

“Time-Banking” Transit and Carsharing: Can it bring additional users to carsharing originations and increased mobility and access to low-income populations?

Introduction and Overview

Carsharing has been most attractive to those in middle-income brackets, with most users being those who could afford to buy an additional car but instead choose to live in areas where it is more convenient to join a Carsharing Organization (CSO). However, the structure of carsharing, which moves the fixed costs of car ownership to variable costs, seems to create an opportunity for providing access to the benefits of private automobile use to those that could not otherwise afford it. As Giuliano and others have pointed out, a highly disproportionate number of low-income households have limited access to private vehicles.¹ The lack of access to private vehicles appears to result in reduced trip-making, and increased use of alternative modes.² While one should attribute some of the reduced trips to lower amounts of money available for discretionary travel, low-income people may not be making other trips simply because they are unable to access some auto-oriented destinations. Further, Giuliano shows that the use of alternative modes is by necessity, not choice – that is, they would rather use a private vehicle, if they could afford it.³ Consequently, it appears that developing a scheme that allows carsharing use by lower-income people could be a “win-win:” CSO’s could expand their customer base while the low-income population would gain a means to access new areas.⁴

Financial considerations are the major obstacle towards making such a seemingly logical connection a reality. While carsharing has much lower fixed costs than owning a car, application fees, membership fees and monthly fees may be part of paying for a CSO membership,⁵ all of which are greater fixed costs than paying transit fares or walking, and, over time, can add up to more than the fixed costs of owning a bicycle. Since low-income populations already pay a greater share of their income for transportation costs than people with higher incomes,⁶ adding these costs to their budget is a significant consideration. On the other hand, reducing carsharing fees to affordable levels for low-income people would be financial suicide for CSO’s that struggle to make a profit operating in neighborhoods populated by users that can afford higher rates.

Consequently, this service would need some type of subsidy. A potential model for this subsidy would be a time-banking model where users “bank” transit trips that can be then used for car sharing time. An obvious partner for providing this subsidy would be transit providers. While these organizations are often strapped for resources themselves, collaborating with CSO’s to offer carsharing to some of the low-income populations they serve could provide benefits in return. The subsidy could be a mechanism that at least retains, and possibly increases ridership: if the hub is located in an area that provides good commute service, a program where the transit service pays for an hour or two of carsharing use by riders that build up 8 – 10 transit trips per week (basically using transit for the work trip) preserves the transit commute.⁷ In the alternative, if a low-income person buys their own car, the transit commute is likely lost, due to incentives for the new auto owner to maximize use of their new purchase.⁸ Additionally, such a program could attract new, higher-income riders, as the addition of carsharing would serve as incentive

for higher-income residents to become regular users of transit. In other words, the carsharing connection would provide them with “mobility insurance.”

An option for reducing this subsidy is locating carsharing hubs in locations accessible to both low-income and higher-income users. Given the finding that most carsharing members choose to live in mixed-income neighborhoods, this happy circumstance is not completely impossible to find. Since financial success of a CSO is based upon increasing the hours each car is in use, the greatest benefit arises if additional users can be brought to existing cars, rather than expanding the fleet. Locating a hub in neighborhoods with high concentrations of low-income people actually exacerbates the latter situation, as the limits on charges discussed above greatly increases the number of hours required for use before the hub breaks even. In other words, locating in an exclusively low-income neighborhood would likely require a continual subsidy to the CSO, exposing it to the same critiques and potential cuts endured by existing government-subsidized transit services. Instead, location in mixed-income neighborhoods creates the opportunity for creative pricing structures, internal cross-subsidizations and other mechanisms that reduce the overall additional assistance needed.

Obviously, this is a “niche.” The program would only work in mixed-income neighborhoods that have a high level of transit service. Fortunately, the discussion in earlier tasks shows these are the same neighborhood characteristics that indicate a higher likelihood of carsharing success. The remaining obstacles are identifying the neighborhoods most favorable to adding low-income users, and working with a transit provider to develop a method for financing the subsidies.

Methodology

The research team examined whether such a model could work in the Twin Cities. To determine the likelihood for a time-banking model to work, the team looked at the following factors:

- Population
- Poverty rate
- Work location and
- Transit use

The team then set up a working hypothesis that the neighborhood needed a high population density to support carsharing and discourage parking (thus creating demand for carsharing), commutes long enough that transit made more sense than walking or biking, a relatively high transit commute share, and, most importantly for this analysis, a poverty rate that is high enough for a significant number of low-income people to benefit from the program, but not so high as to overwhelm demand for the carsharing car.

For this analysis, we looked at 4 neighborhoods identified in earlier tasks as being most favorable to car sharing: Loring Park, University of Minnesota, Marcy-Holmes, and Uptown areas. Please see map 1 for the locations. Then, using the census tracts identified in the neighborhood analysis from earlier subtasks, we used census data to identify the population and poverty rates in each neighborhood. We calculated poverty

rates for the neighborhood as an average of the tracts⁹ (see tables 1 – 4). Finally, we created maps and tables describing where people in these neighborhoods work.¹⁰ The results of this data, and analysis of whether the model could succeed in each neighborhood are presented below, with neighborhoods listed from most likely to least likely.

