personal perception. The messages mentioned below only reflect the negative comments from the focus groups. Not all focus groups responses were negative; to the contrary, a large number of the responses were positive. However, the purpose here is to address those negative issues which the DTA may be able correct with the ultimate goal of converting current nonriders into riders and providing a better product to their customers.

There are two messages that need to be expressed to the general public; one focuses on getting the public to consider the bus as an attractive transportation alternative, the second focuses on increasing the public's understanding of the important role transit plays in making the Twin Ports area a more livable community.

The following is a list of advantages and disadvantages of general public marketing.

Market Advantages:

- All markets can be reached with a single message and medium.
- Can impact public attitudes toward DTA.
- Taxpayer support is crucial to transit system viability.

Market Disadvantages:

- More expensive to reach (media costs).
- Uncertainty of a beneficial outcome. Could be utilizing marketing resources better by focusing on likely transit riding markets.

Market Assessment: Two key issues affect general population ridership; first is the negative image of transit, the second is transit's ability to provide services which can realistically compete with the automobile. The image problem facing the DTA most likely hinders some potential customers from riding transit. Furthermore, given the need for public funding, the image of transit may impact the community's willingness to support continued transit investment. As a result, the transit image issue pertains to both potential customers and taxpayers.

For some people, transit will never be an attractive alternative to driving. Given current travel patterns, in order to make transit attractive for most, the DTA would have to increase services to a point that would not be cost-effective. Therefore, the DTA needs to focus on attracting those customers that have trip patterns where transit service can compete with the automobile. The key is to attract borderline transit customers to existing or new cost-effective services.

Another problem affecting the DTA is the negative perception regarding personal security when using DTA facilities. The fear of becoming a crime victim is not unique to Duluth. Throughout the United States, crime is a major concern. However, the perception of crime in the United States is often much different than the reality. Still, it is the perception which is affecting behavior. Further more, this issue goes beyond just the fear of crime; it encompasses a more general concern for peoples "comfort level." Unfortunately, the DTA facilities, and the transit centers in particular, are perceived as being unsafe and/or uninviting spaces due to a significant number of discourteous young people, and other unacceptable activity.

The DTA has worked to correct this problem by helping get a police substation put near the Holiday Transit Center downtown. However, this alone may not be enough to alter the unsafe perception. One strategy that came out of the focus groups were to use video cameras to increase the perception of security. Some camera's have been installed inside the transit centers and in some buses.

Two key issues affect general population ridership; first is the negative image of transit, the second is transit's ability to provide services which can realistically compete with the automobile.

The transit centers in particular are perceived as being unsafe and/or uninviting spaces due to a significant number of discourteous young people, and other unacceptable activity.

Insufficient customer information (in both quantity and quality) was also a common critique among focus group participants. As a result, changes in the dissemination of transit information should be a priority.

The messages communicated to the general public need to address both image issues and service issues. The following list identifies some those messages.

Increase Ridership Communication Objectives:

- You can benefit from using the transit system. Transit is not just for the poor, the disadvantaged, or school kids. The DTA is for everyone.
- DTA's operations and facilities provide safety and personal security.
- Transit is affordable compared with owning and operating a second car; monthly passes may be funded in part by your employer.
- Using the DTA is easy and convenient.
- Transit provides a means of avoiding parking hassles.

Public Support Communication Objectives:

- The transit is a community resource.
 - Less congestion
 - More parking availability
 - Less automobile generated pollution
 - Transit helps disadvantaged persons

Strategy Options:

1. If current nonusers are going to give up their cars and take transit, it will be necessary to provide a pleasant experience during waiting periods as well as during trips. Therefore, the DTA will need to increase the perception of security, and enhance facility aesthetics, particularly at the transit hubs. The following are some ideas that may warrant considerations
 - Maintain or increase a “community policing” strategy which provides a “friendly”, interactive law enforcement presence.
 - Promote the Safe Haven Program which promotes buses as “safe zones” in which a person in distress can board a vehicle and the bus driver can phone for appropriate assistance.
 - Instruct transit center employees to monitor situation and contact authorities if situations warrant. Transit Center employees should be able to accept and respond to complaints and should provide customer satisfaction.

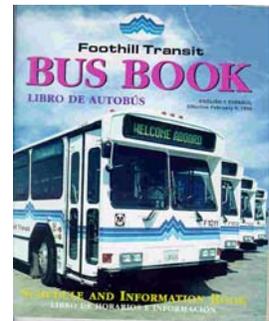
The downtown wait should be as pleasant an experience as possible.

- Increase video cameras on buses and around transit centers. Customers should be aware of video cameras to enhance sense of security and serve as a deterrent.
 - Transit centers and bus shelter should be inviting attractive spaces.
 - Areas in and around transit center and bus shelters should be well lit open spaces.
2. Develop a *Rider's Guide to Accessible Transit*; the guide should:
- include “user friendly” schedule information and maps for all routes;
 - include schedules of weekday, evening and weekend service;
 - contain a “how to ride” guide with graphic information geared toward the first-time rider that provides step-by-step instructions for using the bus, including how to pay, how to stop the bus, tips on riding, bus rules, code of conduct, how to use lift-equipped buses, how to use bike racks; information on specialized transit customer needs;
 - Encourage people to use the 722-SAVE number and to give input on service;
 - include phone numbers, hours of operation, and fares;
 - explain differences between express and regular routes;
 - describe how to transfer;
 - and be easy to use and carry.
- Do NOT include or de-emphasize “schedule times subject to change without notice”; this statement does not encourage confidence in reliability;

A publication such as this could be costly to produce. A couple of options to offset this expense would be to:

- Impose a minimal charge. Included in the booklet could be complimentary free passes / monthly pass discount coupon which would encourage initial purchase.
- Could generate sponsors by advertising within booklet. Coupons throughout could also encourage use.
- A combination of both advertising sponsors and a small charge.
- The guide could be distributed to employers and universities. Furthermore, the guide could be included on all buses (like phone books at phone booths).

3. Improve route and system maps. Maps should:
- include more cross and side streets, notable landmarks, north arrow and always have north at the top of the map;



Rider-Guides Provide Customers With All the Information Needed to Use Transit.

- include enhanced graphic with more background network and be properly oriented;
- use consistent symbols (e.g., wheelchair);
- better utilize color coding (why are different colors given to sections of town?)

Creating effective maps is not an easy task and may require additional resources. The task of creating effective maps is complicated by the complexity of some of the routing (e.g., special runs, different evening routes, combining several routes that is identified as a single route).

4. Improve time schedules eliminating confusing or out of order time points and increasing the number of time points. This will provide customers with a sense of confidence in the schedules by providing drivers, as well as customers, a benchmark from which to judge on-time reliability.
5. Allow customers to buy passes through the mail and/or by credit card over the phone and the internet web-page.
6. Other information dissemination improvements.
 - Place DTA map in the phone book with 722-SAVE highlighted. (transit map currently published in US West Direct phone book is incorrect and not detailed enough to be of use to potential riders).
 - Make route name on bus more visible.
 - Attach route information and time schedules to all or selected bus stop signs. This provides instant service information to users, increases confidence in service reliability, and advertises the services available to neighborhood residents.

These recommendations should focus on increasing “customer-oriented”, “user-friendly” transit information and should be tested on a focus group.

7. Post new bus stop signs. Bus stop signs serve several purposes. First is to inform passengers where they can be picked up by the bus. Second, they communicate that transit service exists in the area. Finally, the bus stops send a message about the quality of the system. The DTA currently has approximately 1,300 bus stops. Several comments have been made regarding the condition of current signs; many are faded, bent, vandalized and are in somewhat poor condition. Others commented that the signs are not “eye catching”. The current sign color scheme does not draw attention to the signs, particularly as they age and fade from the sun.

- We recommend that new signs be considered which would stand out (discernible color design and shape with reflective surface) while also providing critical information to the public (utilizing back of sign as well).
8. The condition of bus shelters serve a similar function in delivering a message about the DTA. Bus shelters must appear to the general public as clean, attractive and secure places. A couple of strategies may be considered to make shelters more aesthetically pleasing.
- Promote the existing “Adopt-a-shelter” program. The program currently only has a couple of participants. There may be an opportunity to encourage neighborhood groups, local churches, or schools to assist in the maintenance, care, and supervision of bus shelters.
 - Ensure that shelters have trash containers to discourage littering.
 - Another, and perhaps, more cost-effective strategy may be to turn over maintenance of shelters to a contractor who would lease out advertising space on or in shelters; similar to what is done with some of the benches at transit stops. However, such a system that sells advertising space may actually detract from attractiveness of the shelters and affect neighborhood aesthetics
 - Design new shelters which fit with neighborhood characteristics and design. One possibility would be to solicit local artists to submit bus shelter designs.
9. Other General public marketing strategies should focus on encouraging first time riders and improving the community’s image of the DTA. The following list of strategies are a sampling of possible ways of encouraging first-time riders to use transit and to improve the awareness of the DTA and its services.

Other General Public Strategy Options:

- Event sponsoring.
- Park/ride to special events (e.g., Duke’s games, hockey games, blues festival).
- Advertise bike racks.
- “Product samples” free ride coupons.
- Put schedules in newspaper once or twice a year.
- “Free ride day”.

To insure that new customers trying transit service for the first time are satisfied customers, all adopted recommendation changes should be implemented prior to inviting new riders to try DTA’s services.

The evaluation and control of marketing and promotional programs need to be a standard practice.

EVALUATION AND CONTROLS

Businesses cannot simply design and implement marketing and promotional programs and then forget about them. The evaluation and control of these programs is important if their potential shortcomings are to be addressed and corrected. Thus, the evaluation and control of marketing and promotional programs need to be a standard practice. There are many ways in which an organization can evaluate and control its marketing functions. Listed below are several methods the DTA could integrate into their current marketing activities.

Control: Keeping on track to achieving to a goal typically takes place while activities are in progress.

1. Budgets: Setting an initial marketing budget, and as events are completed and paid for, their actual cost is compared to the forecasted cost.
2. Comparison with industry standards: Compare an aspect of the company to industry standards. Tells user if what they are experiencing is commonplace in the rest of the industry.

Evaluation: More diagnostic in nature and is concerned with the reviewing the results to determine how well or poorly objectives are being achieved.

1. Periodic marketing audits: Systematic, critical, and unbiased review and appraisal of the basic objectives and policies of the marketing function and of the organization, methods, and procedures employed to implement the policies.
2. Follow up surveys: Administer surveys with the same questions as the first surveys. Everything else being equal, it can be assumed that any changes in the results can be attributed to the marketing programs that were implemented during that time frame.
3. Ridership numbers: A total ridership count should be determined before and after the implementation of marketing programs. Everything else being equal, it can be assumed that any changes in the results can be attributed to the marketing programs that were implemented during that time frame.
4. Code coupons: Every coupon or free ride voucher that is produced, should have a reference number that is unique to the media that coupon or voucher was administered through. For example, all coupons administered through the Duluth-News Tribune will have the number 123 in the lower right corner. This number would be unique to all ads run in the DNT.

Thus, any coupon returned to the DTA with the number 123 on it, is from the DNT. Records should then be kept containing the quantity of coupons returned, then an evaluation of the effectiveness of the advertising could be determined.

CONCLUSION

This plan attempts to analyze the DTA's marketing situation, provide guidance for maximizing marketing resources, and suggest marketing strategies to accomplish marketing goals. Marketing is much more than promotions and advertising; it is a total package of strategies which respond to the needs of current and potential customers focused on producing satisfied customers. It was not the purpose of this plan to dictate to the DTA specific promotion or strategies. Instead, our goal was to offer general guidance for developing marketing policies which will help focus the DTA's marketing efforts.



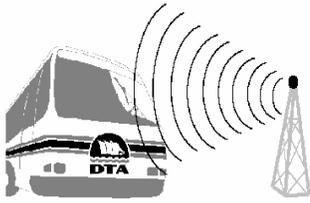
Customers boarding DTA bus near Spirit Valley Shopping Center

MIC staff identified the following issues as the key marketing priorities for the Duluth Transit Authority. Specific Marketing Recommendations are listed in the Recommendations Section.

1. Maintain current customer base by increasing the "user-friendliness" of transit and promoting a "customer-oriented" service.
2. Improve the overall image of the DTA and riding transit.
3. Target the CBD commuter market for increased ridership.

Marketing is much more than promotions and advertising; it is a total package of strategies which respond to the needs of current and potential customers focused on producing satisfied customers.

INTELLIGENT TRANSPORTATION SYSTEMS (ITS) AND PUBLIC TRANSIT



The term Intelligent Transportation Systems (ITS) refers to a wide range of transportation related technologies. ITS applies state-of-the-art and emerging technologies to provide more efficient and effective solutions to transportation problems. While ITS technologies alone cannot solve all transportation problems, these technologies can aid in the development of innovative and cost effective solutions. When effectively integrated and deployed, ITS technologies offer many benefits, including more efficient use of our transportation infrastructure and energy resources, and significantly improve safety, productivity, accessibility, and mobility.

ITS technology is already being used by some in the transit industry. Many more transit systems have ITS implementation plans in place. As the benefits of ITS are recognized among transit agencies, the use of ITS will increase. Below is a brief summary of the types of ITS systems currently on the market and some examples of the benefits they provide.

ADVANCED PUBLIC TRANSPORTATION SYSTEMS (APTS)

APTS applies state-of-the-art and emerging technologies to provide more efficient and effective solutions to current transit problems. To help resolve these problems, the Federal Transit Administration (FTA) established the APTS Program as part of the United States Department of Transportation's (USDOT) ITS initiative. APTS focuses on developing innovative transit solutions to increase schedule adherence, operational efficiency, and quality of service; to reduce travel times and operating, training, and maintenance costs; and to improve driver and passenger safety. As reliability and ease of use increases, transit will become a more attractive transportation option. APTS is broadly categorized into three different groups: Transit Management Systems, Electronic Fare Payment Systems, and Traveler Information Systems.

TRANSIT MANAGEMENT SYSTEMS

Transit Management Systems focus on improving transit operations, schedule adherence, and safety by deploying Automated Vehicle Location (AVL) systems, Automated Passenger Counters (APC), Transit Operations Software, Geographical Information Systems (GIS), and Traffic Signal Control Systems.

As the benefits of ITS are recognized among transit agencies, the use of ITS will increase.

Automated Vehicle Location (AVL) Systems

AVL systems are computer-based vehicle tracking systems that use electronic tags and a Global Positioning System (GPS), Sign Post and Odometer, Dead-Reckoning, or a combination of systems to monitor vehicle locations in real-time. Vehicle location is determined by the AVL system and transmitted at regular intervals to the transit dispatch center. AVL systems minimize voice transmissions by providing data messages regarding vehicle status, operating conditions, and location. During standard route operations, information is transmitted via a data channel. When a driver requests to speak or a dispatcher initiates a voice transmission, the radio is switched to a voice channel.

