

# Putting Residents First: Assessing Auto and Transit Access to County Service Facilities



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Patrick Haney

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GEOG 8290: Urban Mobility and Accessibility

## **Putting Residents First: Accessibility of County Service Facilities**

### **Introduction**

Ramsey County has many facilities that serve the clients and residents. Easy access to these facilities is important so that services are available to those who need them. Some facilities are aging and may be replaced in the future, so analysis needs to be conducted on if they are in accessible locations or could be better served elsewhere. Transit is an important indicator for access as many of those who use Ramsey County services rely on transit for their primary means of transportation.

This project will look at roughly 25 Ramsey County facilities to see how accessible they are to transit. I will look at coverage of which facilities have any access to transit and then look deeper into how frequent service is and how much of the county is covered by transit access. It is expected that some service facilities will have poor transit access, or none at all. Other service facilities may be well served by transit.

### **Background**

Ramsey County's residents do not live in an evenly distributed manner throughout the county. The areas closer to downtown in Saint Paul are much denser than the first ring suburbs, which in-turn are much denser than the suburbs at the furthest edge of the county. Siting county facilities becomes a challenge due to competing needs to have facilities serve the entire county and have facilities closest to the majority of residents.

Equitably serving transit dependent residents is an important goal and means siting facilities closer to better transit service. Transit service is best in the densest parts of the county where they can serve the most residents and job locations. However not all locations can be centrally located. There are still large

numbers of people in the suburbs that need public libraries or a court location that can be easily driven to.

An ideal analysis would use the home locations of clients who use county facilities, but that data is not available due to privacy concerns. In place of this analysis, there will be analysis done on the geographic coverage of transit service that serves county facilities. Once coverage is found then those areas can be analyze to determine If they serve the majority of county residents and clients who use county facilities.

A rough outline of how access will be measured is outlines as follows. County facilities will be mapped and transit facilities that can be accessed from these facilities will be selected. From these transit facilities routes will be selected and then a buffer distance the length of the route will be created to represent how far someone is willing to travel from that transit route to or from their destination.

A decision needs to be made on the distance that residents are willing to travel to transit stops. There is not a completely defined distance people are willing to travel to a transit stop but it is generally accepted  $\frac{1}{4}$  is a reasonable distance for transit users to travel. Depending on the circumstances transit riders may be willing to travel further distances.<sup>1</sup> For the purposes of this research I will use a  $\frac{1}{4}$  mile travel distance for all locations and modes.

### **Data and Data Preparation.**

Required data for this project is included in the table below. Most of the data was freely available for download from the Geospatial Commons. Some additional data was created for the purposes of analysis for this project.

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<sup>1</sup> Guerra, E., Cervero, R., & Tischler, D. (2011). The Half-Mile Circle: Does It Best Represent Transit Station Catchments? UC Berkeley: University of California Transportation Center. Retrieved from <https://escholarship.org/uc/item/68r764df>

Dataset	Source	Availability	Metadata?	Year	Notes
County street network	Met Council	Yes	Yes	Current	Needed to geocode addresses
County service facilities	Ramsey County	Collected online	No	Current	Manually entered addresses
GTFS data	transitfeeds.com	Yes	Yes	Current	
BetterBusBuffers tool	ESRI	Yes	Yes	Current	Needed to create some shapefiles
Bus stops	Met Council	Yes	Yes	Current	
Park and Rides	Met Council	Yes	Yes	Current	
Bus routes	Met Council	Yes	Yes	Current	
City boundaries	Met Council	Yes	Yes	Current	
Bus stops by number of trips	Created for project	Created	No	Current	Used BetterBusBuffers tool to use

The following section of this paper will outline what steps were done to complete the analysis.

The first task of the project is to determine which facilities are accessible by transit, even if it is barely accessible.

1. Manually enter service facilities into Excel
2. Create Address Locator File
3. Geocode addresses
4. Manually match or create the remain points.

A list of roughly 18 facilities was provided with directions to collect seven additional data points which are Ramsey County libraries. The addresses and names of facilities was manually entered into a Microsoft Excel file and then imported into ArcMap. Using a street network file downloaded from Geospatial Commons, an Address Locator file was created for Ramsey County so that the geographic locations of service centers could be determined. Most addresses were matched to a point location

while about five facilities needed to have their locations manually created after research from other mapping applications like Google Maps.

1. Create shapefile of transit stops and number of bus trips

Next, I create a shapefile from the BetterBusBuffers tool to look at transit stops and see how many trips stop per day at the route. This tool uses GTFS data and Python scripts to create a SQL database of transit stops and the number of trips that stop at each stop. The tool is provided by ESRI along with several other tools to use GTFS data spatially.<sup>2</sup>

## Methods

1. Create a buffer around facility locations.

There are different ways and distance to select a buffer for transit facilities. From completing background research, I determined that people are generally willing to walk ¼ mile for a transit facility. Again, further distances are possible depending on the circumstances but ¼ mile is a good starting point. As discussed earlier, a Euclidian buffer is easiest to make but not the most accurate. For the purposes of this project I will use a Euclidian buffer of ¼ mile to be consistent and simplify analysis.