Uptown Area

This is the most populous of the four areas, with a 2000 population of 30,447. However, it also had the lowest amount of poverty, with 15.2% of individuals in poverty (4639, also the lowest actual number of the 4), and 12.7% of families. Maps 2 and 3 show that while the greatest concentration of workers have relatively short commutes (less than 10 miles), these trips are to the transit-friendly destinations of downtown Minneapolis and the University of Minnesota.¹¹ Additional workers are concentrated in St. Paul, Bloomington and Edina (see table 5), which are 10 – 15 miles away, and more likely to be taken by a motorized mode of transportation, rather than biking or walking, and these areas are also accessible by transit. Consequently, this area appears to be a likely candidate where a time-banking program could serve the low-income residents, and sustain itself.

Marcy-Holmes Area

This area has a population of 21,168, and a high poverty rate of just less than 1 in 3: 28.1%. However, the family poverty rate is much lower: 14.2%, possibly creating a situation where low-income families could benefit from car-sharing providing a “2nd” car, if the program could be structured to cater to families only. Obviously, the feasibility and wisdom of further restricting membership is questionable. Further, and similar to the Loring Park area, workers are very likely to work close to home, as shown in maps 4 and 5. Consequently, walking and biking would be as attractive as transit as an alternative commute mode. The percentage of workers in Minneapolis (see table 6) is not as high as Loring Park, however, and Map 4 does indicate some concentrations of workers near downtown St. Paul, Bloomington, and Edina, which are relatively accessible by transit.¹² Thus, while not as obvious a fit as Uptown, a time-banking model might work in this area, if sufficiently customized, and given lots of attention during its first years of operation.

Loring Park Area

This area is almost as populous as Uptown, with a 2000 population of 29,652. However, its poverty rates were higher, with nearly 20% of individuals and families in poverty. In addition, this area is located closer to downtown Minneapolis (within 4 miles), and 49% of its workers, the highest of the 4 neighborhoods, work within the city limits (see table 7). Maps 6 and 7 further demonstrate the concentration of workers with their jobs located quite close to where they live. Consequently, a time-banking model might not be as effective here. The higher poverty rates indicate a possible higher demand by low-income users, thus reducing the number of trips available to paying users, and reducing the likelihood of the hub sustaining itself financially. On the other hand, the transit share

for work commutes is the highest of the 4 neighborhoods,¹³ so, if sufficient funding exists to subsidize the likely operating loss, low-income users could accumulate the transit trips necessary to obtain use of a carsharing car.

University of Minnesota Area

This area is least likely to sustain a time-banking model. The area has the smallest population (14,281), and the highest poverty rate, leaving a dearth of paying users. Further, a significant portion of the individuals below the poverty rate are probably students, who are unlikely to use transit for regular commute trips,¹⁴ thus making their demand for carsharing vehicles less predictable – and possibly at times when paying users would also be likely to demand use of the vehicles. Finally, as shown in maps 8 and 9, jobs are concentrated within a very small area.

However, despite all these negatives, a time-banking model might even work here. Since the University has two campuses, one in Minneapolis and one in St. Paul, students and staff who live in the area could accumulate a significant number of transit trips between each of these. Further, map 8 and table 8 show a concentration of jobs in downtown St. Paul and in Bloomington, near the airport and Mall of America, which are easily accessed by transit. Consequently, if further research demonstrated sufficient demand by paying customers to cross-subsidize use by those truly in poverty, a time-banking model could sustain itself.

Need for Additional information

Obviously, this review is only a first cut. More data is needed on how much of a subsidy per user would be necessary, how much of that subsidy could be covered through contributions from a transit agency, and how much could be covered through cross-subsidy from paying users. Further, analysis is needed to determine whether there is an optimal mix of lower and higher-income users – that is, whether the combination of increased vehicle use and lower income per use results in a linear or parabolic return, and, if the latter, where the high point(s) are.

In addition, the scheme itself is not perfect. It is not likely to improve mobility and access in the poorest neighborhoods, and it assumes that transit is most effective at serving commute trips, while creating a competing alternative to non-commute trips. As a result, any advocate of this program is likely to face criticism not only from anti-tax and anti-government groups, but from transit advocates as well.