Due to the large amount of data transmissions, AVL systems have created additional communication requirements. Currently, transit authorities mainly use conventional land mobile communication services; however, these services alone can not meet the additional requirements. Innovative strategies, such as trunked radio, FM transmission overlays, low earth orbit satellite services, and cellular phones, have been used to overcome the communication shortfalls. These strategies reduce the strain on the communication system and use the limited electromagnetic spectrum in a more efficient manner.

In the United States, AVL systems are being used extensively by transit authorities. Currently, there are at least 58 AVL systems in operation, under installation, or planned. Over the last four years, AVL system usage has increased by more than 200 percent and many more AVL systems are being planned.

The benefits of AVL systems are numerous. When AVL systems are integrated with CAD (computer-aided-design) software, dispatchers can take corrective action to service deviations and pinpoint vehicle location during emergencies. Furthermore, AVL systems can provide real-time data to traveler information systems. When AVL systems are integrated with traffic signal control systems, the real-time vehicle location information provides input to Traffic Signal Preemption Control devices that determine whether the transit vehicle is given priority at the signalized intersection. Drivers and passengers also benefit from increased security provided by the AVL systems silent alarm feature.

Automated Passenger Counter (APC)

The APC electronically collects passenger boarding and departure data by time and location. The data is used in planning, operating, and scheduling activities and serves as input to traveler information systems. Most data is collected off-line, but if necessary, data can be collected in real-time.

In the United States, AVL systems are being used extensively by transit authorities. Currently, there are at least 58 AVL systems in operation, under installation, or planned.

Currently, some APC systems are in operation and many more are planned. To take maximum advantage of APC, some transit authorities are bundling older, stand-alone APC with their new AVL systems. Compared with manual counters, APC provides much more comprehensive data at a lower cost.

Transit Operations Software

Until recently, transit operations software use was usually limited to "run-cutting" for fixed-route operations. Today, transit operations software, combined with the appropriate hardware, allows a smaller number of operator interfaces to be combined, thus, making the operator's job easier to perform and increasing operational efficiency. When linked with AVL systems, transit operations software can provide real-time dispatching, faster responses to service disruptions, and coordination between transit service, such as a fixed-route bus and a paratransit vehicle. Furthermore, transit operations software helps transit authorities meet ADA requirements.

In paratransit operations, transit operations software is especially useful in scheduling and dispatching. Transit authorities can dispatch vehicles much more quickly and dynamically reschedule and reroute vehicles based on schedule changes such as cancellations. Several transit authorities are currently using transit operations software to improve operations.

Geographic Information Systems (GIS)

GIS uses electronic maps and relational databases to visualize and analyze relationships between non-related data. Usually, the only common feature is location. In transit, GIS is used to display and analyze bus routes, facilities, shelters, emergency call locations, trip planning route choices, on-time performance data, and origin and destination of ridesharing and paratransit clients. Many transit authorities currently use GIS to enhance decision making and analysis capabilities. GIS provides transit authorities with access to information that allows them to better utilize resources and make more informed policy, operations, and planning decisions.

Many transit authorities currently use GIS to enhance decision making and analysis capabilities.

Traffic Signal Control Systems

Traffic Signal Control Systems allow a dispatcher or bus operator to hold a green light longer or shorten a red light at signalized intersections. This technology can help to ensure schedule adherence. Used with an AVL system, signal prioritization would allow bus operators to easily determine their schedule status and adjust accordingly to improve on-time performance. This system would also increase trip speeds and likewise lower trip times; increasing transit competitiveness with the automobile. This technology is obviously most useful for buses which operate in areas with many signalized intersections.

Traveler information systems provide travelers with real-time transit and traffic information.

TRAVELER INFORMATION SYSTEMS

Traveler information systems provide travelers with real-time transit and traffic information. When data from other ITS systems are put into traveler information systems, travelers are provided with pertinent information about the transportation system - such as when the next bus will arrive, what is the actual travel time from point A to point B, can I find a carpool to join, and how many parking spaces are left at the park and ride lot. This information is disseminated to travelers through telephones, television monitors, cable and interactive television, radio, electronic signs, kiosks, personal computers, handheld electronic device, pagers, and the Internet. With this information, travelers can make more informed transportation decisions. Traveler information systems are broadly categorized into the following groups: Pre-Trip, In-Terminal, Wayside, and In-Vehicle Information Systems.

Pre-Trip Information Systems

Pre-trip information systems provide travelers with pertinent information before they begin their trip. In general, most information consists of transit routes, schedules, fares, etc. Traditional pre-trip information systems use automated telephone tree systems or human operators to assist travelers, but some newer systems use computers, Internet, personal digital assistants, and kiosks to provide the same information in a more efficient manner.

Currently, a few pre-trip information systems are in operation to answer information inquiries. Most pre-trip information systems are of the traditional kind, but kiosks and automated telephone trees are becoming popular. Furthermore, a few transit Internet Home Pages are beginning to provide some pre-trip information. Additional transit authorities are planning to deploy pre-trip information systems.

In-Terminal and Wayside Information Systems

In-Terminal and Wayside Information Systems provide travelers with arrival and departure information, schedule updates, transfer information via electronic signs, kiosks, and television monitors. In-Terminal and Wayside Information Systems are still in their infancy because systems are expensive to deploy. A few In-Terminal and Wayside Information Systems are in operation and many more are planned .

In-Vehicle Information Systems

In-Vehicle Information Systems are similar to In-Terminal and Wayside Information Systems except information is provided inside transit vehicles via small electronic displays and enunciators. On rail vehicles, electronic enunciators are frequently used to announce the next stop. On the other

hand, very few systems have been deployed on buses. A few In-Vehicle Information Systems are in operation and a few more are being planned.

ELECTRONIC FARE PAYMENT (EFP) SYSTEMS

EFP systems use electronic communication, data processing, and data storage techniques to automate manual fare collection processes.

Electronic fare media are capable of storing information in read/write format. Some examples are magnetic storage cards, radio-frequency proximity cards, and smart cards imbedded with microchips. Currently, several larger transit authorities have implemented EFP systems to allow customers to use a single fare card to pay for transit and/or parking. Many other transit authorities are planning to deploy EFP systems.

EFP systems benefit both transit authorities and customers. For transit authorities, EFP systems reduce labor-intensive cash handling costs and risk of theft, improve reliability and maintainability of fare boxes, and permit sophisticated fare pricing, based on distance traveled and time of day. In addition, EFP systems permit the automation of accounting and financial settlement processes and create multimodal and multiprovider transportation networks that are seamless to the rider, but operationally and organizationally sound for the multiple providers. From the customers perspective, transit is easier to use because exact change is not necessary and only a single fare card is needed to use the system.

With Electronic Fare Payment Systems, transit becomes easier to use because exact change is not necessary and only a single fare card is needed to use the system.

BENEFITS OF ITS

Advocates promise numerous benefits to transit systems from the use of ITS. The following list provides examples of the types of benefits seen from various transit systems that have utilized ITS technologies.

Customer Convenience

- San Diego County's interactive voice response system has allowed information agents to increase their productivity in handling calls by over 21%.
- Over 85% of Smart Traveler kiosk users in Los Angeles indicated that they would continue to use the kiosks to obtain travel information.
- Rochester-Genesee Regional Transportation Authority in New York has implemented an automated transit information system which answers 70% of information calls. Information calls have increased by 80%.
- New Jersey Transit's automated voice response telephone information system has reduced caller's waiting time from 85 seconds to 27 seconds and has reduced the caller hang-up rate from 10% to 3%. Monthly calls have increased by 40,000 over the prior year.
- Winston-Salem Transit Authority reports that their AVL CAD system

CUSTOMER CONVENIENCE:
...automated transit information system ..answers 70% of information calls. Information calls have increased by 80%.

has decreased paratransit passenger

waiting time by 50%.

SAFETY:

The AVL system's communication and location capability has allowed the emergency personnel to be quickly notified and directed to the exact location of the trouble.

OPERATIONAL IMPROVEMENTS:
KCATA's on-time performance improved from 80% to 90% after AVL installation.

Safety

- In Denver, a man who had just robbed a convenience store was observed to have boarded an RTD bus. The police informed the dispatcher, who used the CAD AVL system to identify which bus the suspect would likely have boarded. The transit control head's message capability was used to confirm the suspect's presence on the bus. The police were then directed to a point where the bus could be intercepted. The suspect was apprehended.
- Also in Denver, a bus passenger had a seizure. RTD was able to notify emergency response personnel of the incident and its location and an ambulance was at the scene within eight minutes.
- There have been several instances in cities with AVL equipped buses where bus operators have observed accidents, crimes, or other situations which warrant quick response by emergency personnel.

The AVL system's communication and location capability has allowed the emergency personnel to be quickly notified and directed to the exact location of the trouble.

- Kansas City Area Transit Authority (KCATA) dispatchers estimate that response times to bus operator calls for assistance have been reduced to three to four minutes with the AVL system from seven to 15 minutes previously.
- Bus operators in transit systems with AVL report a greatly increased feeling of security with the silent alarm, listen-in feature, and rapid response capability that the system provides.

Operational Improvements

- Milwaukee County Transit System claims that on-time performance has improved from 90% to 94% after implementing their AVL system, even though the system is not fully operational.
- The Mass Transit Administration of Maryland reported a 23% increase in on-time performance of buses in Baltimore in their test of AVL equipped buses on a few routes. AVL will soon be system wide.
- KCATA's on-time performance (from one minute early to three minutes late) improved from 80% to 90% after AVL installation.

- The Hamilton (Ontario) Street Railway Company's schedule adherence improved from 82% to 89% after AVL installation.
- Other transit operators claiming improved schedule adherence after AVL implementation include: County of Lackawanna Transit System (Scranton, PA), Broward County (FL) Division of Mass Transit, and Beaver County (Rochester, PA) Transit Authority.
- Transit operators reporting improved scheduling include Mass Transit Administration (Baltimore), Dallas Area Rapid Transit, Tidewater Transportation District

Commission (Norfolk, VA), and KCATA.

- Since the implementation of an AVL CAD system, the Winston-

Salem Transit Authority reports that paratransit ridership has risen by 17.5% and their client base has increased by 100%.

Cost Savings

- The Winston-Salem Transit Authority reports that the CAD AVL paratransit system has decreased operating expense by 8.5% per vehicle mile and by 2.4% per passenger trip.
- London Ontario’s AVL system will provide schedule adherence on a continuing basis, thus saving the \$40,000 to \$50,000 previously spent on each schedule adherence survey.
- A large transit authority has estimated that AVL generated data would allow them to eliminate 30 schedule adherence checkers and would save approximately \$1.5 million per year.
- Rochester-Genesee Regional Transportation Authority’s automated transit information system allow the elimination of four part-time information agents.
- KCATA used AVL generated data to reduce scheduled running times in conjunction with a system-wide service reduction. It was estimated that the maintenance and operator cost savings from the schedule re-timing would be about \$400,000 annually. Theoretically, this would result in a fleet reduction of seven buses with an attendant elimination of bus replacement costs of about \$225,000 per bus.
- Although KCATA did not eliminate street supervisory personnel, they did achieve savings in supervisor labor costs because AVL made it acceptable to allow short-term reductions in the field supervision force resulting from absences or temporary reassignment of supervisors.
- Milwaukee County Transit System plans to reduce the number of street supervisors when the CAD AVL system is fully operational.
- FARETRANS (Ventura County, CA) estimates that their smart card system will save: \$9.5 million per year in reduced fare evasion; \$5 million in reduced data collection costs; and \$990,000 by eliminating transfer slips.
- New York MTA estimates that their Metro Card system will save \$70 million per year in fare evasion.
- The Visa stored value Smart Card that will be implemented in Atlanta will reduce MARTA’s cash handling costs (\$3 million annual budget) significantly.
- New Jersey Transit estimates savings of \$2.7 million in reduced handling costs of fare media.

COST SAVINGS:
London Ontario’s AVL system will provide schedule adherence on a continuing basis, thus saving the \$40,000 to \$50,000 previously spent on each schedule adherence survey.

REVENUE INCREASES:
New Jersey Transit reports increased revenues of 12% after automated fare collection implementation.

Revenue Increases

- New York MTA estimates that their Metro Card system will result in increased revenues of \$34 million from merchant fees and revenue float, \$140 million from unused value on the cards, and \$49 million from increased ridership.



COMPLAINT RESOLUTION: In Milwaukee, a passenger complained that a bus had left a stop too early, a fact that the bus operator disputed. The playback capability of the CAD AVL system corroborated the operator's claim.

- New Jersey Transit reports increased revenues of 12% after automated fare collection implementation.
- MARTA will receive interest on money spent on any smart card they sell until its value is spent.

Complaint Resolution

- In Denver, a bus operator was not initially paid for a day that she worked. The CAD AVL log-in requirement proved that she did work on that day.
 - In Milwaukee, a passenger complained that a bus had left a stop too early, a fact that the bus operator disputed. The playback capability of the CAD AVL system corroborated the operator's claim.
 - Other transit authorities reporting easier resolution of customer complaints or a reduction in complaints include: Beaver County Transit Authority, Tidewater Transportation District, and King County (Seattle) Metro.
-

ITS AND THE DTA

The DTA is currently exploring a project that would entail “recycling” ITS hardware utilized in an operational test of an Advanced Traveler Information System (ATIS) in the Minneapolis metropolitan area. The test involved a Computer Assisted Dispatch System and Automated Vehicle Location (AVL) devices. While the Metropolitan Council Transit Operations (MCTO) was pleased with the outcome, it chose to continue its deployment of this type of technology with another vender. As a result, the equipment is available for use elsewhere.

The proposal being considered by the DTA would consist of a partnership between the Minnesota Department of Transportation (MN/DOT) Office of Transit, the Mn/DOT Office of Advanced Transportation Systems (OATS), and the DTA. The City of Duluth has also expressed interest in becoming a partner. There may be an opportunity to develop further partnerships with other entities as well. The three phases of the project proposal (feasibility study to final deployment) is estimated to cost approximately \$900,000 over a three year period. The DTA would cover 41 percent of this cost (\$370,000) with the OATS covering the remaining cost.



CONCLUSION

There is little doubt that ITS technologies can help to improve the efficiency, planning, and services of the transit authority. However, the question is on whether the benefits of these technologies are worth the cost required for implementing and maintaining ITS. One noteworthy concern when considering any type of ITS component is whether that system will provide the flexibility and adaptability to allow for changes and improvements so as to avoid being “locked in” to a particular technology. Determining the costs and benefits of ITS should be a serious consideration so that limited transit resources are used wisely.

One noteworthy concern when considering any type of ITS component is whether that system will provide the flexibility and adaptability to allow for changes and improvements in technology.



