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A Greenway Runs Through it: The Midtown Greenway and the Social Landscape of Minneapolis, Minnesota

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Abstract

Minneapolis' Midtown Greenway is a 5.5 mile bicycle and pedestrian corridor that replaced a grade-separated railroad line in 2000 and expanded to its current length in 2007. In an era of reinvestment in American inner cities and a heightened political awareness of both urban transportation alternatives and public spaces, the academic field of geography has much to contribute to the discussion about the viability, effectiveness, and success of projects such as this adaptive reuse of reclaimed, deindustrialized space. My research investigates results from a survey of 223 Greenway users, exploring participants' demographics, residential proximity to the trail, and purposes for using the facility. My results are then compared to temporal and meteorological correlations of Greenway traffic and to Census-provided demographics of the surrounding neighborhoods. Hennepin County parcel data are also utilized to analyze how property values have changed based on proximity to the Greenway, and I also explore the spatial patterns of individual's donations to the nonprofit that represents local's interests for the trail. Focusing on the scalar dimensions of how this facility is related to the landscape provides an examination of a new piece of infrastructure that represents an emerging urban form poised to potentially revitalize, reorganize and reshape American cities.

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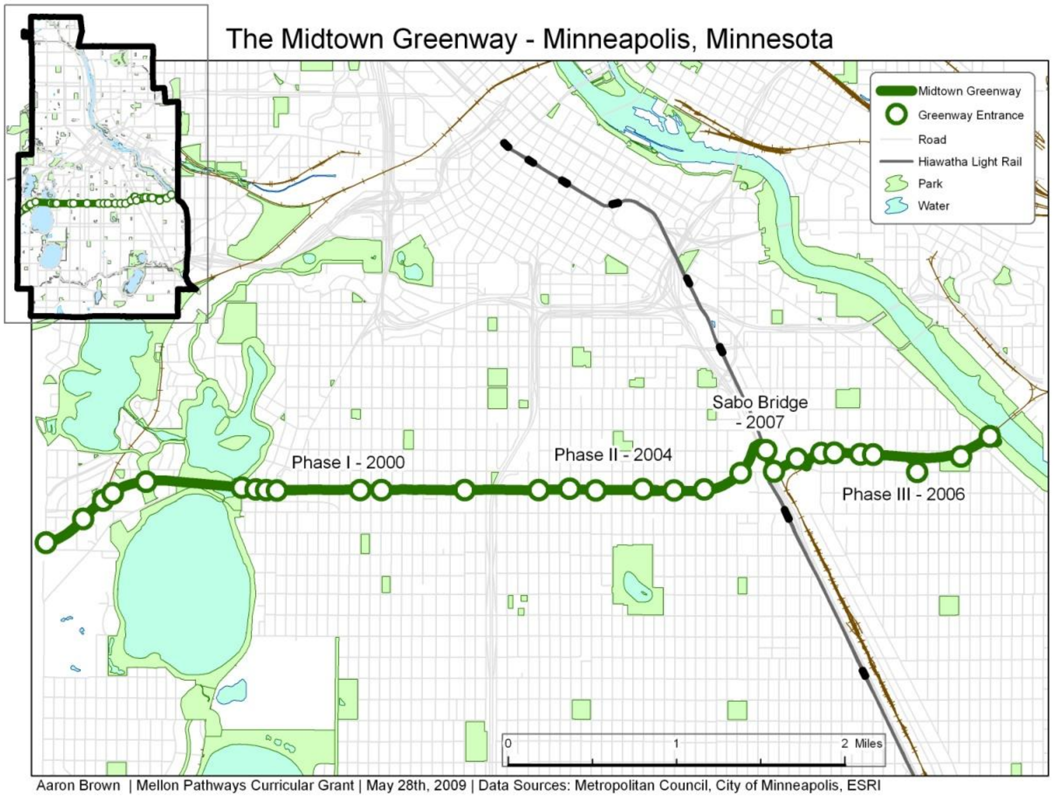


Map 1 – The Midtown Greenway in southern Minneapolis, Minnesota.

1.0 - Introduction

This paper seeks to understand the relationship between the social landscape of the city of Minneapolis and the recently constructed Midtown Greenway, a multiuse bicycle and pedestrian path constructed on the right of way of a former industrial railroad line. Opened in 2000 and expanded to its current length in 2007 (see Map 1), the Midtown Greenway is a unique piece of infrastructure that has been celebrated by many as an adaptive reuse of industrial space for recreation, an invaluable piece of transportation infrastructure linking different neighborhoods of the city, and a piece of public space that stands to revitalize South Minneapolis through encouragement of public and private reinvestment.