MAP 1:

Areas with Best Carsharing Potential

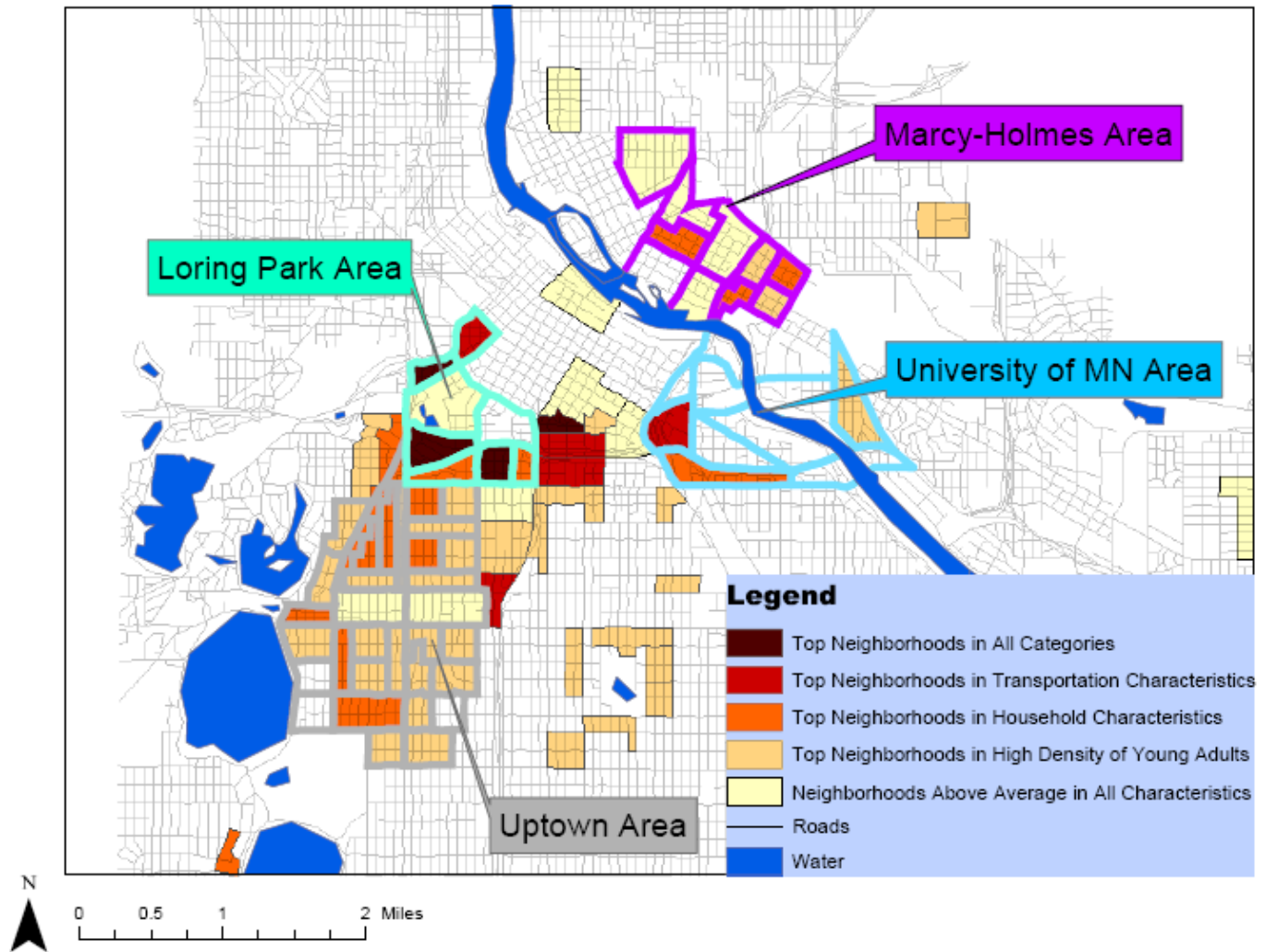


Table 1: Uptown Area

Population	30,447	Families	5,109
Individuals in Poverty	4,639	Families in Poverty	649
Poverty Rate	15.2%	Poverty Rate	12.7%

Table 2: Marcy-Holmes Area

Population	21,168	Families	3,176
Individuals in Poverty	5,953	Families in Poverty	451
Poverty Rate	28.1%	Poverty Rate	14.2%

Table 3: Loring Park Area

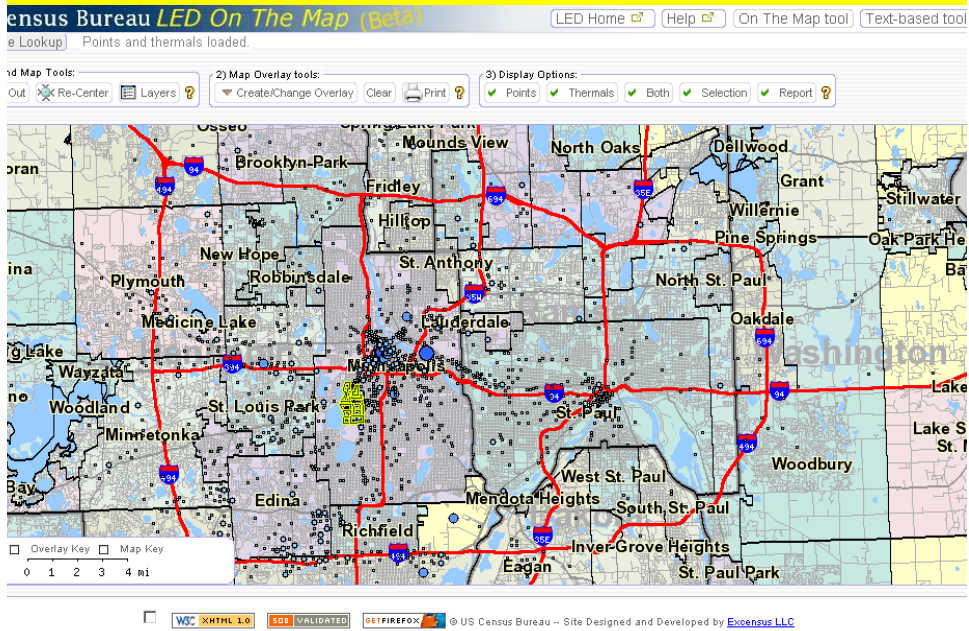
Population	29,652	Families	3,354
Individuals in Poverty	5,863	Families in Poverty	636
Poverty Rate	19.8%	Poverty Rate	19.0%