LAND USE AND TRANSPORTATION DEMAND MANAGEMENT

Creating transit and pedestrian-oriented communities through land use policies, while discouraging certain travel behaviors, can help communities avoid expensive transportation system expansions, decrease congestion, maintain air quality, maximize the mobility of people and goods, and create more “livable” communities. This section is intended to:

- illustrate how local governments, developers, land owners and others can create communities that are more pedestrian-oriented which can be more effectively and efficiently served by transit,
- articulate the economic and social benefits of creating “livable” community settings, and
- inform local communities of the general types and levels of transit services that are feasible in different areas of the region.

THE PROBLEM

Since the end of World War II, the popularity and use of the automobile has greatly influenced land uses. Over the last 50 years, development has been designed to serve the automobile with little, if any, consideration for pedestrians or transit. Auto-oriented development has meant sprawled, low density, separated land uses with an abundance of parking and roadways. These developments have led to a decentralization of activities that still dominate the developing landscape of most communities including the Duluth-Superior urbanized area.

Sprawled Development Patterns Lead to Greater Reliance on Automobiles

Sprawled, separated use, and auto-oriented development patterns aided by increased road construction and accommodate growth have resulted in huge increases in vehicle trips and miles traveled. These developments have also led to a much greater reliance on single-occupancy automobiles and a decline in transit use and ridesharing. Because auto-oriented land uses require freeways and major arterials as connective links, large sections of land are devoted to roadways and other auto related facilities.

As traffic congestion steadily increases and transportation improvement and maintenance costs skyrocket, transportation funds will become increasingly limited. Adding lane capacity may, in the short term, reduce congestion; however, this will merely increase levels of accessibility that encourage additional sprawl and decentralization, which will ultimately

Over the last 50 years, development has been designed to serve the automobile with little, if any, consideration for pedestrians or transit.



The parking lot dominates the Miller Hill Mall landscape

lead to further congestion. Even though the problems of urban sprawl are generally associated with large metropolitan areas like Minneapolis and St. Paul, the impact of these types of development effect less populated areas like Duluth-Superior as well.



Intersection of Highway 53 and Haines Road

The Challenge for Transit and People Who Depend on Transit

Current land use patterns have created a big challenge for transit. Spread out, single-use, disconnected development patterns are not conducive to transit use, regardless of the type of vehicle deployed or service provided. It is extremely difficult for transit to operate cost-efficiently or serve its passengers effectively in such environments. Unless communities adopt a more proactive approach to creating transit and pedestrian-oriented communities, transit will become less and less effective at meeting the travel needs of residents, and its efficiency will deteriorate. The automobile will continue

to dominate the landscape, and more and more of the region's citizens will need to own and depend on automobiles to meet their daily travel needs. As a result, access and mobility for people who are economically disadvantaged, have no car, who are older or younger, or have a disability will become more problematic.

Impacts on Community and Regional Vitality

The economic vitality and livability of many communities are being challenged by these development patterns. The cost of developing and maintaining necessary infrastructure and services to support such land use patterns is straining the public's ability to pay. Natural resources, agricultural land, and the rural characteristics of areas are being compromised. The continued spread of low density development forces a lack of investment in people, infrastructure and services in the inner parts of the urbanized area. At the community level, places are scaled for the automobile and hostile to pedestrians. Individual neighborhoods are purposefully designed to be separated but have the effect of isolation because of missing connectivity. Street level activity is sparse and vibrant community gathering places, an essential ingredient in building community identity, are absent in most areas.

Spread out, single-use, disconnected development patterns are not conducive to transit use, regardless of the type of vehicle deployed or service provided.

Access, mobility and vital community settings are critical to a healthy, thriving regional economy. The ability to access work, school, services, shopping, to move goods, or take advantage of cultural and recreational opportunities is crucial to the community. Investors have begun to acknowledge that healthy, livable places with mixed uses and varied transportation options may be better risks for investment in the next century. Furthermore, emerging real-estate trends suggest that urban properties located near good mass transit in vibrant mixed use areas will increasingly present investment opportunities.

CHANGES NEEDED

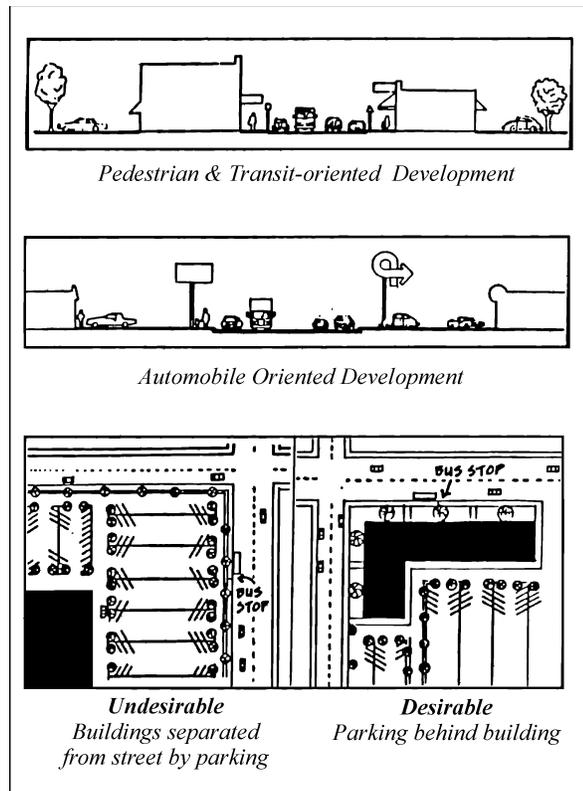
More than ever before, there is a need to make fundamental changes in the way we develop and redevelop our communities. Rather than plan transportation infrastructure to react to growth focused around the automobile, the lead needs to begin with land-use decisions. Cities should build and rebuild communities for people emphasizing the creation of transit and pedestrian-oriented environments that work toward building a sense of place. Alternative forms of transportation, including transit, walking, and bicycling, will then carry a larger share of the travel load. Figure 9a illustrates some of the differences between pedestrian or transit-oriented development and auto-oriented development. The drawing also depicts how simple design changes can make land use access convenient for pedestrians and transit users as well as for drivers.

Cities can meet the community needs of people of all ages, income and physical abilities by developing compact, more efficient growth patterns and revitalizing auto-dominated areas. Achieving the vision for such "livable community" settings can be accomplished in the following ways:

- **Incremental In-fill & Redevelopment**

Within existing city boundaries, neighborhood vitality can be improved and more compact growth patterns achieved without dramatically changing the scale and character of existing neighborhoods. Incremental in-fill development on small vacant

Figure 9a: Transit- and Pedestrian- vs. Auto-Oriented Development.



Cities can meet the community needs of people of all ages, income and physical abilities by developing compact, more efficient growth patterns and revitalizing auto-dominated areas.

parcels, allowing mixed-uses with neighborhood-scale commercial and granny flats or accessory apartments in existing residential neighborhoods, or encouraging residential in primarily commercial areas would result in a gradual intensification along the existing grid system and transit and pedestrian networks. Redeveloping and filling underutilized or vacant buildings would also contribute positively towards community vitality and a more efficient use of land, infrastructure and services.

- *Large Parcel Development*
Newly developing areas or larger parcels of vacant land can be developed in more clustered, mixed use patterns, creating places with a sense of community and making better use of local and regional infrastructure that can support alternatives to the automobile. In rural areas, mixed use cluster development would preserve agricultural and environmentally sensitive lands and rural character.
- *Retrofitting Auto-Oriented Places*
In areas that are fully developed, pedestrian, bicycle and transit infrastructure can be added to weave existing communities back together.

Four basic factors are widely regarded as being influential in the success of transit use, walking, and biking... density, mixed land use, site and community design, and parking.

BY CREATING PEDESTRIAN, BICYCLE, AND TRANSIT-FRIENDLY ENVIRONMENTS, COMMUNITIES CAN MAKE MORE “LIVABLE” COMMUNITIES

Four basic factors are widely regarded as being influential in the success of transit use, walking, and biking. These concepts are discussed below and relate to density, mixed land use, site and community design, and parking. Travel Demand Management (TDM) strategies can further enhance the desirability of transit.

Concentrated, Compact Development Patterns Increase Density

Higher densities offer three primary benefits to improved transit service. First, routes to a relatively large number of points can be offered. Second, as ridership increases, cost per rider of operating transit decreases. Third, increased densities allow transit service to be provided more frequently, which increases convenience and leads to more transit users. A number of studies have found that transit ridership increases significantly with density. One widely used study of U.S. urbanized areas reported at least seven residential dwelling units per acre are needed to generate significant transit ridership. Densities approaching 30 units per acre showed demand nearly tripling.

Housing, population and employment density levels are the most critical factors in determining the type and level of transit services that can operate most efficiently in different areas. Clusters of compact,

concentrated development need to be located within 1/4 mile walk of transit lines or stops, so transit can be provided cost-effectively. Generally, housing densities of at least seven units per acre would justify regular route transit services with 15 -30 minute all day frequencies. Generally, transit works best where these compact neighborhoods are contiguous. Where lower densities exist, dial-a-ride or express-type operation may be more appropriate (refer to Table 9a on page 9-20).

Employment densities of ten or more jobs per acre and/or concentrations of at least 3,000 jobs can also support at least a minimal level of transit service. Employment-generating uses with 50 or more employees per gross acre are needed to support a high level of transit service. One study found that at least 50 to 75 employees per acre are needed before a shift from cars to transit and walking occur. Perhaps even more important to the number of employees per acre, is the amount of total employee concentration within walking distance of transit. Dense, mixed-used, pedestrian-oriented Central Business Districts that provide a large common destination are particularly successful in attracting riders to transit. The first step for many communities is to ensure that transit-supportive densities are permitted, especially in areas within walking distance of regular route transit.

The first step for many communities, is to ensure that transit-supportive densities are permitted, especially in areas within walking distance of regular route transit.

High-density compatible housing

Residents often fiercely resent traditional forms of multifamily development, in part because of past experiences with poorly designed high-density housing. Residents may fear that new, high-density development will be out of character with the surrounding neighborhood. They may also be concerned about maintenance and spillover parking, particularly if rental units are involved. Other concerns may relate to crowded conditions and racial turnover in the neighborhood. Because of neighborhoods resistance to high-density infill, most efforts to increase densities occur on the urban fringe where transit is less effective and there are relatively low concentrations of jobs and services.

To have major impacts on mode choice, densities need to be raised in existing residential areas. To increase acceptance of infill development, communities will need to ensure that new development blends with existing neighborhood features. In addition, studies indicate that housing for families will be better accepted if it is accompanied by neighborhood amenities such as parks, or if the development is an improvement over the existing use.

To have major impacts on mode choice, densities need to be raised in existing residential areas.

Single-family neighborhoods

Approximately 50 percent of the land use in U.S. cities and towns are devoted to single-family housing and many comprehensive plans

emphasize the importance of maintaining single-family neighborhoods. As a result, high density single-family housing that can blend into lower-density single-family neighborhoods can play a key role in supporting transit while addressing housing preference. One obvious approach to increasing densities where larger tracts of vacant land exists, is to allow smaller lot sizes. A variety of design techniques such as zero lot lines and zipper lots can help smaller lots retain privacy and maximize use of space. Small lot platting, that can also be combined when needed, allow higher densities, small developers, and more flexibility and lot size variations.

Cottage housing is another housing alternative that has had market success and increases densities while maintaining a highly livable single-family atmosphere. Cottage houses are modest-sized single-family units with small, private yards clustered around a larger common open space. A number of communities have also developed a combined single-family/duplex zone category which can increase densities while maintaining a single-family appearance. Furthermore, permitting accessory units, also known as “granny-flats” or mother-in-law apartments, attached with single-family units can increase densities with minimal impact to the area.

MIXED LAND USES SUPPORT TRANSIT, WALKING, AND BICYCLING



Canal Park Drive Streetscape illustrates a Pedestrian Friendly Environment

When a variety of land uses are located near one another, transit use, walking, and bicycling become a practical means of travel. The term “mixed use development” may bring to mind the image of an apartment located above a retail business. However, mixed-use development need not be limited to a “vertical” arrangement. Mixing uses on a single site or within the same district can stimulate pedestrian activity and transit use. The following are the three basic criteria to qualify as transit-supportive mixed-use development.

1. Land uses must be compatible and should mutually support each other.
2. Varied land uses must be within convenient walking distance of each other (generally within one-quarter mile).
3. Safe, direct, convenient connections must exist between varied uses.

The key concept in mixed use development is to create communities where daily activities are integrated rather than separated. Therefore, community-wide planning rather than site-by-site planning is critical.

Mixed use development can add variety and vitality to an area. Single-purpose residential or commercial districts are often devoid of activity at certain times of the day, whereas in mixed-use areas people are present throughout the day. As a result of continuous activity, mixed-use areas present less opportunity for crime. For mixed-used development to be successful however, there must be a mutually supportive level of commercial and residential development.

The following checklist of questions is useful for identifying needs for mixed-use development.

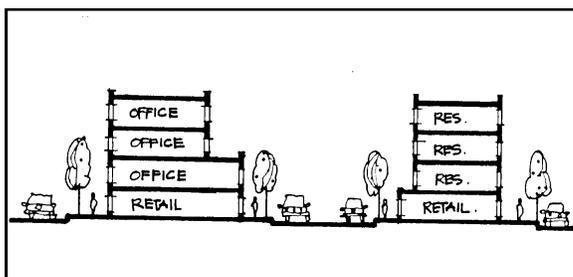
- Are the uses complementary?
- Are the uses linked by sidewalks or paved paths?
- Are they within convenient walking distance of each other?
- Are the walking routes short and direct?
- Do the buildings fit with and complement each other?
- Do the uses create activity at different times of the day?
- Is parking kept out of the pedestrian's path of travel?
- Do uses support one another economically?

Mixing land uses within walking distance of one another was standard practice when most cities and towns were first developed. Since the advent of zoning and the automobile, land uses have been separated into larger zones where separations are scaled to driving distances rather than walking distances. The reasoning for this separation was spurred by concerns about the impacts of different land uses on each other. However, new technologies and design techniques make it increasingly possible to locate different types of uses in close proximity while addressing these impacts. In addition to being within practical walking distance, there must not be barriers blocking pedestrian access between uses. For example, if commercial and residential uses are separated by a freeway or major arterial, walking between the uses will not be practical.

Mixing uses within the same building places different uses in the closest possible proximity. Walking, biking, or using public transit to reach such buildings will often be as practical or more practical than driving an automobile. Many ordinances encourage (or require) pedestrian-oriented uses on the ground floor of mixed-use buildings and allow residential,

Mixing land uses within walking distance of one another was standard practice when most cities and towns were first developed.