2. Map transit stops and then select transit stops within that buffer.

At this point I have selected transit stops that are accessible from service facilities. More analysis is required to see if those bus stops are practically useful. For example, I can see using the Park and Ride shapefile that some facilities only have Park and Ride stops nearby so they cannot be effectively used throughout the day. Service facility trips may not last a full workday so it is important a resident can travel to a facility and then be able to return home at a reasonable time. Spending most of the day

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<sup>2</sup> ESRI. 2018. Using GTFS Data in ArcGIS. <https://esri.github.io/public-transit-tools/index.html>

waiting before or after a facility visit to return home is not acceptable. It is obvious that some facilities have no bus stops nearby and this means they are not accessible.

I can average the number of bus trips per hour to determine relative service frequency. I determined that for a bus route to be useful it must run at least once an hour. One bus trip per hour is relatively poor service and almost the minimum service frequency to be considered all day service. However, it is still useful enough for residents to access service facilities and then return. This also helps eliminate not useful transit stops that may be nearby facilities. I then map these accessible and functionally useful transit stops and facility buffers.

### 3. Select bus routes that stop at facility accessible transit stops

Next, I look at transit routes to see what areas are served by the transit routes that serve these bus stops. I select transit routes that serve transit stops that are accessible to service center users. I filter out any express bus stop because they are not functionally useful for noncommuters.

I map the above transit routes by the number of weekday trips. This is not perfect because for some routes not every trip serves all branches of a transit route.

### 4. Create buffer surrounding bus routes

The last step helps visualize what geographic areas of Ramsey County are accessible to service facilities.

## Results

Most of the city of Saint Paul is accessible to a service facility. Unsurprisingly the lower half of Ramsey County has much better accessibility than the upper half. The population density in the lower half is much higher and as a result there is more transit service.

There is minimal transit service available to the second ring suburbs. There are also only a few service facilities in the second ring suburbs, so this may not be a huge barrier to residents accessing services.

There is marginally better service in first ring suburbs, but it is still poor compared to the central city of Saint Paul. Roseville, Little Canada, Maplewood, and North St. Paul have the best service outside of Saint Paul.

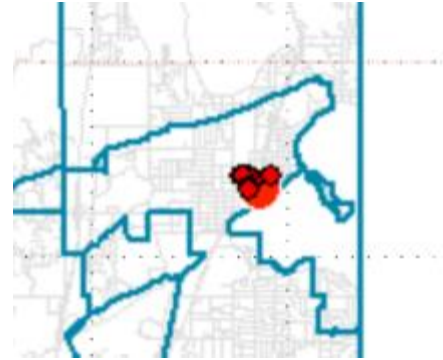
Several low accessibility places are libraries in the suburbs. This may be necessary offer everyone a nearby library even if that means they cannot use transit to get to it. As long as residents have a library close to their home it is not as important that they have access to all libraries.

Some facilities it may not be as important for there to be great transit access. Public works buildings may fit better in a centralized location well served by the road network, but not necessarily served by transit. Facilities that primarily serve county employees may also be a lower priority. While transit accessibility would be nice for county employees to use on their commute, they are not as likely to be transit dependent as people using county social services.

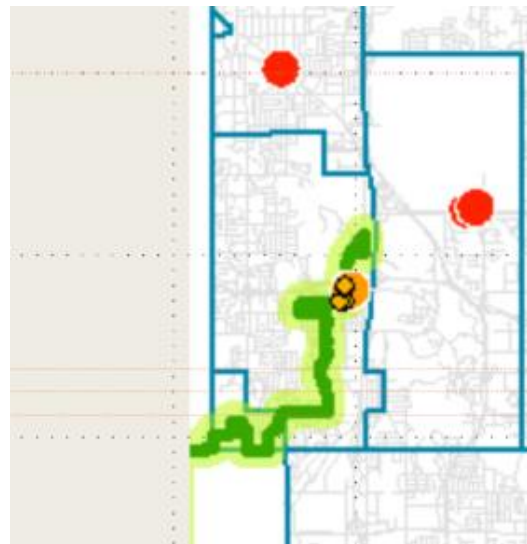
There are some unusual spots of Ramsey County that require further analysis and comment.



- The Ramsey County Library at White Bear Lake has several bus stops that are within close walking distance to it. However the only transit route that serves these stops is an express bus with four trips in the morning towards downtown Saint Paul. This means transit service to this location is functionally non-existent.