Table 4: University of Minnesota Area

Population	14,281	Families	2,665
Individuals in Poverty	5,104	Families in Poverty	713
Poverty Rate	35.7%	Poverty Rate	26.8%

MAP 2

Uptown Area (points)



MAP 3

Uptown Area (thermals)

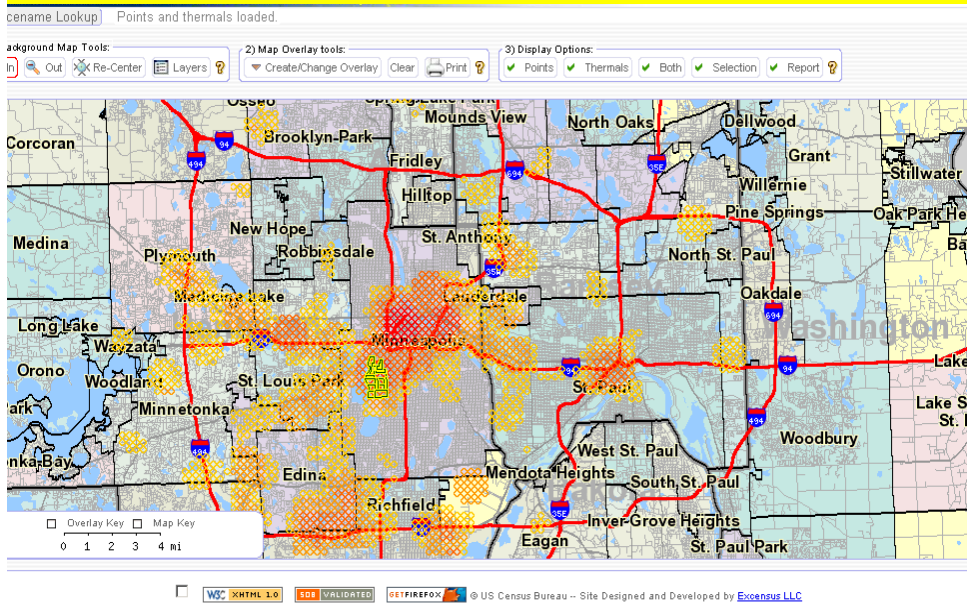


Table 5: Uptown

Commute Shed Report-Where Residents are Employed: Minneapolis' Uptown Area

NUMBER OF JOBS HELD BY RESIDENTS

	2003		2002	
	<u>Count</u>	<u>Share</u>	<u>Count</u>	<u>Share</u>
*All Jobs	7,823	100.0%	8,572	100.0%
*All Jobs (Private Sector Only)	6,870	87.8%	7,605	88.7%
*All Primary Jobs (Worker's highest paying job)	7,202	92.1%	7,923	92.4%
*All Primary Jobs (Private Sector Only)	6,298	80.5%	6,991	81.6%