Figure 9b: Mixed Uses within Buildings Increase Pedestrian Access



office, or other uses on upper floors. Others may limit some or all of the street-front portion of the ground floor to commercial uses. Vertical mixing of uses as illustrated in Figure 9b seem more accepted and successful in dense commercial areas of large cities that have considerable pedestrian activity.

Many communities are beginning to designate mixed-use zones to allow a broad range of uses. These zones generally require some type of site plan or master plan review to ensure that the proposed uses are mutually supportive and that the development works together as a whole. Some communities have also used a floating zone not tied to a specific location on a map until a developer comes in with a workable proposal at a specific site. In other cases, communities have created zones in specific locations to accomplish special purposes. A number of communities have created mixed-use zones surrounding transit stations. Still, other communities have used mixed-use zones as transitional areas or to maintain uses in the area that would otherwise be pushed out, such as in Olympia, Washington, where a mixed use zone was established to preserve existing housing within walking distance of its downtown.

According to a University of Berkley study, the degree to which retail and public services are provided within or adjacent to an employment center is the primary determining factor in the transportation mode choice of suburban office workers. When commercial services, such as banks, day-care, restaurants, and dry cleaners are located near industrial and office employment centers, workers can take care of many daily errands without a car.

By prohibiting uses in the mixed-use zone that have impacts that are difficult to control or do not complement the mixed-use zone, such as auto-oriented uses, communities can ensure compatibility. In contrast, instead of specific uses or height and bulk standards, performance standards designed to mitigate the potential impacts of a project on surrounding development can encourage a greater variety of land uses.

Neighborhood Commercial

Examples of successful mixed-use developments exist in urban and suburban locations, and in newly developed areas as well as established communities. Some of these developments include a wide range of uses while others have only a few complementary uses. A study of mixed-use development indicated that mixed-use projects most likely succeed where commercial uses are clustered in compact areas surrounded by reasonably dense residential areas. The study concluded the requirements for mixed-use development, and even requirements for ground-floor retail, can be successful when applied in the cores of existing commercial centers.

Central Business District

Central Business Districts (CBDs) ideally should be the hub of all uses and activities in a community. CBDs have the critical mass of people and activity to make travel by foot and transit more efficient than automobile. Downtown's can also offer quality living and working environments if they contain attractive development, pedestrian facilities, landscaped area, plazas, parks, and other amenities that can attract residents and hold businesses.

Other Commercial Districts

Other commercial districts with mixed-use potential fall in between the neighborhood and CBD commercial districts. These commercial districts offer perhaps the greatest potential for a variety of housing types than do the neighborhood district and offer an in-between level of commercial service.

Auto-Oriented Shopping Centers

Even very large auto-oriented shopping centers can be made more transit and pedestrian friendly over time, particularly if centers undergo major remodeling, which most do at some point. Better pedestrian connections should be encouraged or required in and around shopping centers whenever opportunities arise. Where building additions are contemplated, they should be modified to create at least some building entrances on the public street. In addition, high density residential development and office development can be encouraged (through zoning requirements or incentives) within walking distance of shopping centers. As pedestrian connections and transit service improves, some parking can be devoted to building additions or new structures may be built on outlying areas of the parking lot. Most major renovations of suburban shopping centers have included parking structures (rather than added surface parking) as undeveloped land has decreased in supply and increased in value.

Clustering compact, concentrated, mixed use development, all within 40 to 160 acre "neighborhoods," can offer a number of places to go and things to do within walking distance. Businesses can be intermingled with housing, community gathering places, public buildings, parks, social activities, schools, day cares and other services. These developments integrate instead of separating jobs including retail and housing from each other. Housing units should be within ¼ mile walking distance of employment, schools, day cares, shopping centers, recreational uses, neighborhood services and transit stops. Such areas offer evening and weekend activity and encourage walking, bicycling and transit use for internal trips, thus reducing both the number of vehicle trips and the need to drive.

Central Business Districts have the critical mass of people and activity to make travel by foot and transit more efficient than automobile.

Better pedestrian connections should be encouraged or required in and around shopping centers whenever opportunities arise.

ENVIRONMENTS DESIGNED FOR PEOPLE ENCOURAGE WALKING, BICYCLING AND TRANSIT USE

All land uses should accommodate pedestrian, bicycle and auto access.

Transit-supportive areas are generally synonymous with pedestrian and bicycle-friendly areas. Because transit trips begin and end with a walking trip, the success of a transit system depends in part on the quality of the supporting pedestrian system. In addition, a "sense of community" is created with a pleasant, safe, walkable environment by enhancing streets and development with gathering places, parks, landscaping, lighting, trees, streetscape, preserved natural features and other amenities. All land uses should accommodate pedestrian, bicycle and auto access.

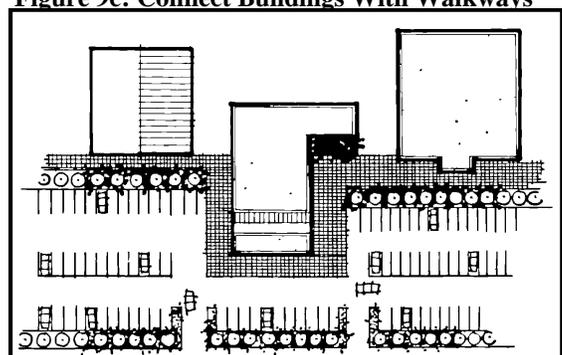
The following bulleted items highlight several key elements in creating pedestrian, bike, and transit-friendly developments.

- A continuous pedestrian/bicycle network needs to connect streets, sidewalks, and trails for all uses.
- Buildings should front the street and setbacks be reduced to shorten walks to the street and transit.
- Transit, pedestrian and bicycle travel should be at least as convenient as travel by automobile.
- A well connected radial and grid or modified grid-style street network should be kept narrow to slow traffic and emphasize pedestrian, transit and bicycle travel, while still accommodating the automobile.
- Streets need to be easy to cross on foot, and if the street is wide, trees should be planted and pedestrian islands or waiting areas created.

Pedestrians Need Continuous, Direct, Convenient Linkages

If transit, bicycling, and walking are going to provide a realistic travel alternative to the automobile, they need to offer continuous, direct, and convenient routes. Suburban developments often lack a continuous sidewalk network common in older cities. Encouraging cities to include

Figure 9c: Connect Buildings With Walkways



pedestrian and bicycle circulation provisions into their site design guidelines for developing suburban areas can make public transit and walking more competitive with the automobile. According to the 1990 National Personal Transportation Survey, the average person is willing to walk about 1,500 feet to shopping areas or to a transit stop. However, this distance is likely shorter for Duluthian's who face hills and winter snow and ice. Average walking distances will also be shorter when pedestrian routes are perceived as inconvenient or when there are missing links in the pathway system.

A well connected network of pathways should link residential and business development with popular destinations, such as shopping and employment centers, transit stops, schools, and parks. Similarly, within individual developments, pathways should directly link buildings, parking areas, recreation areas, convenience stores, services and other areas of interest. Existing developments can connect individual buildings with walkways (see Figure 9c).

In general, sidewalks and bicycle routes within the street right-of-way are the most visible and safest for pedestrians and cyclists. It is also cheaper to locate pathways within a street right-of-way. Therefore, a network of street right-of-way needs to support continuous pathways. The use of cul-de-sacs and dead-end streets in many suburban developments greatly increase the distance pedestrians must travel to reach nearby destinations and transit stops (see Figure 9d). Pedestrians often must wind their way through subdivisions to access a primary entrance to connect to transit or other destination. Furthermore, it is difficult to establish transit routes that pass conveniently near residents when many streets do not connect. Traditional grid street designs allow more direct and convenient connections for both pedestrians and vehicles alike (see Figure 9e).

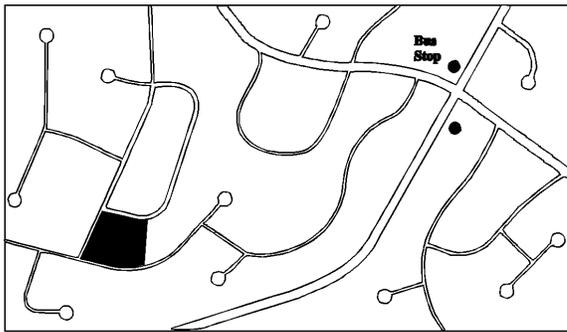


Figure 9d: Disconnected Streets

Recent Practice has emphasized discontinuous streets, such as loops and cul-de sacs, in order to discourage through traffic. Unfortunately, such streets also make it impossible for busses to pass through and substantially increases walking distances.

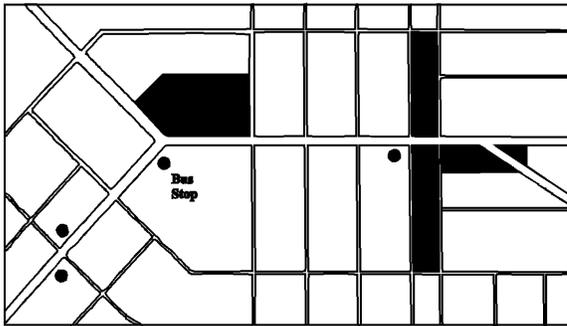
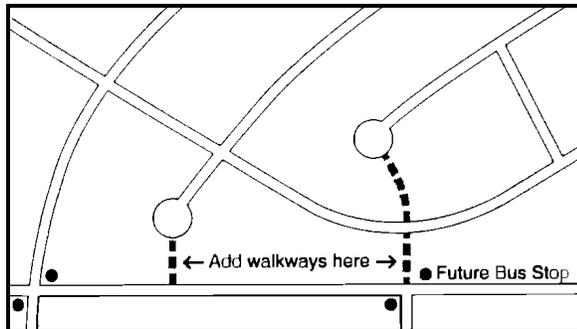


Figure 9e: Interconnected Streets

Interconnected streets give pedestrians many alternative walking paths and shorten walking distances. When streets are connected this way, auto drivers also have many route alternatives as well which disperses traffic and reduces car volumes on any one street in the network.

Where it is not possible to connect new streets to existing streets, pedestrian access-ways should be added (see Figure 9f). Pedestrian short-cut routes should also be added through long city blocks (greater than 600 feet). The key to good pedestrian access requires that direct links are in place where pedestrians want to go. In addition, each development project needs to ensure that systems on individual sites match up and that lot patterns and other development features do not block future street and pathway connections.

Figure 9f: Pathways Connect Transit Stops



Pathway Amenities

Designing pathways to create a pleasant environment for walking and bicycling can greatly influence the number of and distance people are willing to walk or bike as an alternative to driving. People are willing to walk further when they feel comfortable and secure and the streetscape offers more attractions. Below are some issues that should be considered for designing walking and bicycling infrastructure.

- Appropriate lighting can provide both a

sense of security and an attractive addition to the surrounding environment.

- Providing adequate space for pedestrians and bicyclists is necessary if these modes are going to offer quick and convenient means of travel. Sidewalks need to accommodate disabled persons with minimum five foot widths with slopes not exceeding 8.3 percent.
- Limiting the number of curb cuts can reduce vehicle-pedestrian conflicts.
- Comfortable waiting areas and seating will encourage walking and transit use.
- Reducing building setbacks add to pedestrian comfort by enclosing, defining, and providing a sense of continuity to the streetscape.
- Avoid blank facades and reduce effects of lengthy, featureless facades and building walls lining pedestrian routes.
- Street trees and other landscaping, and open space provide good contrast to buildings and pavements and soften the urban environment.
- Public open spaces, such as pedestrian plazas and landscaped areas, provide pedestrians with additional points of interest along routes.

People will more readily choose to walk, bike, or use transit, if they perceive advantages that offset the comfort and convenience of an automobile. By ensuring that pedestrians and bicycles have access to continuous, direct, convenient linkages increase the likelihood that transit, walking and biking are more viable transportation options. Furthermore, people will generally travel greater distances when they feel comfortable and secure and are in an interesting and attractive environment.

Parking

Expansive, excessive and poorly designed parking lots can constitute a barrier that discourages pedestrian travel and transit use particularly when lots block or fail to offer safe, comfortable, interesting, and direct routes between transit stops or public sidewalks and buildings or other destinations. Parking can be shared between developments or located on-street, in structures, underground, or behind or beside buildings, as opposed to large parking lots in the front of buildings that create vast, paved, unprotected open areas. Garages located in back, sides of homes, or alleys focus activity on living space (homes, public/open space, workplaces, entertainment areas, pedestrian paths, etc.) that together should amount to more than auto space (garages, roadways, driveways, parking). Parking provisions can reduce traffic congestion, improve safety, air quality, and community character while accommodating parking needs balanced with needs of pedestrians, bicyclists, and transit users.

Parking Location

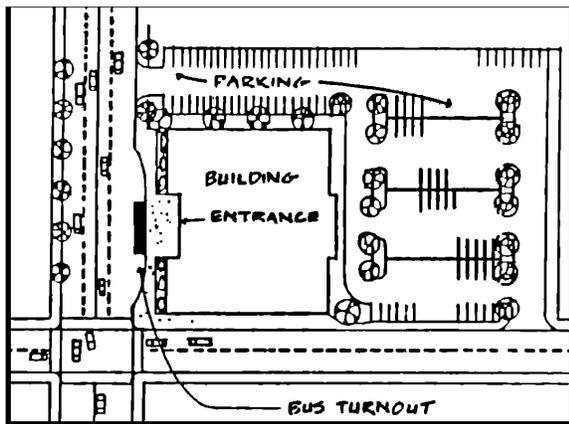
The location of parking can greatly reduce transit and pedestrian accessibility; resulting in more drivers and few pedestrian, bicycle, and transit users. Likewise, altering where parking is located can enhance

People will more readily choose to walk, bike, or use transit, if they perceive advantages that offset the comfort and convenience of an automobile.

access for all modes of transportation. Locating parking between a building and a public street or sidewalk in effect gives automobile passengers priority access to buildings and increases the distance transit users and pedestrians must travel to access buildings.

Many communities are beginning to prohibit or restrict parking between primary building and public streets. Figure 9g illustrates how the location of parking can enhance pedestrian access while accommodating automobile travel. Having alley access also makes it easier to locate parking in the rear of buildings. In addition, parking structures, instead of large sprawling surface parking lots, have the benefit of lessening the distance pedestrians have to walk to access buildings.

Figure 9g: Side and Rear Parking Enhances Pedestrian and Transit Access as well as Accommodating Automobiles



Parking Lot Design

Parking lots should be designed not only to facilitate efficient vehicle circulation and maximize vehicle capacity, but also to allow smooth pedestrian and bicycle circulation in and around the lot. Large parking lots with inadequate pedestrian and bicycle considerations can be barriers to these transportation modes. Parking lots should accommodate the fact that once people step out of their cars, they become pedestrians.

Parking lots should facilitate pedestrian circulation through the parking lot by clearly defining walkways within parking lots and minimizing obstructions to walkway paths.