The paper begins with an introduction to urban greenways in American metropolitan areas, tracing the history of the movement and the possibilities of the form for contemporary urban planning. I also include a brief introduction of the history of the Midtown Greenway, explaining its roots as project initiated through local community organization, regional planning and coordination and funded largely through federal transportation monies. This paper then has five parts which each attempt to answer a particular question related to the larger theme about usage of the Midtown Greenway and how the facility affects and is affected by the social landscape of southern Minneapolis. First, I will review the city of Minneapolis' data about trail usage, run a regression analysis to see if daily usage is increasing over time, and explore how strongly usage is affected by seasonal weather and other potentially correlated daily factors. Second, using the assumption that spatial proximity to greenways can contribute to a definition of accessibility, I use Census data to explore the demographics of the neighborhoods near the Midtown Greenway and see how these statistics relate to the demographics of Minneapolis and the seven-county metropolitan region. Third, I conduct a survey of 223 Midtown Greenway users and I compare the racial demographics of survey participants to the demographics of the adjacent neighborhoods. I also explore data gained by the survey to explore how usage of the Midtown Greenway is related to a user's residential proximity to the facility, their purpose for making a trip, gender, age, and their opinions about the trail. Fourth, I analyze Hennepin County Parcel data to see how property values adjacent to the Greenway have changed relative to those in the city of Minneapolis as a whole from 2001 – 2008. Finally, I look at the residential locations of current members who have donated to the nonprofit Midtown Greenway Coalition as a proxy for understanding the geographic aspect of political stakeholdership to the corridor. While there are many other possible avenues of exploration to understand how the Midtown Greenway is used, these five studies provide some of the first research on comprehensively understanding the way in which this unique urban form relates to its nearby communities. This paper provides one of the first looks at a successful, contemporary rail-to-trail conversion in an urban setting and presents clues about how the facility has been integrated into the social landscape of the city. Collectively, these different tests present a holistic approach to understanding how the Midtown Greenway is functioning as a transportation link, recreational corridor, economic amenity, and as a public space in the complex urban ecology of 21st century Minneapolis.

Throughout these studies is an implicit attention paid to the geographic concept of scale. Whether determining how far people will travel to the Greenway, how distance to the facility might affect property values, or how neighborhoods and communities along the Greenway have similar or different demographic characteristics, thinking critically about the geographic sphere of influence of the Midtown Greenway is helpful to identify the spatial implications of this intervention into the landscape and may provide help for urban planners attempting to construct similar facilities.

2.0 – Research Approach

The fact that this paper explores the Midtown Greenway as it exists as a transportation corridor, a piece of recreation infrastructure, and as a prominent swath of urban space lends itself to an extensive, multidisciplinary literature review.[1] Numerous traffic engineers and academics who study active transportation have written extensively about the ways in which travel infrastructure affects bicycle usage, and this paper cites this work in my exploration of survey data and framing how usage of such a corridor is monitored and studied empirically. Significant literature also exists about the historic greenway movement and greenways in general, ranging from its historic ideological underpinnings to the role linear park corridors can play in 21st century urban form. I also cite social theorists in various disciplines concerned with the ways race, class and gender are reproduced in society, using these perspectives to help offer possible answers to explain the demographic trends I uncover in my research. These different perspectives, from various wings of the academic world, have all applied methodological studies to study how people are interacting with these new linear corridors, although I believe this paper to be the first to combine the contributions from different parts of the academy to specifically focus on Minneapolis' Midtown Greenway. My project not only attempts to bridge the gaps between these various fields of inquiry but to do so in relation to a unique piece of infrastructure that is seen as a model for urban revitalization across the country. Because this paper has five different methodological research projects, I will provide a review of each section's relevant literature before each respective section of the paper, rather than presenting all of the relevant literature here.

[1] A thorough analysis of how different interpretations of greenways and linear corridors relate to morerecent forms of urban trail development can be found Chapter 2 of Sooyoung Kim's analysis of the Burke-Gilman trail in Seattle, Washington (Kim, 2003).

2.1 Greenway Form – A History

The Midtown Greenway and other contemporary linear parks owe their ideological roots to some of the earliest Western urban planners. Robert Searns (1995) describes how development of greenways have changed historically, categorizing three distinct "generations" of Greenway construction dating back to Olmsteadian boulevards informed by Anglo-American city planning as early as 1700. The intellectual ancestors of today's conservation corridors can be seen in various urban planning models, from London's Greenbelt boundary to American City Beautiful advocates such as the Olmsteads who sought to create a network of parks to increase the health and moral quality of urban citizens (Walmsley, 1995).

The first generation of greenways consisted of parkways, boulevards, and axes intended to combat what was understood as the unhealthy ills of the contemporaneous industrial city. Minneapolis' Grand Rounds park system, planned in the late 19th century in concert with the early growth of the city, is an exemplary model of First Generation Greenway development; the forty-mile green strip that winds through Minneapolis and connects the city's abundant lakes and rivers is in many ways the intellectual ancestor of the Midtown Greenway, and the rhetoric in Minneapolis used to build these parkways stressed the need to connect different neighborhoods as a way to obtain a higher quality of life. As Minneapolis park planner Horace Cleveland stated:

> " I would have the city itself such a work of art as may be the fitting abode of a race of men and women whose lives are devote to a nobler end than money-getting and whose efforts shall be inspired and sustained by the grandeur and beauty of the scenes in which their lives are passed. Nature

> offers us such advantages as no other city could rival, and such as if properly developed would exhibit the highest attainment of art…" (Cleveland, 1883)