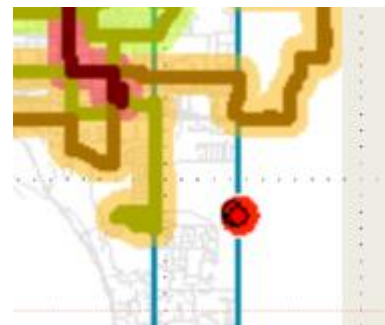


- The Ramsey County Library at New Brighton has several bus stops nearby and a bus route that appears to have great service. There are two issues from this original analysis. The first is that not all buses on that transit route travel all the way up to New Brighton. Many stop several miles before the library which means service is not as great as it appears. The second issue is



- that very little of the bus route serves Ramsey County and it in fact goes towards Hennepin County and downtown Minneapolis. For most transit dependent residents of Ramsey County they would need to travel to Hennepin County first before being able to travel to the library.

- In the bottom right of the county, just on the border with Washington County is the Ramsey County Correctional Facility. At first glance it appears there is a bus route with great service to the facility. This is misleading because the bus route that stops at the facility is simply one of the



- branches near the end of a bus route and that branch has service only. Only two trips per day actually serve the facility and they are in the middle of the day.

- Finally, there is some surprisingly accessible suburban locations on the East Metro in Maplewood. This is due to frequent service on two bus routes that both leave downtown Saint Paul and end at Maplewood Mall. The maps can be slightly misleading again due to branches that are not served frequently but overall those locations have some of the best transit accessibility in the suburbs.