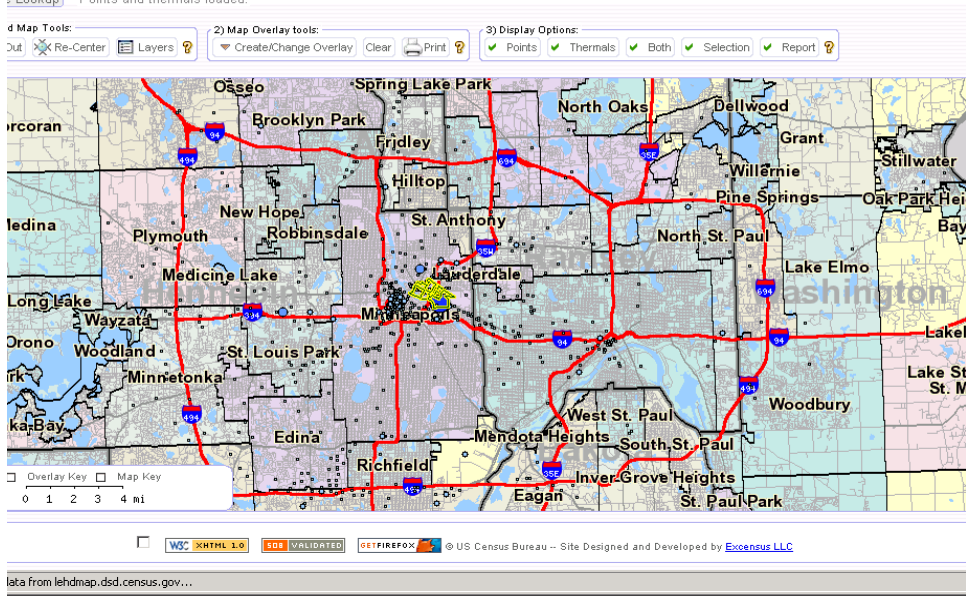
WHERE AREA WORKERS ARE EMPLOYED

	2003		2002	
	<u>Count</u>	<u>Share</u>	<u>Count</u>	<u>Share</u>
Total Workers (Primary Jobs-Private Sector)	6,298	100.0%	6,991	100.0%
Cities/Towns Where Residents are Employed				
*Minneapolis	2,770	44.0%	3,017	43.2%
*St. Paul	451	7.2%	498	7.1%
*Bloomington	451	7.2%	504	7.2%
*Edina	311	4.9%	422	6.0%
*Golden Valley	237	3.8%	233	3.3%
*All Other Locations	2,078	33.0%	2,317	33.1%
Counties Where Residents are Employed				
*Hennepin	4,879	77.5%	5,427	77.6%
*Ramsey	751	11.9%	791	11.3%
*Dakota	196	3.1%	207	3.0%
*Anoka	121	1.9%	175	2.5%
*Washington	57	0.9%	42	0.6%
*All Other Locations	294	4.7%	334	4.8%

Source: LED Worker Origin/Destination Database (2nd Quarter 2002 and 2003)

MAP 4:

Marcy-Holmes Area (points)



MAP 5:

Marcy-Holmes Area (thermals)

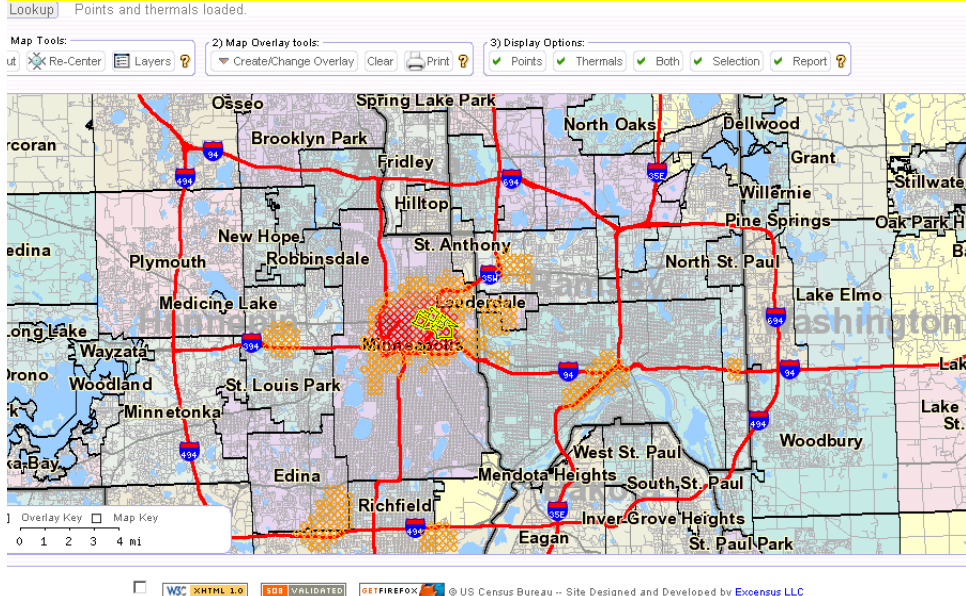


Table 6: Marcy-Holmes

Commute Shed Report-Where Residents are Employed: Minneapolis' Marcy-Holmes Area

NUMBER OF JOBS HELD BY RESIDENTS

	2003		2002	
	<u>Count</u>	<u>Share</u>	<u>Count</u>	<u>Share</u>
*All Jobs	2,488	100.0%	2,712	100.0%
*All Jobs (Private Sector Only)	1,974	79.3%	2,214	81.6%
*All Primary Jobs (Worker's highest paying job)	2,246	90.3%	2,413	89.0%
*All Primary Jobs (Private Sector Only)	1,761	70.8%	1,941	71.6%