Parking lot walkways should also be well-lit and buffered from vehicle areas. Safe, comfortable, and convenient pedestrian facilities encourage walkers to visit more than one place on foot, rather than driving from place to place. In addition, people will walk through parking lots when they represent a shorter route to desired destinations.

Parking lots can also be designed to make parked cars less visible and allow features of greater pedestrian interest to dominate the streetscape. This can be accomplished by reducing the parking lot size, requiring interior landscaping or requiring perimeter landscaping or screening. While vehicles within parking structures (i.e., ramps) are less visible, the structures themselves are often large and lacking pedestrian interest. Design standards or requirements for retail usage on street level can help improve appearance and functionality of parking structures (see Figure 9h). Providing bicycle parking facilities can also enhance bicycle commuting alternatives.

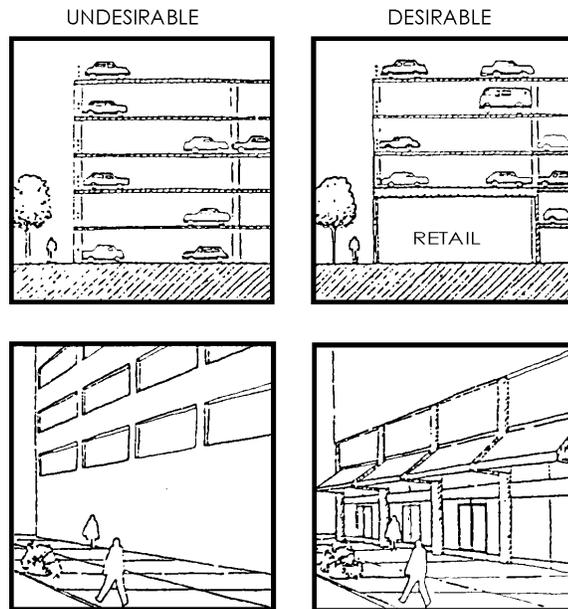
Parking: Supply & Demand

Abundant, free parking is a subsidy to automobile drivers and provides an incentive to use their cars rather than choose transit or other alternatives. Large parking lots consume land that could otherwise be used for building area, open space or other productive uses. In addition, large, difficult to cross, parking areas often constitute barriers to convenient bicycle, pedestrian, and transit travel. They also provide unfriendly, uncomfortable environments for pedestrian and transit users, reinforcing the desire to drive and often detracting from the attractiveness of the streetscape, further discouraging walking.

Recent studies have found that typical parking requirements by local communities greatly exceed peak parking demand on a typical day. A few cities have begun adjusting their parking requirements downward to reflect real demand rather than require additional spaces that rarely, if ever, are used. Reducing vehicle parking requirements to better match real demand can be done in any community. However, reducing allowable parking significantly below demand requires regular transit service to be available. The following bulleted items address how to alter parking supply and demand to enhance alternative modes.

- Reducing the supply of parking is most workable in locations where regular transit service and pedestrian or bicycle facilities are available.
- Cities can allow reduced parking in exchange for improved transit amenities.
- Some communities have chosen to eliminate minimum parking requirements in areas that are particularly well served by transit.
- Parking reductions can also be allowed in mixed-used developments where demand for on-site parking is lower because visitors are able to combine trips when several needs can be met within the development.
- Shared and combined parking arrangements enable developers to reduce the total parking area required for individual uses. Such arrangements allow customers to visit several businesses while parking only once.
- On-street parking may be able to accommodate some of the needs of specific adjoining residences or businesses. Limiting the number and

Figure 9h: Design Elements Can Minimize Impacts of Parking Structures



frequency of curb cuts can help increase the amount of on-street parking.

- Some communities allow businesses to contribute cash in lieu of providing parking and then use accumulated funds for parking structures or lots that can serve multiple businesses.
- Land in the vicinity of transit stations should be developed at the greatest intensity that will provide the most opportunity for transit ridership. Surface parking lots within transit-oriented districts therefore, should be targeted for redevelopment or parking structures, or more preferable, as transit-supportive employment or commercial centers.
- Providing preferential parking for ridesharing encourages car- and van-pooling which can be particularly useful in lowering the parking demand for commuters and lowers the total number of parking spaces needed.
- The amount of parking area can be reduced by allocating compact car spaces. The total amount of area devoted to parking can be reduced if smaller parking stall dimensions are permitted for compact cars.

Parking provisions can support a more balanced transportation system and increase opportunities for pedestrian and transit travel.

Parking provisions can support a more balanced transportation system and increase opportunities for pedestrian and transit travel. While parking reduction measures can be very effective when applied to employment centers, they may be less appropriate when applied to retail businesses dealing in bulky, difficult-to-transport goods. Despite limitations, measures that reduce the amount of free parking can be among the most effective tools for motivating a switch from single occupancy vehicle travel.

Travel Demand Management (TDM) ¹

Travel Demand Management (TDM) has been succinctly described as the art of influencing traveler behavior for the purpose of reducing or redistributing travel demand. The primary purpose of TDM is to reduce the number of vehicles using the road system while providing a wide variety of mobility options to those who wish to travel.² Implementing TDM strategies can help areas avoid costly expansion of the transportation system, decrease congestion, maintain air quality and maximize the mobility of people and goods. While TDM is not a panacea, it can help ease some transportation problems.

The term TDM encompasses discouraging driving alone and encouraging alternative modes. TDM applications have generally occurred at individual employment sites. They have also been implemented on an

¹ "The Future of Transportation Demand Management", Innovations Briefs: Urban Mobility Corporations, March/April 1997.

² *Overview of Travel Demand Management Measures*, U.S. DOT, January, 1994.

area-wide basis where government agencies have directed the initiatives. Experience has shown that the effectiveness of area-wide programs greatly depends on the amount and type of employer participation. Therefore, the development of effective TDM programs should be approached from the perspective of how public officials and local employers can work together to meet the goals of improving accessibility.

Typical TDM alternatives include car and van-pools, public transit, and non-motorized travel such as bicycling and walking. TDM programs can include strategies to influence when travel occurs during the day or if it even occurs on some days. These “alternative work schedule” strategies include:

- compressed work weeks in which employees work a full 40-hour work week in fewer than the typical 5 days,
- flexible work schedules which allow employees to shift work start and end times to less congested times of the days, and
- and telecommuting which allows employees to work at home or at satellite work centers one or more days a week.

Increasing transportation alternatives is an essential component to developing an effective TDM program. When alternatives are available, steps can be taken to enhance the attractiveness of using these alternatives. Financial or time incentives can increase the use of TDM alternatives. TDM strategies include:

- financial and time incentives such as preferential parking for rideshares, subsidies for transit riders, and transportation allowances,
- parking management programs which limit the amount and type of parking allowed in certain areas,
- information and marketing on-sight availability of transit schedules, on-site purchase of transit passes, and guaranteed ride home programs, and
- the application of site or area-wide surcharges or subsidy measures designed to make the relative cost of single occupancy vehicles use higher than high occupancy vehicles such as charging less for car-pooler parking.

Because trip making patterns, volumes, and modal distributions are largely a function of development patterns, exercising control over the trip generating characteristics of the land use can be used to make the resultant demand consistent with the existing transportation infrastructure and the level of service desired. Therefore, planning should provide for the most cost effective transportation system improvements necessary to reduce or alleviate traffic problems.

BENEFITS OF IMPLEMENTING TRANSIT AND PEDESTRIAN FRIENDLY COMMUNITIES

Application of the land use concepts described above would offer a number of benefits. Creating more clustered "livable community" settings in both developed and newly developing areas would contribute toward the following transportation, fiscal, environmental, and social benefits.

Transportation Benefits

- Improves accessibility to housing, employment, entertainment, service, and education.
- Improves mobility and accessibility for elderly, youth, and disabled persons.
- Offers businesses and residents a variety of high quality transportation alternatives.
- Increases walking, bicycling, and transit use.
- Decreases auto trips and vehicle miles traveled per person and household.
- Improves transit's effectiveness and efficiency.

Environmental and Social Benefits

- Revitalizes declining neighborhoods and business areas.
- Preserves natural resources, farm land, open space, and rural areas.
- Reduces auto emissions, energy consumption and fossil fuel dependence.
- Improves sense of community and quality of life for more of the region's people.

Fiscal Benefits

- Reduces the cost of community and regional services and infrastructure.
- Lowers living costs for people (for housing and transportation).
- Maintains or increase a community's property values and tax base.
- Make more efficient use of land by maximizing use of existing investments and limiting geographic spread of development.

LINKING TYPES AND LEVELS OF TRANSIT SERVICE TO LAND USE PATTERNS

The "Transit Related Land Use Standards" shown in Table 9a are intended to help inform communities of the general types and levels of transit services that might be feasible in different areas of the region. Generally, regular route transit (bus service operating on a fixed route with a fixed schedule and stops, with all day, fairly frequent service) operates well where densities are higher (where housing is at least 7 units per residential acre), and connected or intermixed with higher concentrations of jobs and housing. Other forms of transit, like express bus services, circulators, ridesharing and demand-responsive transit, need to be deployed to a greater extent where land use intensity is lower.

Table 9a is meant to communicate the general relationship between density and different types and levels of transit service, with particular emphasis on regular route scheduled services (operating on a fixed route, with a fixed schedule). These density standards are meant to be applied as communities consider the types and levels of transit services that can be economically justified in particular areas, based on likely patronage potential. These standards are the first step in assessing service feasibility, and are intended to supplement more detailed community or corridor level with census data and other information regarding households or persons who are likely to be dependent on transit, as well as trip patterns.

Table 9a: General Land Use Density Standards for Levels of Transit

	Employment, Household, and Population Density Levels	Appropriate Types and Levels of Transit Service
Service definitions:	<p>Highest Density Areas Large concentrations of highest density jobs (50+ jobs/acre in concentrations of at least 10,000), and/or concentrations of highest density housing (12+ households/acre and/or 30+ persons/acre).</p>	<p>Primary emphasis on high-capacity regular route service generally operating at 5-15 service minute frequencies, complemented by STRIDE and downtown circulator.</p>
<p><u>Regular Route:</u> Bus service operating on a fixed route with a fixed schedule and stops.</p>	<p>High Density Areas Large concentrations of high-density housing (7-1 households/ acre) and/or population (18-30 persons/acre) with mixing of jobs (20-50 jobs/acre in concentrations of 5000+ jobs). These areas are contiguous to the highest density areas.</p>	<p>Primary emphasis on high-capacity regular route service generally operating at 15-30 minute frequencies, complemented by STRIDE and neighborhood circulators.</p>
<p><u>Circulators:</u> Service providing either downtown, neighborhood, community, county/rural circulation on either a fixed route or on a demand-response or advance-reservation basis, and provided with a bus, small bus, van or automobile.</p>	<p>Moderate Density Areas Concentrations of moderate-density housing (4-7 households/ acre and/or population (10-18 persons/acre) that are contiguous to the high density areas & may also contain employment at 10-50 jobs/acre with at least 3,000 jobs.</p>	<p>A mix of high-capacity regular route service (generally operating hourly) tied with community circulators at transfer points and complemented by STRIDE.</p>
<p><u>Expresses:</u> Scheduled service, primarily operating during peak periods, running along a fixed route and generally operating at higher speeds and making fewer stops than regular routes</p>	<p>Low Density Areas Housing and population density is lower (less than 4 households/acre and less than 10 persons/acre) and jobs are more spread out (less than 10 jobs/acre & concentrations have less than 3,000 jobs).</p>	<p>Primary emphasis on peak period commuter expresses and county/rural circulators linked with major park/ride lots.</p>
	<p>Moderate Density Pockets Housing and/or jobs are concentrated in areas that are not contiguous to High & Moderate density areas and have 4+ households/acre (10 + persons/acre) and/or 10+ jobs/acre in concentrations of at least 3,000 jobs.</p>	<p>Primary emphasis on peak period commuter expresses that may loop through neighborhoods, linked with community circulators at major park/ride lots.</p>

Note: Housing and population density levels shown in Table 9a are based upon residential acreage (single family, multifamily, isolated farms); job density is based upon acreage in commercial and industrial use.



CONCLUSION

Land use policies and practices can impact the public's transportation choices. This section has looked at how land uses can be more transit and pedestrian-friendly by addressing densities, mixed use development, site design strategies, and parking. These strategies are not exclusive to large metropolitan areas, but can work well in a variety of community situations. While some of these strategies may be better suited for urban in-fill situations, others may be particularly effective in newly developing areas .

Land uses can be more transit and pedestrian-friendly by addressing densities, mixed use development, site design strategies, and parking, which can promote a more balanced transportation system.



Superior Street - Downtown Duluth

RECOMMENDATIONS

I. Customer Service Improvements

I-A Recommendation

Increase security and comfort level at Transit Centers.

Description:

- Install video cameras to monitor the outside front area of transit centers.
- Enhance Transit Center aesthetics and encourage more pedestrian activity (e.g., sponsoring live music during summer lunch hour and peak departure times; perhaps in cooperation with school and university performing groups).
- Continue funding and promotion of downtown community policing.

Rationale:

Promote customer security and provide a means to aid in prosecution of criminal activity. Increase comfort level and security at Transit Centers.

Projected Result:

Increased security and enhanced comfort level among customers and downtown patrons.

Requirement for Implementation:

Funding Commitment
Organizing Transit Center events

Cost Estimate:

Additional Video Cameras = **\$9,500**
Community Policing = **\$12,500/year**
Staff hours = **120**
Group assistance = **\$1,500**
Expenses = **\$250**

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

I-B Recommendation
Enhance “user-friendliness” of system map and information, and improve route information, maps, and time schedules.

Description:

Maps and time schedules should:

- include more cross and side streets, notable landmarks, north arrow and have north at the top of the map;
- include enhanced graphics with more background network;
- use consistent symbols (e.g., wheelchair) and notations;
- better utilize color coding (*why are different colors given to sections of town?*);
- better illustrate interlined routes;
- be designed toward readability by “middle school aged” focus group and meet the needs of all markets.

Creating effective maps and schedules are not simple tasks and are complicated by the complexity of some of the routing (e.g., special runs, different evening routes, combining several routes that are identified as a single route).

Rationale:

A common critique of focus group participants related to the difficulty in understanding maps and schedules.

Projected Result:

Increasing ridership attractiveness by providing information that is “user-friendly.”

Requirement for Implementation:

Cost Estimate:

Staff time = **100 Hours**

Market Research & Development = **\$15,000**

I-C **Recommendation**
Disseminate promotional and informational pamphlets (e.g., “Take Outs”) on buses and at Transit Centers.