Searns' second generation of greenways began around 1960, and emphasized trail-oriented recreational greenways intended to provide access to rivers and other natural amenities. Generally constructed for recreational purposes, these facilities often included trails intended for recreational travelling around environmental resources, were occasionally built on abandoned rail lines, and were delineated from their predecessors because of the travel-inducing, automobile-free nature of the trails. Searns writes:

> "In completing a discussion of Generation 2 greenways, it is important to examine more closely the concept of urban trails, because it is these non-motorized routes of travel that define the purpose and core of this greenway era. Trails have been around as long as humans, but, with the exception of informal footpaths here and there, recreation trails were traditionally either a 'wilderness' experience or the more formal walkways found in city parks and the pleasure gardens of European royalty. The trails experience was not commonly accessible to city dwellers. The urban greenway trail represents a special, more accessible, adaptation, a combination of the off-street bikeway concept which first emerged in Europe, wilderness hiking trails, and Olmstead's park walkways." (1995, p. 72)

The landscaping changes to Minneapolis' Grand Rounds park system reflect this paradigmatic shift; significant renovation of the Grand Rounds retrofitted the system with a recreational, off-road trail throughout the entirety of the park system (Erickson, 2004, p. 237).

An emerging national movement for environmental consciousness led to a new paradigmatic shift in thinking about linear corridors. In the third generation of greenway development (dated as starting in 1985), projects were not necessarily designated explicitly for recreation purposes (although these functions were often included as well) but to address multiple objectives ranging from restoration of ecological processes to urban flood protection to wildlife habitat preservation. This third generation of greenways attempted to coordinate disciplines ranging from wetland ecology, landscape architecture and civil engineering to bring together new landscapes sensitive to ecological processes that conceptually understand nature as not just a recreation amenity but a resource needing as much conservation as cultivation. Searns sees the third generation of greenways as combining the linear park features of the previous generations with an increased focus on preservation and conservation by designing corridors for healthy and renewed ecological processes in developed locations. This latest form of greenway construction can also be seen as the beginnings of a shift away from the Euclidian, single-use zoning model that dominated urban planning discourse for most of the twentieth century because it encouraged land-use experts of different backgrounds to coordinate their efforts and accomplish multiple goals on the same strips of land.

This beginning of the third generation of greenways coincided with a rise in national awareness of the possibilities for greenways and trails in the country. President Reagan's commission on American Outdoors specifically recommended the establishment of greenways in American communities, in which Greenways are defined as "corridors of private and public recreation lands and waters, to provide people with access to open spaces close to where they live, and to link together the rural and urban spaces in the American landscape" (1986, p. 99). The connotation of a greenway as a site of nature reflects the discourse associated with linear park development; as conceived in the 1980s, greenways were seen as effective environmental amenities appreciated for their ecological aesthetic and the opportunities they provided for recreation and exercise. The Commission further noted that:

> "Greenways are local natural areas where recreation and conservation are among the primary values. They are fingers of green that come in many shapes and sizes. They may be in public or private ownership, and may serve many purposes. Greenways link people and resources. They can put recreation open spaces within a short walk from your home" (1986, p.99).

Noting that much of the federal and state park land are located "far from where people live," the report framed the need for Greenways by its intrinsic ability to connect people to resources; "[Americans] need open spaces close to home, and they need the pride that comes from realizing individual initiative. Greenways can meet those needs" (1986, p. 103).

The trails movement picked up steam with articles in popular magazines such as *National Geographic* (Grove, 1990) and *The Atlantic* (Hiss, 1997), although Charles Little's seminal work, *"Greenways for America"* (1990) served as a catalyst for development by documenting the grass-roots coalitions across the nation promoting these facilities and exploring the potential these greenways carry for future American cities. Little's pioneering work provides a thorough synthesis of the full range of projects, big and small, utilitarian or conservation-based, that were then taking place around the country under the name of greenway development. His oft-cited explanation of Greenways is notable for its broad, intentionally inclusive definition:

> "Greenway: 1. A linear open space established along either a natural corridor, such as a riverfront, stream valley, or ridgeline, or overland along a railroad right-of-way converted to recreational use, a canal, a scenic road, or other route. 2. Any natural or landscaped course for pedestrian or bicycle passage. 3. An open-space connector linking parks, nature reserves, cultural features, or historic sites with each other and with populated areas. 4. Locally, certain strip or linear parks designated as a parkway or greenbelt" (1990, p. xi).

Charles Little's book describes in detail numerous greenway projects, many of which, such as the preservation of the Willamette River valley in Oregon, hardly resemble the relatively short, urban Midtown Greenway. However, Little believes that the rail trail conversion projects are an important form of greenways and adeptly predicts much of the evolution of thinking behind greenways that would continue after the publication of his book. His lengthy discussion on the relevance of rail trail conversations helps understand how trails like the Midtown Greenway relate to larger linear conservation projects:

> "The question remains, how do the rail-trails relate to the larger greenway movement? Thoreauvian greenway types, given to ruminative country walks, would have a hard time feeling at home on the Burke-Gilman Trail [an urban trail in Seattle, Washington] with light-weight racing bikes zooming by at twenty miles an hour. Indeed, many of the rail-trails are so single-mindedly recreational that even their sponsors do not consider them to be greenways.... My own view is that this is not a terribly useful argument. Most of the rail-trails provide multiple benefits, including ecological ones, since many rail lines parallel water courses or otherwise present the natural scene to us in fresh new ways, such as the Illinois Prairie Path. As Aldo Leopold counseled, 'recreation is not the outdoors, but our reaction to it.' And when we have no less of a naturalist at our side than May Theilgaard Watts, we may be sure that our reaction to the out-of-doors is of the most profound and beneficial kind, for it and for us. Here, on a beloved old prairie railroad right-of-way or on some other

> patch of rail-trail elsewhere in the country is where Leopold's idea of land ethic might well take hold in minds that otherwise would never consider such a thing..." (1990, p. 104)

Searns' systemic approach to organizing greenways is useful but ultimately not sufficient for classifying a trail like the Midtown Greenway; while the Midtown Greenway would most likely be identified as a "Generation 2" corridor because it was not designed to explicitly serve ecological restoration processes, Searns' academic work on greenway classification is symptomatic of academic scholarship on linear trails in general in that the article does not mention transportation, commuting or other non-recreational active uses for the particular urban form. Similarly, in the introduction of the issue of *Landscape and Urban Planning* dedicated to exploring greenways, Fabos (1995) describes the form as predominantly classified into the three overlapping categories of ecologically significant corridors, recreational corridors and cultural corridors. While emphasis in the 1990s literature of greenways is focused on how the form can promote "sustainable land use," (Fabos, 1995), little regard is paid by these texts to the potential transportation functionality of these assets.

2.2 - ISTEA: A Fourth Wave of Greenways?

Publishing his historical taxonomy of greenways in 1995, Robert Searns could not have predicted how quickly what one could consider the fourth wave of greenway and linear trail development would arrive. While many third-wave trails and paths were built in state parks and watersheds far from dense urban areas or in rural areas as buffers to prevent encroachment from expected suburban growth, the passing of the 1991 Intermodal Surface and Transportation Efficiency Act (ISTEA) bill would dramatically change the way trails were conceived, planned, and funded. While many earlier trail projects in the early nineties received the bulk of their federal funding as appropriations from Agriculture and Interior departments, the passing of ISTEA changed the political landscape by specifically making rail-trail acquisition and development eligible for federal transportation funding. The Rails to Trails Conservancy estimates that by 1994 over $375 million had been appropriated to bicycle and pedestrian projects from federal monies, an avalanche of money that not only enabled dozens of communities to think about potential trail projects but also encouraged applicants to think about the potential transportation and mobility aspects of their project, in contrast to the previous waves of greenways which were designed with recreation or ecology in mind (Patten, 1994). Another study commissioned by the Surface Transportation Policy Program (STPP) noted that the intermodal approach to transportation identified by ISTEA legislation include more flexibility in how transportation money is spent, more public participation and decision-making power at the local regional level, and greater focus on environmental issues (DiStefano and Raimi, 1996). Funding for the construction of bicycle and pedestrian infrastructure nationwide would climb annually and reach a high watermark of $427 million in 2004, an unthinkable amount before the passing of ISTEA in 1991 (Mapes, 2009, p.49).

It is difficult to overstate the importance in the paradigmatic shift in funding from the federal government; while the appropriation still paled in comparison to the enormous federal transportation subsidies spent on highway and road construction, the passing of ISTEA marked the first time active transportation advocates won a proverbial seat at the table and have since held small but legitimate advocacy status as they vie for federal funds.[2]

In short, there is no one specific definition for a greenway, and the term has been used to describe virtually any linear project, whether conservation or recreation based, intended to carry some environmental aesthetic or ecological benefit. For the purposes of this paper, understanding the intellectual underpinnings of linear corridors and how that has affected the historical design of these projects encourages us to think about how a project such as the Midtown Greenway possibly represents the next stage of thinking about linear corridors and their potential uses in urban areas. By placing Minneapolis' corridor into historical context, we can get a sense of how the Midtown Greenway is a special facility to study, and why this research might embolden future planners who have innovative ideas to reappropriate spaces for recreation, mobility and economic revitalization.

2.3 - History of the Midtown Greenway

A brief history of the corridor helps explain how the unique built environment of the Greenway and its environs were grandfathered into the physical landscape of the city and how the Greenway differs from other, traditional greenway facilities of years past. In 1881, the Milwaukee railroad line started service along Lake Street, then the southern edge of the recently-founded city of Minneapolis. While the corridor was built primarily for the transport of grain into the city from points westward, the railroad also encouraged

[2] Chapter 2 of Mapes' *Pedaling Revolution* (2009) describes in detail the political maneuverings that brought about funding for bicycles and pedestrians in the congressional bill.

the siting of industry along the corridor, a zoning pattern that would leave empty vestigial structures along the Greenway today. Increasing urbanization and southward expansion of the city led to significant traffic congestion along the at-grade railroad, and the Minneapolis City Council passed an ordinance requiring a depression of the rail line (Hofsommer, 2005). The Chicago Milwaukee and Saint Paul Railroad between 1912 and 1916 dug a three-mile channel for the railroad as it paralleled Lake Street between Hiawatha and Hennepin. The twenty-two foot cut was crossed by thirty-seven bridges over the channel, allowing for the free movement of rail cars beneath the street traffic and creating the tunnel-like trench that characterizes the Midtown Greenway almost ninety years later (see Photos 1 and 2) (City of Minneapolis Department of Public Works, 2007; Derlerth, 1948).