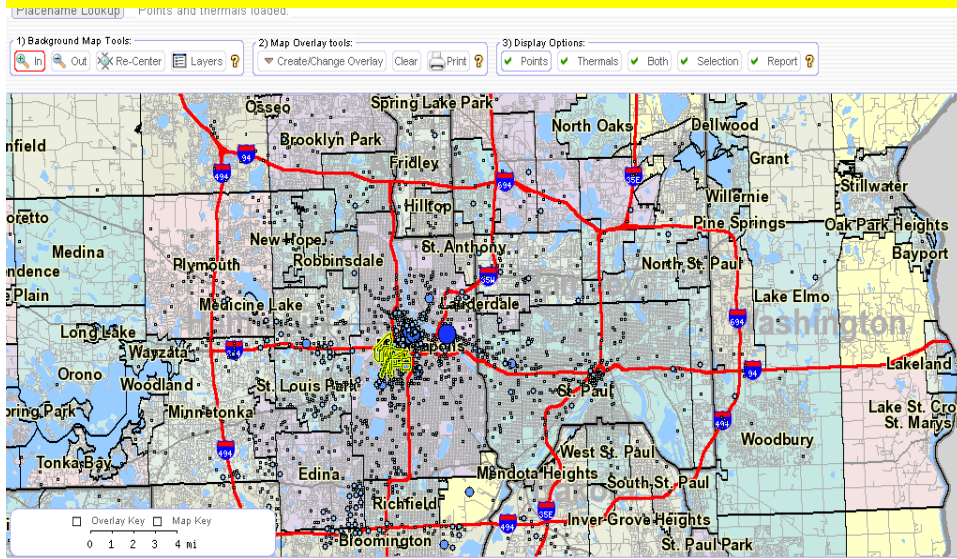
WHERE AREA WORKERS ARE EMPLOYED

	2003		2002	
	<u>Count</u>	<u>Share</u>	<u>Count</u>	<u>Share</u>
Total Workers (Primary Jobs-Private Sector)	1,761	100.0%	1,941	100.0%
Cities/Towns Where Residents are Employed				
*Minneapolis	821	46.6%	940	48.4%
*Bloomington	120	6.8%	115	5.9%
*St. Paul	119	6.8%	147	7.6%
*Edina	64	3.6%	58	3.0%
*Roseville	52	3.0%	60	3.1%
*All Other Locations	585	33.2%	621	32.0%
Counties Where Residents are Employed				
*Hennepin	1,272	72.2%	1,399	72.1%
*Ramsey	243	13.8%	279	14.4%
*Dakota	82	4.7%	61	3.1%
*Anoka	58	3.3%	74	3.8%
*Washington	17	1.0%	25	1.3%
*All Other Locations	89	5.1%	88	4.5%

Source: LED Worker Origin/Destination Database (2nd Quarter 2002 and 2003)

MAP 6:

Loring Park Area (points)



MAP 7:

Loring Park Area (thermals)

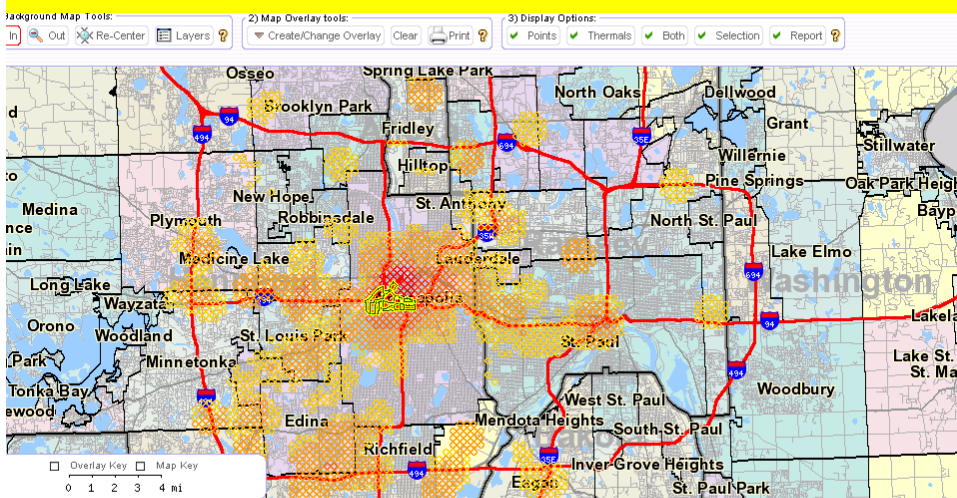


Table 7: Loring Park

Commute Shed Report-Where Residents are Employed: Minneapolis' Loring Park Area
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NUMBER OF JOBS HELD BY RESIDENTS

	2003		2002	
	<u>Count</u>	<u>Share</u>	<u>Count</u>	<u>Share</u>
*All Jobs	11,390	100.0%	12,237	100.0%
*All Jobs (Private Sector Only)	10,221	89.7%	10,977	89.7%
*All Primary Jobs (Worker's highest paying job)	10,339	90.8%	11,073	90.5%
*All Primary Jobs (Private Sector Only)	9,229	81.0%	9,890	80.8%