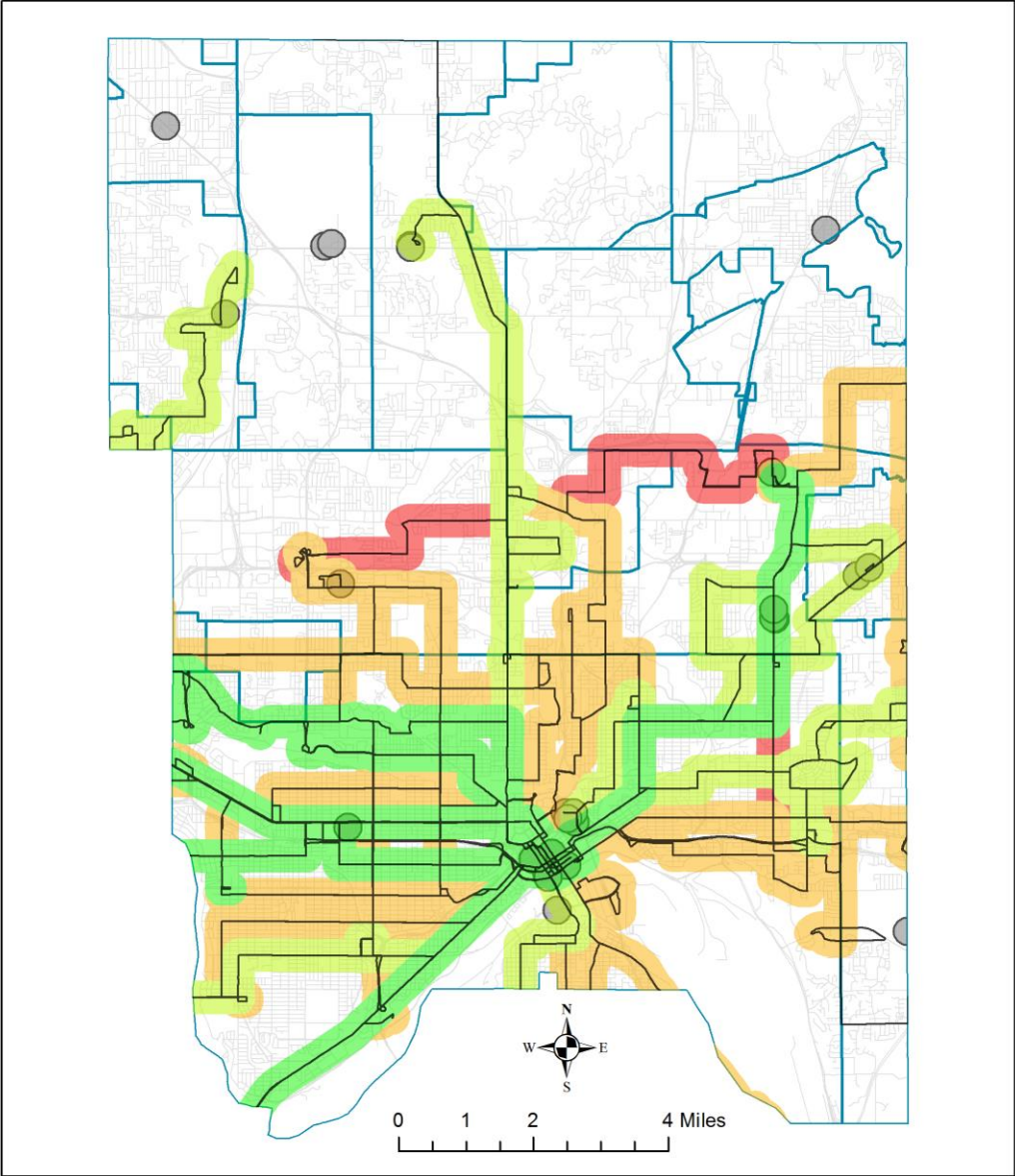
### **Future Analysis Possible**

Most importantly it may be worth investigating is looking at the accessibility to Ramsey County service facilities from the homes of service facility clients. This information is protected information and could be used to personally identify individuals, so it is not feasible to work at that level of detail. A broader view could look at concentrations of county clients and see if transit service serves clients in those high concentration areas.

It is worth looking at the type of services offered as well. For example, a facility in downtown may make most of the surrounding area look accessible but if it only serves a limited purpose this is not as useful. The busiest and most used facilities would best serve transit dependent populations if they were centrally located. If there is only one facility offering a service and it is in an inaccessible location, then further study should be done to determine if in the future a better site should be chosen.

Considerations for network distance from stops rather than Euclidian distance, using GTFS data in a network dataset, including transfers, and different levels of acceptable travel distance could all be considered.

# Service Area of Accessible Bus Routes

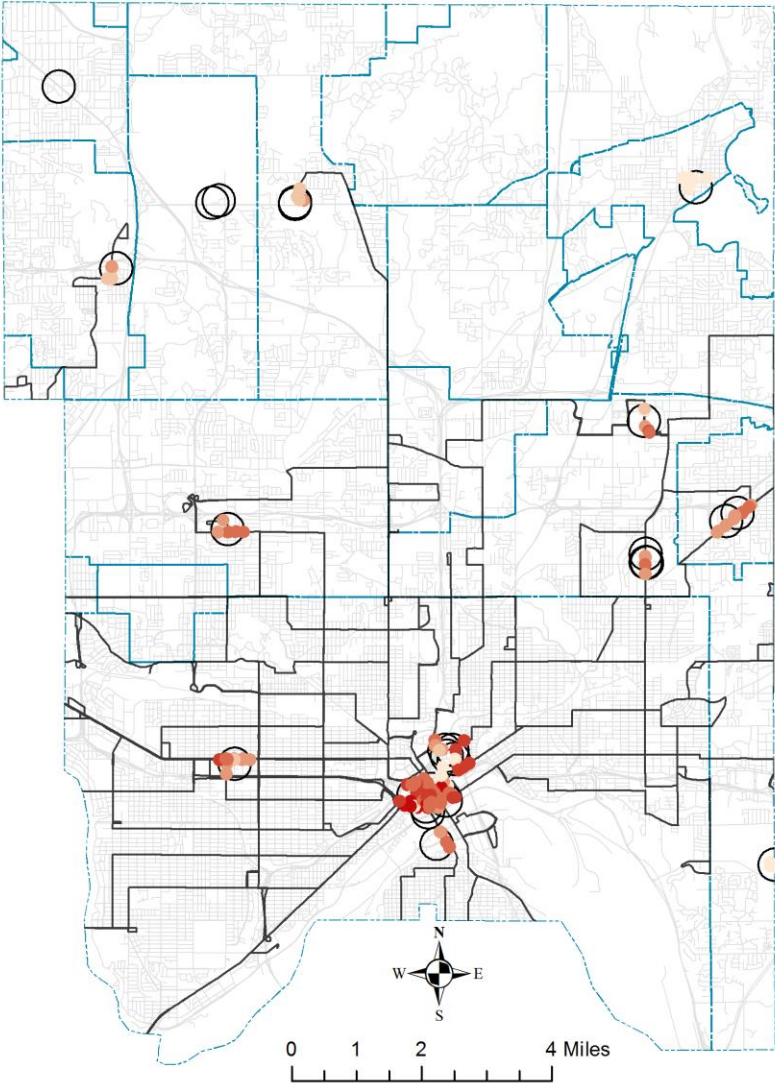


**Weekday Trip Frequency**

- 18 - 46
- 47 - 115
- 116 - 169
- 170 - 258
- Service Facility

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Data from Ramsey County and Met Council  
December 2018

# Accessibility of Proximate Bus Stops



### Accessibility of Bus Stops by Frequency

- Very High Accessibility (more than 18 trip per hour)
- High Accessibility (up to 18 trips per hour)
- Moderate Accessibility (up to 6 trips per hour)
- Low Accessibility (up to 3 trips per hour)
- Very Low Accessibility (up to 1 trip per hour)
- Not Accessible (less than 1 trip an hour)

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Data from Ramsey County and Met Council  
December 2018