Description:

Distribute quarterly pamphlets that are conveniently provided on buses and in Transit Centers that offer transit service updates, upcoming promotions, and other information useful or of interest to transit passengers. Information and topics may include:

- Environmental benefits of riding transit
- The Personal Financial Benefits of riding transit over driving
- How Transit creates more livable communities
- DTA’s Service Quality Guarantees
- The importance of being a courteous passenger
- Encouraging your employer to participate in the Commuter Pass Program.
- Special DTA events and services.

Rationale:

Provides a simple means of communicating marketing and service information to current customers that improve the relationship between the DTA and their customers and promote positive DTA customer attitudes toward their transportation choice.

Projected Result:

Will improve communication with customers and enhance customer loyalty. Increase knowledge of DTA services and increased usage.

Requirement for Implementation:

Staff time to produce publication and distribute.
Could utilize university marketing students or graphic art students to design and develop pamphlets.

Cost Estimate:

Staff time = **80 hours**
Production and Publishing Costs = **\$8,000**

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

I-D Recommendation
Develop comprehensive
“Transit Rider Guide” Booklet.

Timeline:
 Short
 Midrange
 Long

Priority:
 High
 Medium
 Low

Description:

The Rider Guide should include:

- “user friendly” schedule information and maps for all routes;
- schedules of weekday, evening and weekend service;
- “how to ride” information with graphics geared toward first-time riders including how to pay, how to stop the bus, how to transfer, how to use lift-equipment, how to use bike racks, tips on riding, bus rules, passenger code of conduct, hours of operation, fares, and information on specialized transit needs;
- the 722-SAVE number encouraging customer questions and comments;
- the differences between express, regular route, seasonal tripper, and STRIDE service;
- an easy to use and carry format; and
- the elimination or de-emphasis of the phrase “schedule times subject to change without notice”; this statement does not promote confidence in reliability. *Some systems guarantee schedule good through a specific date.*

Rationale:

Increase user-friendliness of riding transit. Rider Guide would provide a convenient location for all relevant transit information.

Projected Result:

Increase convenience and use of DTA services.

Requirement for Implementation:

The guide could be distributed to employers and universities. Furthermore, the guide could be included on all buses (like phone books at phone booths).

Cost Estimate:	Staff (Hours)	Consultant	Expenses
Rider Guide	150	\$2,000	\$7,500
Costs			

This publication is costly to produce. Options to offset this expense include:

- Impose a minimal charge and include complimentary pass(es) or discount coupons on monthly pass to offset purchase price.
- Allow advertising within booklet with coupons throughout to encourage purchase.
- A combination of both advertising sponsors and a small charge.



I-E Recommendation

- 1. Increase pass purchasing options.*
- 2. Expand pass user options by implementing smart card passes with either magnetic strip or contactless format.*

Description:

1. Allow customers to purchase passes (annual & monthly) by mail, phone, and internet web-site using checks and credit cards.
2. Smart passes allow customers to buy a pass good for a specific number of days per week as well as a stored value capacity.

Rationale:

Increase customer convenience and “user-friendliness.”

Projected Result:

Increased purchase and use of transit passes.

Requirement for Implementation:

Increased administration of program and responsibility for DTA operators.

Cost Estimate:

Accepting credit cards = **3.5% of sales**

Administrative costs = **\$500**

Installing Smart Card readers to fare-boxes = **\$4,500** per installed unit

Data system = **\$40,000**

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

I-F Recommendation
Enhance current customer complaints system focused on ensuring “customer satisfaction.”

Description:

- Enter “customer database” information.
- Mail “sorry for the inconvenience thanking them for bringing the problem to the DTA’s attention” letter with two free passes or a discount on the next bus pass purchase and/or gift.

Rationale:

Communicates message that the customer is important to the DTA and the transit system is here to serve them.

Projected Result:

Enhanced DTA image as a “customer friendly” service and increased customer loyalty. Better monitoring of complaints and improved GIS capabilities.

Requirement for Implementation:

Minor policy change.

Cost Estimate:

Minimal charge for staff training and response (distribution of letter and free-ride pass or discount on next bus pass) = **\$200.**

I-G Recommendation
Enhance bus stop signs and shelters.

Description:

- Replace worn and weathered DTA bus stop signs with new reflective signs.
- Add changeable sign holders or stickers or signs to post route information and time schedules at key stops.
- Work with city to add trash/ash tray and recyclable material receptacles at key stops and all bus shelters.
- Work with city to provide concrete waiting areas at key stops.

Rationale:

Bus stop signs inform potential customers of the existence of transit service and serves as a marketing tool in communicating the quality of the service. Increase amenities at stops and shelters enhance customers wait time.

Projected Result:

Increased awareness of the amount and quality of DTA service.

Requirement for Implementation:

Currently, 20 to 50 signs of a total of approximately 1,300 signs are replaced each year (2%-4%). We recommend that this be increased to at least 100 per year and about 200-300 for the first year.

Cost Estimate:

Current signs = **\$12**

Total Reflective signs = **\$25**

New artwork including an additional one time charge = **\$500**

With existing design for first year = $300 * \$25 = \mathbf{\$7,500}$

Additional year = $100 * \$25 = \mathbf{\$2,500/year}$

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

I-H Recommendation
Assist regular route usage among persons with disabilities.

Description:

- Driver sensitivity training.
- Guarantee lifts and kneeling buses are in working conditions.
- Highlight accessible routes and buses in riders guide and schedules.
- Include regular route information in STRIDE literature.

Rationale:

Regular route usage by persons with disabilities is more cost-effective than STRIDE service.

Projected Result:

Additional regular route ridership; less reliance on STRIDE.

Requirement for Implementation:

Increased training requirements may be needed.

Cost Estimate:

Development Staff Time = **80 Hours**; Expenses = **\$1,000**

Annual Staff Time = **40 Hours**; Expenses = **\$500**

II. MARKETING

II-A *Recommendation* *Increase marketing resources.*

Description:

Increase marketing staff and funding resources.

1. Separate marketing budget among Marketing Research, Advertising and Promotions, and Customer Service functions.
2. Increase Advertising and Promotions (i.e. media costs) to industry standards = approximately one percent of total operations costs.
3. More aggressively promote painted bus advertising limited to five to ten percent of fleet.
4. Increase staff time (utilize university marketing student interns where possible).

Rationale:

To accomplish marketing goals, it will be necessary to add marketing resources in the form of both staff and funding. The marketing budget should be separated to ensure that appropriate dollars are being allocated to their respective functions which will assist in monitoring dollar effectiveness.

Projected Result:

Increased funding and staff to enhance and expand marketing plans and campaigns. Better monitoring of marketing effectiveness and clarification between marketing functions.

Requirement for Implementation:

Funding Commitment

Cost Estimate:

Advertising and promotion budget is currently = **\$55,000/year**

1% of total operations costs = **\$80,000/year**

Marketing Research = **\$2,750 + 1,700 hours staff time**

Customer Service = **\$85,000 (No Change)**

Additional staff time = **contingent on marketing strategies initiated**

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

II-B Recommendation ***Increase CBD commuter marketing effort.***

Description:

- Commuter Pass Packet focusing on:
 - Economic benefits (car vs. transit costs “how much could you save by foregoing the second/third car?” worksheet).
 - Good DTA service to the CBD.
 - Environmental benefits.
 - CBD has mixed land use conveniences.
 - Good pedestrian system.
- Guaranteed-Ride-Home program for commuter pass program participants.
- Promote commuter pass program among all businesses (large and small) focusing on the following business benefits:
 - can offer cash in lieu of parking without forgoing tax benefit;
 - increases parking spaces for customers;
 - lessens congestion which discourage customer trips.
- Direct marketing of residential units within quarter-mile of transit route.

Rationale:

The CBD offers the most attractive non-transit dependent market for the following reasons:

- greatest concentration of employment,
- most convenient transit service,
- parking constraints,
- good pedestrian facilities and amenities (e.g., skywalk system, interesting walking environment, etc.).

Projected Result:

Increased education and awareness of the benefits of transit leading to an increase in transit use.

Requirement for Implementation:

Some increased administration and marketing resources for enhancing current commuter pass program will be needed.

Cost Estimate:

Packet Production = **\$5,000**

Guaranteed-Ride-Home program = **\$5,000**

Direct Marketing = **\$10,000**

II-C Recommendation ***Increase college student marketing effort.***

Description:

- Pursue partnerships with college administrations, student governments, and student groups to promote transit use and encourage contract services for special events (e.g., UMD hockey).
- Promote and target web-site to university student market.
- Partner with local merchants to enhance collegiate pass program.
- Enhance student informational packet targeted toward student concerns and issues.

Rationale:

Colleges:

- Offer large, pedestrian-friendly trip destinations.
- Have some parking constraints.
- Are more receptive to environmental arguments.
- Have students more likely to have financial constraints.

Projected Result:

Increase transit knowledge, awareness and comfort level among the growing college student market leading to increased college student ridership.

Requirement for Implementation:

Marketing production and distribution resources.

Cost Estimate:

Staff Time = **100 Hours**

Expenses = **\$2,000**

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

II-D Recommendation
Produce and distribute Senior Transit Packet.

Description:

Create a packet of transit materials similar to the commuter packet targeted at senior concerns and issues. Coordinate with City Parks and Recreation and County services.

Rationale:

Higher percentage of non-drivers.
Growing senior population.
High density senior housing within urban areas.

Projected Result:

Increased transit knowledge, awareness and comfort level among the growing senior market leading to increased senior ridership.

Requirement for Implementation:

Marketing production and distribution resources will be required.

Cost Estimate:

Packet = **\$5,000**

II-E Recommendation
Develop “Summer Fun Guide” to work in conjunction with Teen Pass Program.

Description:

Summer Fun Guide would be a convenient sized booklet targeted toward kids ages 12-16 which would provide information for using the DTA when traveling to summer time destinations. The booklet should include coupons from sponsors and be distributed free of charge to the middle and senior high schools at the end of the academic year.

Rationale:

Encourage purchase and use of Teen Pass Program during the summer months.

Projected Result:

Increased Teen Pass purchases and teen ridership in the summer months.

Requirement for Implementation:

Marketing Staff Time.

Cost Estimate:

Staff Time = **80 Hours**

Expenses = **\$1,500**

Timeline:

Short

Midrange

Long

Priority:

High

Medium

Low

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

II-F **Recommendation**
Educate, promote and lobby the public and city government toward “livable community” policies.

Description:

- Promote the creation of transit-friendly developments.
- Ensure consideration of transit needs in reconstruction of important transit roadways.
- Encourage mixed-used developments near transit facilities.
- Support policies that enhance bicycling and pedestrian activities (e.g., snow removal, infrastructure).
- Advocate planning policies that enhance transportation choices (e.g., efficient parking policies).

Rationale:

City and planning decision regarding the type and design of development greatly impacts the viability of transit service. The City of Superior is in the process of completing a comprehensive plan and the city of Duluth is beginning the process.

Projected Result:

City policies that enhance transit’s ability to effectively serve the Duluth-Superior area population.

Requirement for Implementation:

Administrative staff working with jurisdictions.

Cost Estimate:

Staff Time = **50 Hours**

Program Development = **50 Hours**

II-G Recommendation
*Enhance distribution of Port Town
Trolley map and schedule and other
DTA information.*

Description:

Increase distribution of Port Town Trolley map and schedule and DTA information to downtown and Canal Park hotel rooms and lobbies, restaurants and other popular tourist destinations.

Rationale:

There appears to be a lack of knowledge of the Port Town Trolley or the DTA's transit service among tourists. As congestion increases and free parking becomes difficult to find at popular tourist sites, the Trolley and the DTA will increasingly become a more attractive option for vacationers.

Projected Result:

Increased awareness of the Trolley service leading to increased ridership.

Requirement for Implementation:

Ensure that all downtown/Canal Park hotels have Trolley information in rooms and lobbies.

Cost Estimate:

Staff Time = **80 Hours**

Expenses = **\$500**

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

III. MARKETING RESEARCH

III-A Recommendation *Implement comprehensive Marketing Research Program.*

Description:

The needs of the community can be assessed using different methodologies. The DTA needs to look at the total market, as well as existing users, to best develop transit services. Subgroups of the community should also be analyzed as potential markets. These types of information should then be compared to actual ridership on a route by route basis, as well as on an area by area or block by block basis.

- Comprehensive community-wide marketing survey 3 to 5 years
- Block by block ridership 5 years
- On-board surveys 12 to 18 months
- Route by route ridership 12 to 18 months
- Outreach and focus group research Ongoing

Rationale:

Knowledge of DTA and transportation perceptions, attitudes, needs, and wants of potential customers and community residents help the DTA to develop and enhance customer-oriented services, effective marketing programs, and community support.

Projected Result:

Better services and more effective marketing campaigns that increase transit attractiveness and ridership.

Requirement for Implementation:

Increased marketing staff resources (training of phone operators to conduct data reduction).

- University student interns and Metropolitan Interstate Committee Staff.

Cost: Estimates:	Staff Time (Hours)	Intern Costs	Expenses
Community marketing survey	300	\$1,000	\$500
Block by block ridership	900	\$4,500	\$1,000
On-board surveys	300	\$600	\$250
Route by route ridership	100		\$50
Outreach and focus group research	100		\$250

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

III-B Recommendation:
Solicit customer input and complaints via:

- *Internet web-site,*
- *Comment cards on buses and at Transit Centers,*
- *Promote comments through 722-SAVE, and*
- *On-board survey.*

Description:

Encourage customers to contact the DTA with their comments, criticisms, and questions through the DTA web-site, comment cards on buses and in Transit Centers, and through the 722-SAVE telephone number by adding a message on all new literature that provides how to contact the DTA to “let us know how we’re doing.”

Rationale:

Promotes customer feedback and suggestions and encourages customers to identify possible problems that they may otherwise hesitate to provide. It also sends the message that the DTA cares about their customers and the service they provide.

Projected Result:

Encourages useful input from customers that will improve problem identification and lead to better service.
Promotes the DTA’s concern for customer satisfaction.

Requirement for Implementation:

Minor wording additions to all new DTA literature and advertising.
Data entry by phone operators.

Cost Estimate:

\$100

Staff Time = **50 hours**

III-C Recommendation *Develop customer database.*

Description:

Create a customer database with key transit and marketing information. Data could be obtained from complaint and comment calls, free pass drawings, pass purchases, survey participation, etc.

Rationale:

Better service and information can be designed and provided for our customers with the following customer data:

- residential address, mailing address, and phone number;
- frequent destinations: “where do you board?” and “where do you alight?”;
- what types of services would you like to see provided;
- “can contact you to discuss our services;”
- geo-code data to computer mapping software (i.e., GIS).

Projected Result:

Customer data can be used for informational mailings, marketing campaigns, identifying trip patterns and provide a means of soliciting customer input for marketing research and service evaluation.

Requirement for Implementation:

Personnel time to setup database.
Data entry by phone specialist.
Staff time developing system for obtaining customer data.