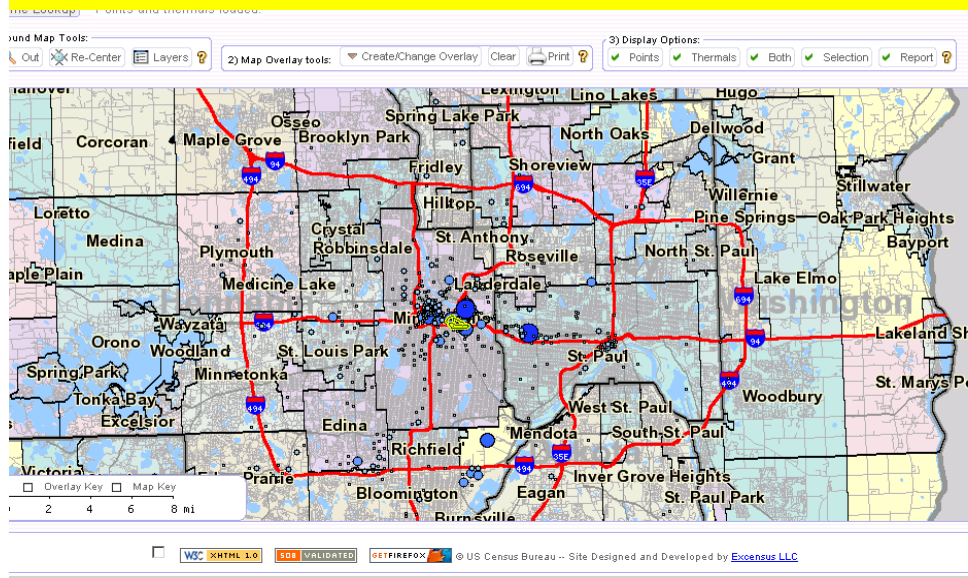
WHERE AREA WORKERS ARE EMPLOYED

	2003		2002	
	<u>Count</u>	<u>Share</u>	<u>Count</u>	<u>Share</u>
Total Workers (Primary Jobs-Private Sector)	9,229	100.0%	9,890	100.0%
Cities/Towns Where Residents are Employed				
*Minneapolis	4,551	49.3%	4,864	49.2%
*St. Paul	632	6.8%	656	6.6%
*Bloomington	540	5.9%	541	5.5%
*Edina	443	4.8%	522	5.3%
*St. Louis Park	306	3.3%	320	3.2%
*All Other Locations	2,757	29.9%	2,987	30.2%
Counties Where Residents are Employed				
*Hennepin	7,185	77.9%	7,800	78.9%
*Ramsey	1,053	11.4%	1,047	10.6%
*Dakota	321	3.5%	246	2.5%
*Anoka	200	2.2%	236	2.4%
*Washington	78	0.8%	59	0.6%
*All Other Locations	392	4.2%	482	4.9%

Source: LED Worker Origin/Destination Database (2nd Quarter 2002 and 2003)

MAP 8:

University Area (points)



MAP 9:

University Area (thermals)

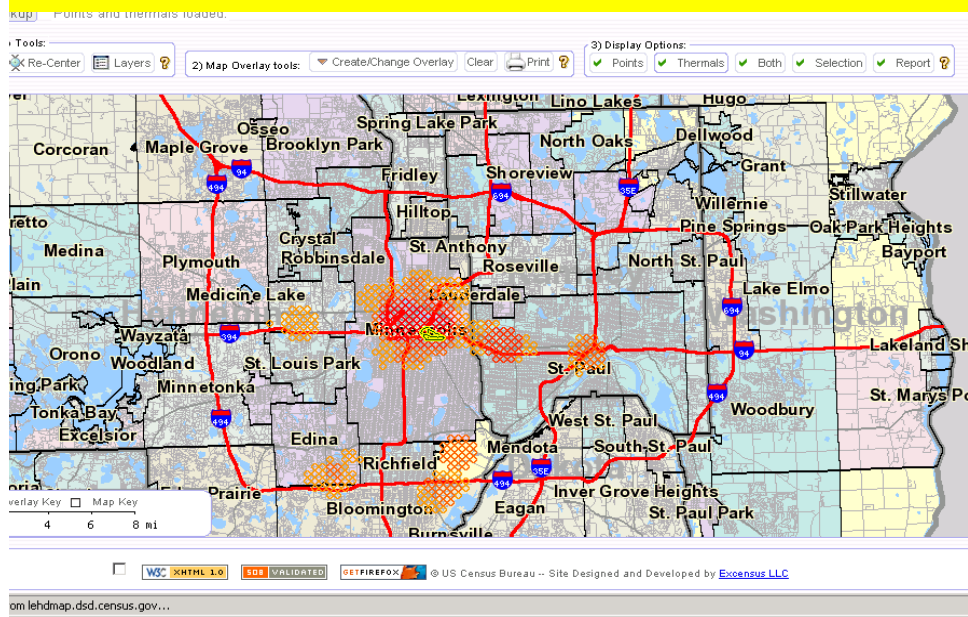


Table 8: University of Minnesota

Commuter Shed Report-Where Residents are Employed: Minneapolis' University of Minnesota Area
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NUMBER OF JOBS HELD BY RESIDENTS

	2003		2002	
	<u>Count</u>	<u>Share</u>	<u>Count</u>	<u>Share</u>
*All Jobs	2,407	100.0%	2,565	100.0%
*All Jobs (Private Sector Only)	2,126	88.3%	2,267	88.4%
*All Primary Jobs (Worker's highest paying job)	2,087	86.7%	2,277	88.8%
*All Primary Jobs (Private Sector Only)	1,817	75.5%	2,004	78.1%