Photo 1 - The Trench of the Midtown Greenway stretches from Hennepin Avenue to 28th Avenue, with many ramps and staircases to the street network above but only one at-grade crossing (photo by the author, 2010)

As railroads statewide fell into disuse later in the century, the Hennepin County Regional

Railroad Authority (HCRRA) was formed in 1980 with the intention of acquiring disused railroad corridors for future transportation use. HCRRA purchased the corridor from the railroad for $10.3 million to preserve the right of way for future use as a corridor for public transportation such as light rail. Plans and funding for rail transit along the corridor never materialized, and HCRRA began looking for potential interim uses for the corridor. Concurrently, Hennepin County had begun aggressively began pursuing the creation of park space as a solution to mediate against urban economic decay (Martin and Jacobson, 2008), and a cadre of inspired environmental and bicycle activists eager to cooperate with Hennepin County resulted in a political climate that helped envision, plan for and acquire the funds to build the Midtown Greenway. My concurrent scholarship fully explores the creation of the Midtown Greenwaty as a case study of how the construction of new models of infrastructure can complicate contemporary urban theory that suggests private enterprise largely dictate the forms and policies of capitalist, American cities. My research shows that private developers and landed-interests were largely absent from the efforts to construct the Midtown Greenway, and that it owes its existence largely to organized citizen groups and progressive, flexible government agencies, but cautiously notes that private developers are beginning to play

Photo 2 - Looking East from the Bryant Avenue bridge over the Greenway (photo by the author, 2010)

an increasingly larger role in advocacy as the Greenway becomes increasingly connected into regional recreational and transportation networks (Brown, 2010).

Phase I of the Midtown Greenway was opened in the Midtown Corridor in 2000 from Saint Louis Park to I35W, expanded further east with Phase II to Hiawatha Avenue in 2004, and extended to its current termination at the Mississippi River Boulevard in 2006 with the completion of Phase III. In 2007, a modern suspension bridge linking the second and third phases of the Greenway over the busy Hiawatha Avenue and the light rail line was built, and the span completed the Greenway as it exists at the time of writing this paper (see Photo 3). The Midtown Greenway has twenty five entrance points, and intersects with the Minneapolis street grid at grade ten times (most of these crossings are with residential streets on the edges of Phases I and III, away from the below-grade trench section of the trail). Discussions of expanding the Midtown Greenway across the Mississippi River and to Saint Paul have stalled, thanks to engineering and preservationist concerns about the Short Line railroad bridge that spans the river and ongoing negotiations between the city of Saint Paul and the Canadian Pacific railway, which still uses the tracks for freight on infrequent service.

Photo 3 - The Martin Sabo Bridge, constructed in 2007, connects Phases II and III of the Midtown Greenway over Hiawatha Avenue and the Hiawatha LRT line. (photo by the author, 2010)

3.0 – Temporal and Meteorological Correlates of Daily Midtown Greenway Use

This paper begins empirical research by first examining the quantity of users on the Midtown Greenway, and how that usage is changing over time and is dependent on meteorological and temporal factors. Because traffic data exist from three different locations on the Greenway, we can make inferences into how weather- and time-based factors affect usage differently on different sections of the Greenway.

3.1 – Review of Trail Traffic Correlation Literature

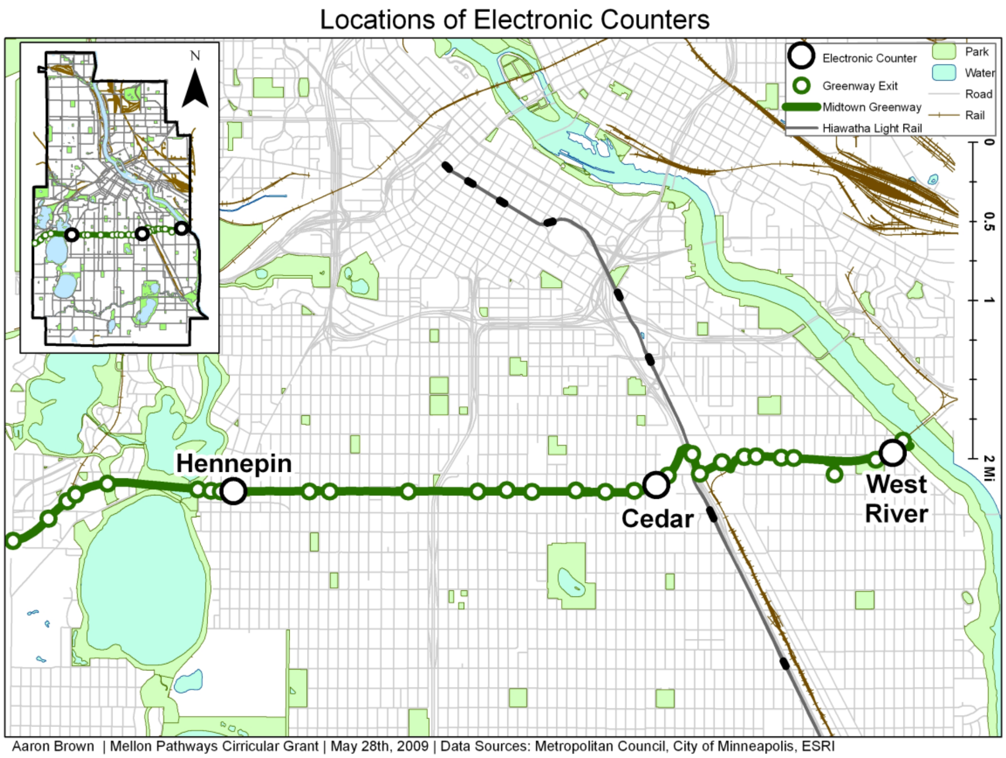
The methodology of this research is based on the quantitative analysis of trail usage in the Indianapolis region; Lindsey et al. (2006) undertook a comprehensive evaluation of correlates of trail use on the six greenways in the Indianapolis region, studying how temporal, weather, and local demographic statistics affect trail use. Continued research on Indianapolis' greenways (Lindsey et al., 2008) adds Light Detection and Ranging (LIDAR) data to find statistically significant positive correlation between larger view sheds, presence of vegetation, and landscape greenness and visual "openness" and the traffic recorded on various sections of the greenway system. This quantitative methodology analyzes characteristics of the built form of the trail system and attempts to measure how these characteristics impact the observed volume of traffic, suggesting that the design of trails can impact the amount of usage an urban trail experiences.