Cost Estimate:	DTA Staff Time (Hours)	Consultant	Expenses
Initial startup and setup cost	50	\$6,000	\$200
Annual costs	25		\$100

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low



IV. ROUTE RECOMMENDATIONS

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

IV-A Recommendation *Expand Service to Airpark and Airport.*

Description:

Extend commuter shift service to Airpark area. Currently, the Airport has approximately ten scheduled departures and arrivals with the first departure at 6:00 AM and the last arrival at 10:23 PM (see the Appendix for schedule details).

AM trips	Arriving at Airpark before	7:00 a.m. (service added) 8:00 a.m. (service extension) 9:00 a.m. (service extension)
PM trips	Leaving Airpark after	4:30 p.m. (summer = service added) 5:30 p.m. (service extension) 6:00 p.m. (service extension)

Airport Arrival and Departure Times See Appendix

Rationale:

The Airpark is the only large employment area that does not receive transit service within Duluth. Increased employment and business growth is anticipated for the Airpark.

Projected Result:

Some increased commuter ridership to Airpark.

Requirement for Implementation:

All trips tied to existing trips.

Cost Estimate:

Estimated average annual cost = **\$112,000**

Estimated marginal annual cost = **\$77,520**

IV-B Recommendation:
Create West Duluth to Miller Hill Mall Route.

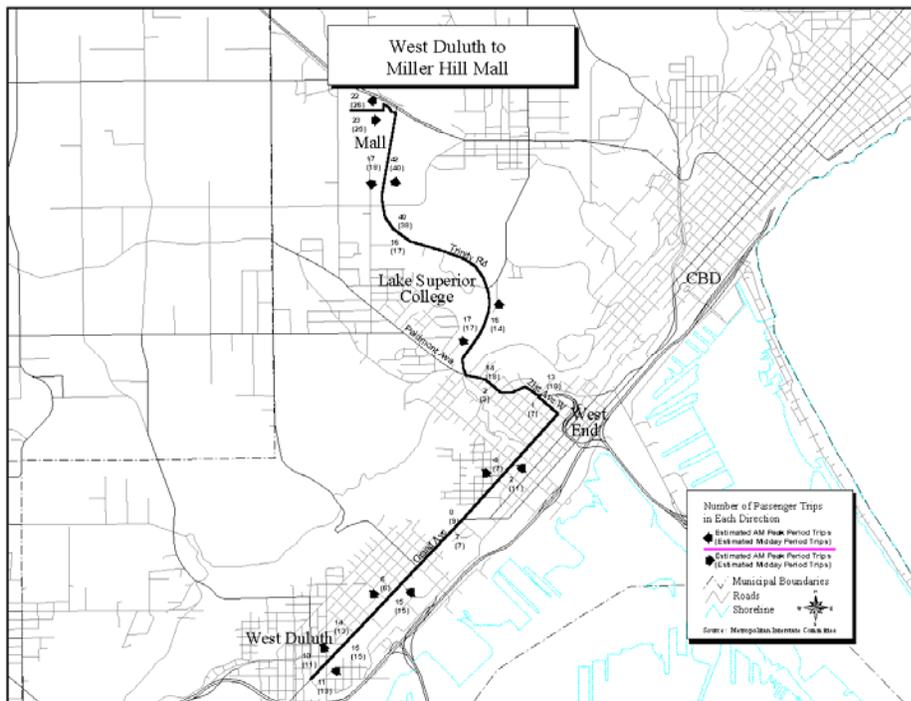
Timeline:
 Short
 Midrange
 Long

Description:

The West Duluth to Miller Hill Mall Route would provide a direct route between the Spirit Valley shopping center to the Miller Hill Mall with the option of servicing Lake Superior College. It is recommended that this route be initially implemented as a weekend service with an hour headway. If ridership warrants, this route should be tested as a Midday option and if successful, be considered as a full time route.

Priority:
 High
 Medium
 Low

Service needed for this route could be provided by redirecting current some of the current West Duluth service directly to the Miller Hill Mall, which would increase the headway from West Duluth to Downtown when this route was active.



Rationale:

The route would provide direct routing to Miller Hill Mall Area from West Duluth. The West Duluth area has transit favorable demographics. Demand for service to Lake Superior College is growing and this would provide an additional connection between LSC and Miller Hill Mall. Currently, parking demand at LSC is reaching capacity.

Projected Result:

Table 10a; Results for 1995 Spirit Valley-Mall Route

Passenger Trips	Existing Network	Spirit Valley-Mall	Difference	Percent Change
AM Peak	2,901	2,981	80	3%
Midday	3,810	3,930	120	3%

Source: BRW, Inc. MIC, and DTA. Based on Transit Model; adjusted to reflect regression analysis, current transfer rates, and historical empirical evidence

Table 10b; Transit Model Results for 1995 Passenger Trips for Spirit Valley-Mall Route

	AM Peak	Midday
Spirit Valley to Miller Hill Mall	88 (15)	76 (6)
Miller Hill Mall to Spirit Valley	67 (11)	57 (5)
Total Passenger Trips	155 (26)	133 (11)

Source: BRW, Inc. MIC, and DTA

() = Ridership Per Route Trip. Number of Route Trips equal headway divided by time period.

Table 10c; Transit Model Results for Regular Route Financial Analysis of Scenario Options

	1998 BASE	West Duluth To Mall	Difference
Passenger Revenue	\$2,197,647	\$2,219,067	\$21,420
Operations Expense	\$5,182,928	\$5,250,243	\$67,315
Operating Deficit (loss)	\$5,177,191	\$5,223,086	\$45,895
State of MN Subsidy	\$3,304,498	\$3,334,790	
City of Duluth Subsidy	\$1,514,693	\$1,530,296	
Total Subsidy Shares	\$5,177,191	\$5,223,086	\$45,895

Regular Route Statistics			
System Miles	1,959,296	1,987,149	27,853
Cost Per Mile	\$4.16	\$4.13	(\$0.03)
Revenue to Cost Ratio	36.4%	36.3%	-0.10%

Source: Duluth Transit Authority

Requirement for Implementation:

___ additional Revenue Hours

Cost Estimate:

Operations Expense = **\$67,315** Net loss = **\$45,895**

IV-C Recommendation *Create UMD Circulator.*

Description:

The UMD circulator route would traverse the eastern hillside, where many rental units are serving the student market, and provide an attractive option for UMD and St. Scholastica students living in the area. The map below illustrates the route that was modeled.

Rationale:

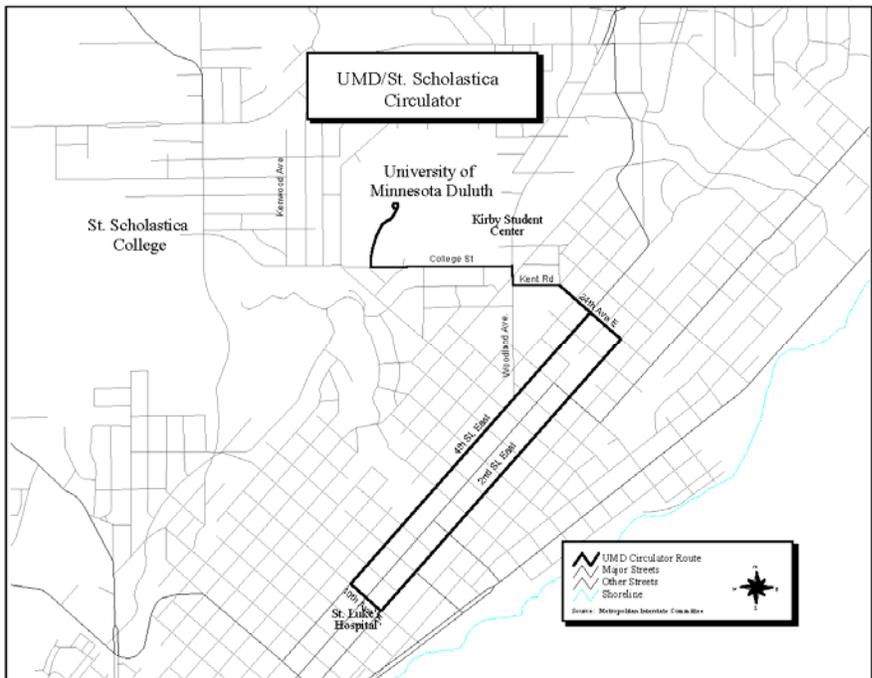
At one time a UMD service existed support in part by funding from UMD. However, the UMD administration ended funding for the route and the service ended. Currently, UMD is exploring options for addressing a decrease in parking spaces due to a library expansion. Increasing transit accessibility to UMD could offer a cost-effective alternative for addressing parking demand problems. UMD and St. Scholastica offer demographics that make transit a viable market.

Transit agencies in several cities around the country are partnering with colleges and universities to promote transit ridership among their student populations. Many colleges fund transit service through student fees and then offer students unlimited transit service to students at no additional charge. These types of partnerships can be beneficial for both students and colleges where parking and vehicular traffic is a problem. By increasing the attractiveness of transit use, colleges can limit the amount of parking and lessen congestion.

Timeline:
Short
Midrange
Long

Priority:
Contingent on UMD
Parking Policy.

High
Medium
Low



Projected Result:

Table 10e; Transit Model Results for UMD and Downtown Circulators

Passenger Trips	Existing Network	Scenario 4	Difference	Percent Change
AM Peak 1995	2,901	3,001	100	3%
Midday 1995	3,810	3,890	200	5%

Source: BRW, Inc. MIC, and DTA

Table 10f; Transit Model Results for 1995 Passenger Trips for Circulator Routes

	AM Peak	Midday
UMD Circulator	116 (39)	153 (26)
Downtown Circulator	208 (35)	205 (17)

Source: BRW, Inc. MIC, and DTA

() = Ridership Per Route Trip. Number of Route Trips equal headway divided by time period.

Table 10g; Transit Model Results for Regular Route Financial Analysis of Scenario Options

	1998 BASE	UMD & CBD Circulators	Difference
Passenger Revenue	\$2,197,647	\$2,229,783	\$32,136
Operations Expense	\$5,182,928	\$5,278,818	\$95,890
Operating Deficit (loss)	\$5,177,191	\$5,240,945	\$63,754
State of MN Subsidy	\$3,304,498	\$3,347,648	
City of Duluth Subsidy	\$1,514,693	\$1,475,800	
Total Subsidy Shares	\$5,177,191	\$5,240,945	\$63,754

Regular Route Statistics			
System Miles	\$1,959,296	\$1,998,976	\$39,680
Cost Per Mile	\$4.16	\$4.12	(\$0.04)
Revenue to Cost Ratio	36.4%	36.3%	-0.10%

Source: Duluth Transit Authority

Requirement for Implementation:

_____ additional Revenue Hours.

Cost Estimate: (for Both UMD and Downtown Circulator)

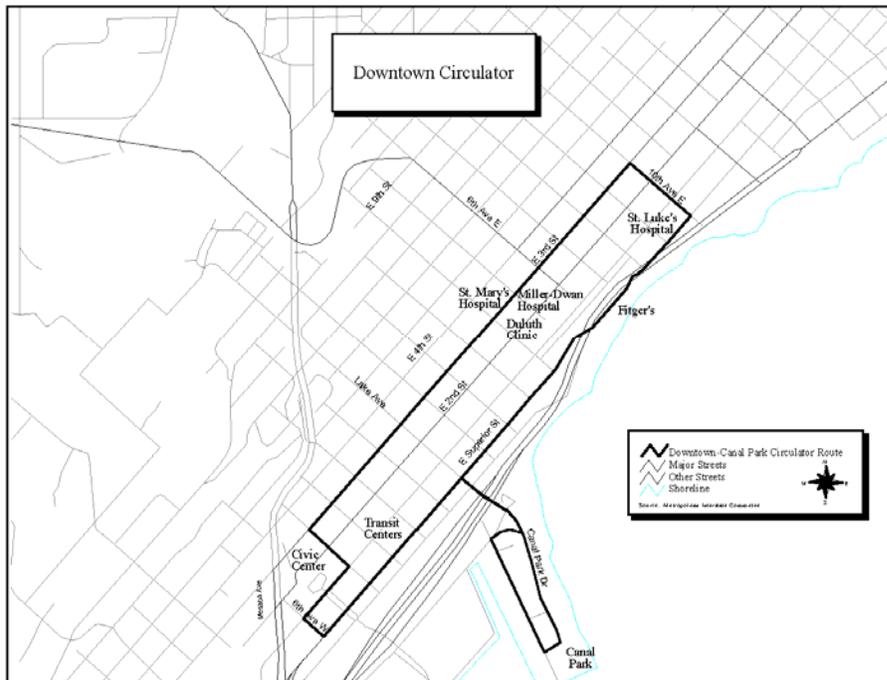
Operations Expense = **\$95,890** Net loss = **\$63,754**

IV-D Recommendation

Create Downtown Circulator.

Description:

The downtown circulator would expand on the Port Town Trolley route to include the hospital area and serve more of the downtown area. However, unlike the Trolley, the downtown circulator would target commuters and downtown shoppers. The circulator route that was modeled is shown on the map below.



Rationale:

The downtown circulator would provide a better alternative for short trips in and around the CBD. A Duluth Downtown Circulator would offer shoppers and commuters a more user-friendly option for connecting to jobs, restaurants and stores in and around the Downtown and Canal Park area.

Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

Projected Result:

Table 10h; Transit Model Results for UMD and Downtown Circulators

Passenger Trips	Existing Network	UMD & Downtown Circulators	Difference	Percent Change
AM Peak 1995	2,901	3,001	100	3%
Midday 1995	3,810	3,890	200	5%

Source: BRW, Inc. MIC, and DTA

Table 10i; Transit Model Results for 1995 Passenger Trips for Circulator Routes

	AM Peak	Midday
UMD Circulator	116 (39)	153 (26)
Downtown Circulator	208 (35)	205 (17)

Source: BRW, Inc. MIC, and DTA

() = Ridership Per Route Trip. Number of Route Trips equal headway divided by time period.

Table 10j; Transit Model Results for Regular Route Financial Analysis of Scenario Options

	1998 BASE	UMD & CBD Circulators	Difference
Passenger Revenue	\$2,197,647	\$2,229,783	\$32,136
Operations Expense	\$5,182,928	\$5,278,818	\$95,890
Operating Deficit (loss)	\$5,177,191	\$5,240,945	\$63,754
State of MN Subsidy	\$3,304,498	\$3,347,648	
City of Duluth Subsidy	\$1,514,693	\$1,475,800	
Total Subsidy Shares	\$5,177,191	\$5,240,945	\$63,754

Regular Route Statistics

	1998 BASE	UMD & CBD Circulators	Difference
System Miles	\$1,959,296	\$1,998,976	\$39,680
Cost Per Mile	\$4.16	\$4.12	(\$0.04)
Revenue to Cost Ratio	36.4%	36.3%	-0.10%

Source: Duluth Transit Authority

Requirement for Implementation:

_____ additional Revenue Hours.

Cost Estimate: (for Both UMD and Downtown Circulator)

Operations Expense = **\$95,890** Net loss = **\$63,754**

IV-E Recommendation
Hub and Spoke system for midday, evening, and weekend periods.