WHERE AREA WORKERS ARE EMPLOYED

	2003		2002	
	<u>Count</u>	<u>Share</u>	<u>Count</u>	<u>Share</u>
Total Workers (Primary Jobs-Private Sector)	1,817	100.0%	2,004	100.0%
Cities/Towns Where Residents are Employed				
*Minneapolis	833	45.8%	952	47.5%
*St. Paul	259	14.3%	173	8.6%
*Bloomington	109	6.0%	155	7.7%
*Unincorporated Area	72	4.0%	68	3.4%
*Edina	57	3.1%	73	3.6%
*All Other Locations	487	26.8%	583	29.1%
Counties Where Residents are Employed				
*Hennepin	1,264	69.6%	1,428	71.3%
*Ramsey	326	17.9%	287	14.3%
*Dakota	50	2.8%	46	2.3%
*Anoka	47	2.6%	48	2.4%
*Steele	18	1.0%	25	1.2%
*All Other Locations	112	6.2%	162	8.1%

Source: LED Worker Origin/Destination Database (2nd Quarter 2002 and 2003)

¹ Giuliano, G. Low Income, Public Transit, and Mobility. In *Transportation Research Record: Journal of the Transportation Research Board, No 1927*, TRB, National Research Council, Washington, D.C., 2005, pp. 63-70.

² *ibid*

³ *ibid*

⁴ Note that a related effect is that the quality of the automobile fleet would also improve, as CSO's usually operate with new cars in good repair, while most cars purchased by low-income people tend to be older cars in poor repair. One area directly improved by this change would be air quality, as the worst emitting vehicles also are older cars in poor repair.

⁵ For example, a ZipCar member in Minneapolis would pay a \$25.00 application fee plus a \$50.00 annual fee in addition to the \$8.00 per hour use charge. Data from <http://www.zipcar.com/umn/apply/>? Last accessed August 25, 2006. Similarly, HOURLCAR, the other CSO in the Twin Cities requires a \$50.00 application fee and monthly fees that vary depending upon the plan the user chooses, in addition to use charges. Note that the use charges and monthly fees to vary inversely. Data from <http://www.hourcar.org/rates.html> Last accessed August 25, 2006

⁶ Giuliano

⁷ This idea is inspired by the "time-banking" model developed by Katherine Freund of ITNAmerica. More information at www.itnamerica.org (last accessed July 21, 2006)

⁸ Giuliano points out that low-income people would rather own cars than take transit

⁹ Data for the calculations in tables 1 – 4 came from Census factfinder http://factfinder.census.gov/servlet/SAFFacts?_event=Search&geo_id=04000US27&_geoContext=01000US%7C04000US27&_street=&_county=Minneapolis&_cityTown=Minneapolis&_state=04000US27&_zip=&_lang=en&_sse=on&ActiveGeoDiv=geoSelect&_useEV=&pctxt=fph&pgsl=040&_submenuId=factsheet_1&ds_name=DEC_2000_SAFF&_ci_nbr=null&qr_name=null®=null%3Anull&_keyword=&_industry=

¹⁰ This last tool can be found on-line at: <http://lehdmap.dsd.census.gov/>

¹¹ Transit share in 2000 for zip code 55408 was 20.5%. Data from Census factfinder.

http://factfinder.census.gov/servlet/QTable?_bm=y&-geo_id=86000US55408&-qr_name=DEC_2000_SF3_U_DP3&-ds_name=DEC_2000_SF3_U&-lang=en&-redoLog=false&-sse=on last accessed August 10, 2006

¹² Transit share for work commutes in zip code 55414 is only 12%, while 21.6% walked. Data from Census factfinder. http://factfinder.census.gov/servlet/QTable?_bm=y&-geo_id=86000US55414&-qr_name=DEC_2000_SF3_U_DP3&-ds_name=DEC_2000_SF3_U&-lang=en&-sse=on Last accessed August 10, 2006

¹³ Despite the close proximity of downtown, the transit share of work commutes in zip code 55403 is 21.3% with 18% walking. Data from Census factfinder. http://factfinder.census.gov/servlet/QTable?_bm=y&-geo_id=86000US55403&-qr_name=DEC_2000_SF3_U_DP3&-ds_name=DEC_2000_SF3_U&-lang=en&-redoLog=false&-sse=on Last accessed August 10, 2006

¹⁴ Two zip codes are referenced in this area 55455, and 55454. The transit share of work commutes in 55455 (which includes the U of M campus), is only 10%, with 50% walking. Data from Census factfinder http://factfinder.census.gov/servlet/QTable?_bm=y&-qr_name=DEC_2000_SF3_U_DP3&-geo_id=86000US55455&-ds_name=DEC_2000_SF3_U&-lang=en&-redoLog=false&-sse=on last accessed August 10, 2006. The transit share is higher in the adjacent 55454, 195, but that is still not as high as the walking share, which is 25%.