While Minneapolis' Department of Public Works (DPW) has recorded daily traffic count data on the Greenway at three specific locations since 2007 and recently began producing annual reports about Greenway traffic, no research has yet applied the models provided by Lindsey et al. to the Midtown Greenway. Information about Greenway traffic largely comes from other work of the DPW, including annual hand counts of bicycle and pedestrian traffic at various locations across the city. DPW's research includes a comparison of Midtown Greenway traffic at the Hennepin location in 2003 and 2007, noting a 260% increase in traffic in the four year span. Another study published by the DPW found that of 28 surveyed locations during the 2008 bike count, the three locations situated on the Greenway had the highest rates of bicycle traffic in the Twin Cities behind only two locations near the University of Minnesota. The same report also explored how Greenway usage changes throughout the day, noting that at all three locations, between 76% and 80% of the daily traffic happens between roughly 6:30 am to 6:30 pm and that up to 21% of daily traffic happens between roughly 4:00 and 6:00 in the afternoon (City of Minneapolis Dept. of Public Works, 2009).

This paper's quantitative analysis will give us a broad perspective of how Greenway usage by bicyclists is changing over time, how usage is affected by weather, and how usage is affected by day of the week. By understanding how different stretches of the Greenway are used, we can make inferences about its intended usage, and these inferences can be compared to the survey data collected and analyzed in the next section.

3.2 - Data and Methodology

To estimate how much traffic the Greenway receives on a daily basis, I used the Department of Public Works' aforementioned daily bike counts stretching from March 1st, 2007 to January 31st 2010, a total of 1,027 days worth of traffic counts. The three automatic electronic counters tally every bicycle that passes over its sensor. The



Map 2

Hennepin Counter is located in Phase 1 of the Greenway, to the west of the Greenway's intersection with Hiawatha Avenue; the Cedar counter is located in Phase 2 between the Greenway's intersections with 28th and Cedar Avenues; and the final counter at West River is located between the Brackett Park and West River Road exits (See Map 2). The Hennepin Counter began to malfunction and no data were recorded between December

12th, 2008 and November 11th, 2009. For the purposes of creating an estimation of the counts over the summer of 2009, for the missing data points I assumed that Cedar and West River counting locations accounted for 58% of the total traffic, and used those two data points to make rough estimations for the Hennepin Location to derive the daily total bike count predictions for most of 2009. I use this estimation because the Hennepin Location represented between 40 and 44% of the daily traffic recorded at all three locations over 95% of the data points. In addition, a span of five days in October 2008 and 15 days in October 2009 had insufficient data and are thus omitted from the study.

For this time span in which I had traffic data, I compiled weather data from the Minneapolis station of the National Oceanographic and Atmospheric Administration (NOAA), located at the Minneapolis/Saint Paul Airport about four miles south of the Greenway. My weather data came from the official Monthly Data form (CF6), and I added to my model data related to the daily temperature and precipitation. Measurements of Trace rain were replaced with a value of .05 inches, and measurements of Trace snowfall were recorded as .5 inches. The NOAA CF6 form also records the presence of Smoke/Haze, Blowing Storms, Fog, Reduced Visibility Fog, Thunder, Ice Pellets, and Hail, all of which are added to this model as dummy variables. NOAA also monitors the daily amount of sunshine; every day is assigned a value from 0 – 10 based upon the relative amount of sunshine/clouds in the sky. I assigned dummy variables for any days with an SS value of either 0 – 2, 3 – 6, or 7 – 9, using the variable 10 (the value assigned to a completely overcast sky) as a constant.