Description:

Change DTA service in the off-peak periods (9am-3pm M-F, all Sat. & Sun). Neighborhood circulators funnel into local area hubs that provide more direct service to major destinations (e.g., the mall, UMD). Hub and Spoke Map.

Rationale:

Better serve complex travel patterns by providing more flexible and direct routing.

Projected Result:

Table 10k; Transit Model Results for Hub and Spoke Midday

Passenger Trips	Existing Network	Hub and Spoke	Difference	Percent Change
Midday 1995	3,810	3,849	39	1%
Midday 2015	4,060	4,404	344	8%

Source: BRW, Inc. MIC, and DTA

Table 10l; Transit Model Results for Regular Route Financial Analysis of Scenario Options

	1998 BASE	Hub and Spoke	Difference
Passenger Revenue	\$2,197,647	\$2,229,339	\$31,692
Operations Expense	\$5,182,928	\$5,338,813	\$155,885
Operating Deficit (loss)	\$5,177,191	\$5,304,384	\$127,193
State of MN Subsidy	\$3,304,498	\$3,347,646	
City of Duluth Subsidy	\$1,514,693	\$1,571,738	
Total Subsidy Shares	\$5,177,191	\$5,304,384	\$127,193

Regular Route Statistics

	1998	Hub and Spoke	Difference
System Miles	\$1,959,296	\$1,998,976	\$39,680
Cost Per Mile	\$4.16	\$4.28	(\$0.12)
Revenue to Cost Ratio	36.4%	36.0%	-0.4%

Source: Duluth Transit Authority

Timeline:
 Short
 Midrange
 Long

Priority:
 High
 Medium
 Low

Requirement for Implementation:

- _____ Additional Revenue Hours.
- _____ Capital
- _____ Small Buses
- _____ Hub facilities

Cost Estimate:

Operations Expense =
\$155,885
 Net loss = **\$127,193**



Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

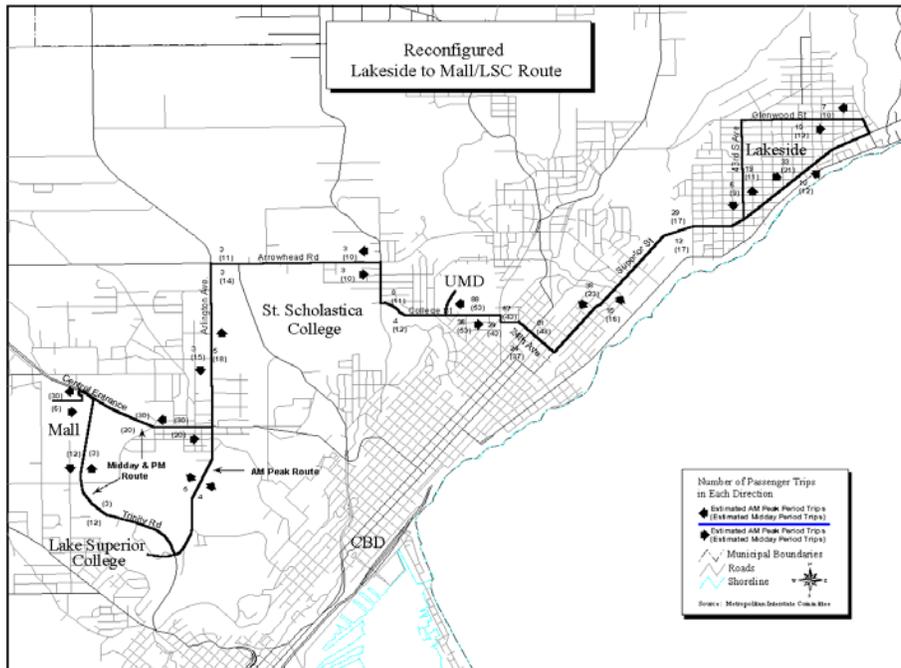
IV-F Recommendation

- a. Further evaluation of Lakeside-Mall Route options need to be conducted.
- b. Evaluate additional service options to Lake Superior College.

Description:

The reconfigured route below was designed to attract more riders to this underutilized route; while at the same time, offering greater service to Lake Superior College and providing a connection for LSC students to the Mall. However, our model showed only a minimal increase in ridership on the reconfigured route. Given that this redesigned route would require additional resources (i.e., an extra bus) making it cost prohibitive.

The current route does attract a sufficient amount of ridership between Lakeside and the UMD/St. Scholastica College area. Therefore, further options need to be explored to provide service to this area, while offering more effective service to LSC and the Mall.



Rationale:

Increase attractiveness of existing route by connecting to another major traffic generator (i.e., LSC). Lake Superior College is seeing a growing demand for service and would provide an additional connection between

LSC and Miller Hill Mall. Currently LSC students purchase the same percentage of collegiate passes as UMD, despite less service. Parking demand is reaching capacity at LSC.

Projected Result:

Table 10m; Transit Model Results for 1995 Reconfigured Lakeside-Mall Route

Passenger Trips	Existing Network	New Lake-side to LSC/Mall	Difference	Percent Change
AM Peak	2,901	3,001	100	3%
Midday	3,810	3,904	94	2%

Source: BRW, Inc. MIC, and DTA

Table 10n; Transit Model Results for 1995 Passenger Trips for Lakeside-Mall Route

	AM Peak	Midday
Westbound Total Route Ridership	166 (55)	138 (23)
Eastbound Total Route Ridership	76 (25)	113 (19)
Total Passenger Trips	242 (80)	251 (42)

Source: BRW, Inc. MIC, and DTA

() = Ridership Per Bus Route Trip. Number of Route Trips equal headway divided by time period.

Table 10o; Transit Model Results for Regular Route Financial Analysis of Scenario Options

	1998 BASE	New Lake-side to LSC/Mall	Difference
Passenger Revenue	\$2,197,647	\$2,217,243	\$19,596
Operations Expense	\$5,182,928	\$5,271,396	\$88,468
Operating Deficit (loss)	\$5,177,191	\$5,246,063	\$68,872
State of MN Subsidy	\$3,304,498	\$3,344,309	
City of Duluth Subsidy	\$1,514,693	\$1,543,755	
Total Subsidy Shares	\$5,177,191	\$5,246,063	\$68,872

Regular Route Statistics			
System Miles	\$1,959,296	\$1,995,904	\$36,608
Cost Per Mile	\$4.16	\$4.12	(\$0.04)
Revenue to Cost Ratio	36.4%	36.2%	0.20%

Source: Duluth Transit Authority

Requirement for Implementation:



Timeline:
Short
Midrange
Long

Priority:
High
Medium
Low

_____ additional Revenue Hours.

Cost Estimate:

Operations Expense = **\$88,468** Net loss = **\$68,872**

IV-G Recommendation
Work with the City of Duluth to expand Port Town Trolley service hours and extend the service season.

Description:

Increase late afternoon and early evening Port Town Trolley service, extending service past Labor Day into the fall season on weekends.

Rationale:

As congestion increases and free parking becomes difficult to find at popular tourist areas, the trolley will increasingly become a more attractive option for tourists. Some tourists noted expanding the service into the evening would increase the services desirability. Autumn is becoming an increasingly popular season for tourists.

Projected Result:

Increased ridership.

Requirement for Implementation:

Additional driver hours for added running time to run later in the evenings and weekends in September and October.

Cost Estimate:

Costs are tied to City funding.

IV-H Recommendation
Work with the City of Superior to further evaluate route options.

Description:

Service options connecting Superior to Duluth and intracity routes within Superior have been considered by MIC and DTA staff. Superior ridership remains a key component of DTA's service and has been important for many years. The Duluth-Superior intercity route is one of the most highly used routes in the system carrying work trips, medical trips and shoppers between the two communities. The routes operating solely within Superior are important to the transit needs of the city; however, adjustments may be warranted that better match ridership demand with service provision, as well as become more cost efficient for the City of Superior and DTA.

Restructured service would primarily focus on the three "loop" routes operating within Superior since it is these routes that currently operate at a low level of productivity. Service provision could take the form of some type of demand responsive operation. Whether a strict dial-a-ride service or implementing "service routes" for the city, further study and public participation would need to take place. Additionally, the type of vehicle to best provide service would also be important to the future of transit in Superior. Lastly, a greater focus of marketing efforts toward the residents of Superior could also help long term growth potential for the DTA as the transit provider.

All of the issues above need further review to determine prioritized options that best meet Superior's transit needs.

Rationale:

Increase effectiveness of service to Superior residents while also providing the most cost effective transit service option for the DTA. Growing areas of Superior, especially the commercial corridors, are in need of restructured service in order to better match the riding public with preferred destinations. Downtown Superior and the University of Wisconsin - Superior campus are two areas where enhanced transit service would benefit the public and DTA.

Duluth Transit Authority Fixed Asset Schedule 1997-2005 (Numbers shown in bold text are programmed.)

Assets	Original Cost	Service Life	1998	1999	2000	2001	2002	2003	2004	2005
Building and Structures										
Offices, Maintenance & Garage Building.	9,322,154.81	40								
Exterior Walls			25,000	50,000	25,000	100,000	10,000	10,000		
Roof Sections			100,000	100,000	75,000			20,000		20,000
Floor Sealing & Repair			80,000				15,000			25,000
Air Exchanger 1989	50,774.00	10		50,000						50,000
Bus Shelters 1975-86	412,669.00	8	25,000	25,000	25,000				25,000	25,000
Turnarounds 1985	413,209.28	15	40,000	40,000				25,000		25,000
DTA Facility Parking Area					20,000					
Sub-Total	10,198,807.09		270,000	265,000	145,000	100,000	25,000	55,000	25,000	145,000
Revenue Equipment										
1977 Spare Engine	17,025.79	6								
Buses 1975 (1 remaining)	1,115,985.94	12								
Buses 1979 (15 remaining)	4,248,365.12	12	1,305,000							
Bus Rehab 1986 (8 remaining)	446,424.00	7								
Bus Rehab 1987 (7 remaining)	536,817.00	7								
Flexibles 1989 (10)	1,765,757.00	12					3,000,000			
TMC 1990 (10)	1,818,730.00	12						3,000,000		
Gilligs 1995 (25)	5,200,000.00	12								
Trolleys 1984	129,134.00	12								400,000
STRIDE Buses 1989 (5) 2 in use	235,000.00			160,000						200,000
STRIDE Vans 1994 (2)	76,500.00			90,000				120,000		
STRIDE Buses 1995 (5)	289,825.00	6			450,000					500,000
Coin Sorter 1977	1,880.00	13		25,000						
Coin Sorter 1980	3,429.00	10		25,000						
Global Coin Counter 1984	19,800.00	10		25,000						
GFI Counting System 1989	386,887.63	10		35,000		35,000		35,000		35,000
Sub-Total	16,291,560		1,305,000	360,000	450,000	35,000	3,000,000	3,155,000	600,000	535,000
Furniture & Equipment										
Phone System 1986	19,328.01	10			25,000					
Radio Equipment 1989	165,000.00	10		600,000						
Audio Visual Equipment 1984	4,500.00	5 - 10								
Computer Equip. 1982-1989	98,439.00	5	40,000				20,000		20,000	
Office Equipment 1979-89	185,541.00	5 - 10	20,000	10,000	20,000	20,000		20,000		20,000
Sub-Total	472,808.01		60,000	610,000	45,000	20,000	20,000	20,000	20,000	20,000
DOWNTOWN IMPROVEMENTS										
Transit Center East	27,446.77	40	25,000		25,000		25,000			25,000
Transit Center West	492,814.30	15			10,000					
Shelters	204,586.00	15			25,000			25,000		
Sub-Total	724,847.07		25,000	0	60,000	0	25,000	25,000	0	25,000

Source: Duluth Transit Authority

Duluth Transit Authority Fixed Asset Schedule: 1996-2000



Assets	Original Cost	Service Life	1998	1999	2000	2001	2002	2003	2004	2005
Shop & Garage Equipment										
1977 GMC Wrecker	12,858.36	10						35,000		
1978 Ford Pickup w/plow	7,535.09	5		30,000						
1981 Used Pickup Truck	1,600.00	10								
1984 Chevrolet Wrecker	43,961.00	10	20,000							
1984 Dumptruck attachment	5,322.39	10	9,000							
1983 Dodge Pickup	11,750.35	5		30,000						
1983 Chevrolet Citation	7,819.00	5								
1983 Chevrolet Citation	7,664.00	5								
1986 Superv. Autos	21,423.00	5								
1989 Superv. Auto	11,568.00	5		20,000		20,000		20,000		20,000
1979 Drum Lathe & Equipment	20,674.28	10				40,000				
1980 Forklift	19,624.00	15								35,000
1980-85 Small Tools & Equipment	65,826.74	5	30,000		15,000		15,000		25,000	
1980 Sweeper	21,773.00	10	20,000							30,000
1982 Scrubber	19,512.00	10				40,000				
1984 Front End Loader	45,051.00	15								
Bus Washer Brushes	4,288.16	3	5,000			5,000			5,000	
Trucks Front End Loader	8,212.00	10								
Hoist Refurbishments		10		60,000						
Fuel Tank Storage Monitor			20,000							
Sub-Total	336,462.37		104,000	140,000	15,000	105,000	15,000	55,000	30,000	85,000
VISIONING PROJECTS										
Small Buses for Hub System				1,000,000		2,000,000				
Hub Development				3,000,000						
Travel Link AVL			250,000	1,000,000	500,000					
Travel Link ATIS			50,000							
Sub-Total			300,000	5,000,000	500,000	2,000,000	0	0	0	0
Yearly Totals			1998	1999	2000	2001	2002	2003	2004	2005
Base Needs Total			2,064,000	6,375,000	1,215,000	2,260,000	3,085,000	3,310,000	675,000	810,000
Section 9 Capital (incl. local share)			150,000	150,000	150,000	150,000	150,000	150,000	140,000	150,000
STP Funds			1,305,000	250,000	450,000	0	3,000,000	3,120,000	600,000	500,000
Other State or Federal Program			300,000	5,000,000						
Un-funded Needs			309,000	975,000	615,000	2,110,000	(65,000)	40,000	(65,000)	160,000

Source: Duluth Transit Authority

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Thank you to the DTA Board and Staff for their participation and commitment to the "Vision for Transit" project.

***The Mission of the
Duluth-Superior
Metropolitan Interstate
Committee....***

***To provide
comprehensive planning
solutions on issues of
regional significance in
the Duluth-Superior
metropolitan area.***



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