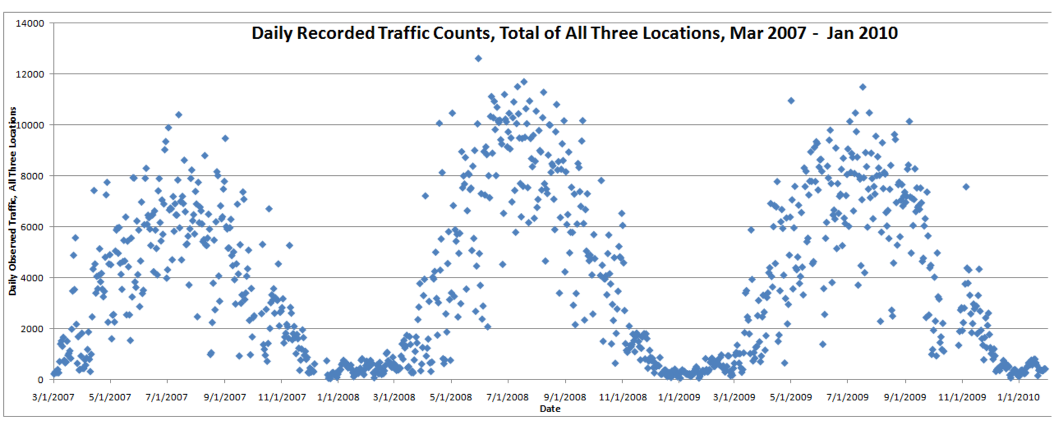
To this model, I also added dummy variables for dates within the years 2008, 2009, and 2010; this will allow us to see if usage of the Greenway is changing by year. I expect to find that the dummy variable for each year would be increasingly positive as traffic on the Greenway increases with each year past the constant 2007. I also added dummy variables for each day of the week from Tuesday through Sunday (with Monday as the constant) to get a sense of how biking changes throughout the week, with specific attention paid to how Greenway usage in different locations differs on a weekend versus weekday basis. It is important to study how usage of the facility varies between weekends and weekdays because the reasons for using the facility are likely different depending on the day of the week; it is expected that weekend usage is much more heavily associated with recreation and non-commuting purposes. I would also expect the Hennepin location to have a higher percentage of usage on the weekend because of the proximity to Lake Calhoun, Lake of the Isles and other recreational parks.

The most glaring limitation of using the electronic loop metal detector count data is that it only counts the number of bicycles that pass over the location and does not register pedestrians, skaters, or joggers. My own personal survey counts (see Section 5.2.1) suggest 16% of the traffic during afternoon hours could be attributed to nonbicyclists. As my survey and other research suggests (Iacono et al., 2008), bicyclists and pedestrians use trails for different purposes, and are likely to travel different distances to access these facilities.

With these data at hand, this section focuses exclusively on how bicyclists' usage of the Midtown Greenway is affected by these weather and time-based factors. It should also be noted that the underground loop detectors only stretch across two-thirds of the width of the Greenway; the loop detectors wouldn't pick up any cyclists who were biking in the demarcated pedestrian lane of the trail. Further research could enhance the accuracy of these statistics by comparing detectors' recorded traffic counts to hand counts undertaken by researchers over a period of time, as undertaken by Lindsey et al. (2006).

3.3 - Results of Traffic Correlates

My model suggests that there is a strong correlation between daily usage of the Midtown Greenway and weather and temporal factors. Twelve of the sixteen weather variables and five of the nine temporal variables were statistically significant at the 5% level, and the overall model had an R^2 value of .872, somewhat higher than the results from the correlates study of trail usage in Indianapolis ($R^2 = .800$) (Lindsey et al, 2006). Graph 1 below shows the daily fluctuations in recorded traffic over the studied time span, Charts 1 and 2 shows the regression model summary, ANOVA, and coefficients.



Graph 1 (Above) and Chart 1 (below)

Combined Traffic Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.934[a]	.872	.868	1158.004

ANOVA[b]

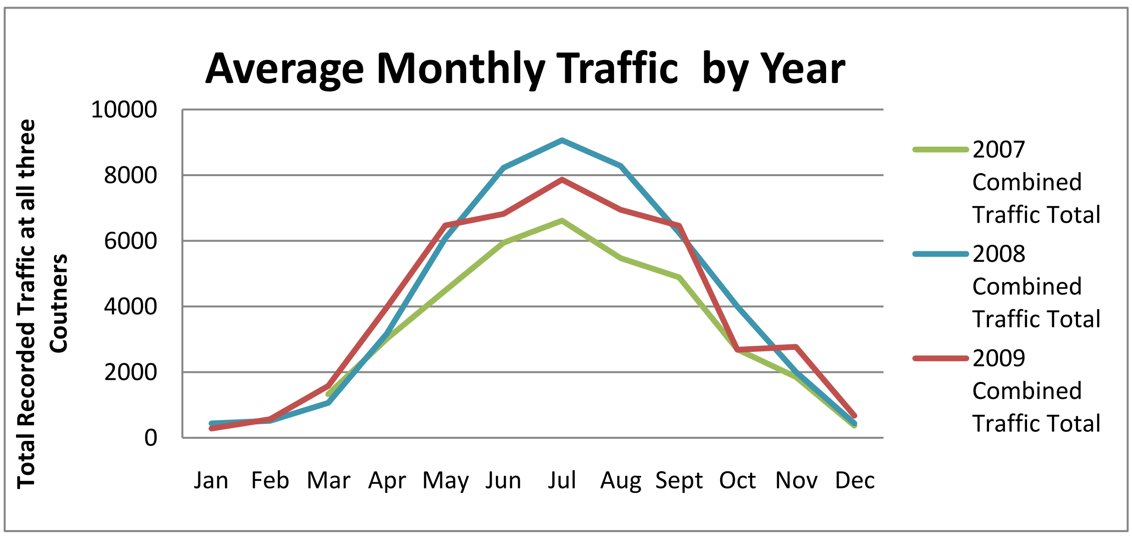
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	9.128E9	25	3.651E8	272.290	.000[a]
Residual	1.344E9	1002	1340974.296		
Total	1.047E10	1027			

Coefficients for Combined Traffic Model

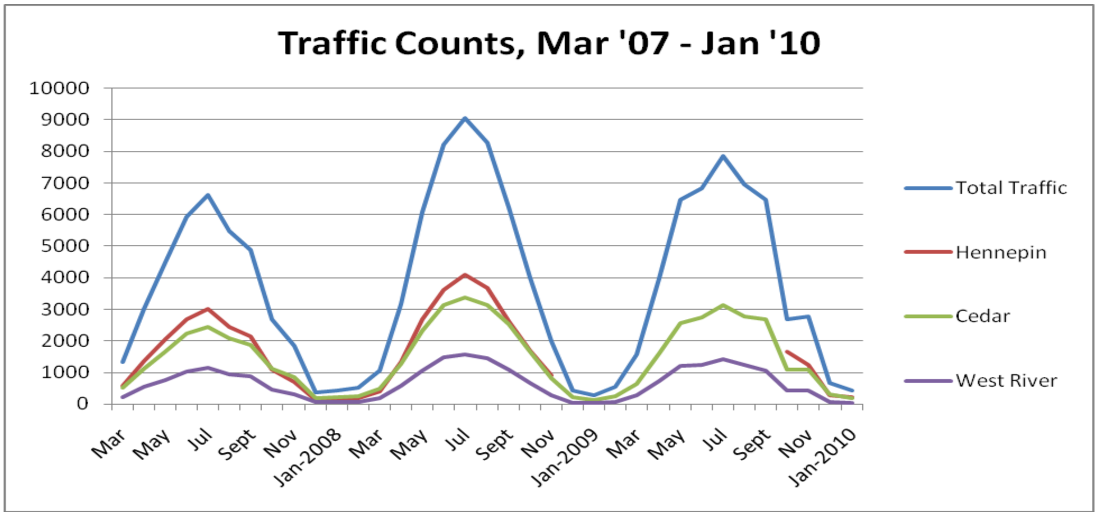
		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
	(Constant)	**-4943.453**	**222.325**		**-22.235**	**.000***
Weather	Max temperature (F°)	117.752	7.186	.906	16.386	.000*
	Min temperature (F°)	20.094	7.421	.144	2.708	.007*
	Temperature Departure From Normal (F°)	-73.913	5.108	-.202	-14.469	.000*
	Smoke / Haze Dummy	-120.091	80.739	-.017	-1.487	.137
	Blowing Storm Dummy	328.370	360.221	.011	.912	.362
	Fog Dummy	-401.227	88.417	-.062	-4.538	.000*
	Fog – Reducing Visibility Dummy	65.740	225.724	.004	.291	.771
	Thunder Dummy	-576.569	158.746	-.051	-3.632	.000*
	Ice Pellets Dummy	-243.712	412.668	-.007	-.591	.555
	Hail Dummy	1624.145	518.499	.039	3.132	.002*
	SS – 0 - 2 Dummy	1241.266	178.097	.133	6.970	.000*
	SS – 3 - 6 Dummy	954.767	149.786	.148	6.374	.000*
	SS 7 – 7 - 9 Dummy	224.414	135.168	.032	1.660	.097*
	Snow on Ground (in)	112.485	21.239	.094	5.296	.000*
	Daily Snowfall (in)	304.934	69.293	.062	4.401	.000*
	Water Equivalent of Daily Precipitation (in)	-1915.267	206.678	-.140	-9.267	.000*
Temporal	2008 Dummy	1338.505	94.677	.200	14.138	.000*
	2009 Dummy	1122.304	94.362	.167	11.894	.000*
	2010 Dummy	1213.711	258.104	.064	4.702	.000*
	Tuesday Dummy	-6.769	136.344	-.001	-.050	.960
	Wednesday Dummy	245.287	136.085	.027	1.802	.072
	Thursday Dummy	-75.356	136.098	-.008	-.554	.580
	Friday Dummy	-121.528	136.109	-.013	-.893	.372
	Saturday Dummy	626.107	136.040	.069	4.602	.000*
	Sunday Dummy	715.371	136.063	.078	5.258	.000*

Charts 1 and 2

Surprisingly, temporal correlates suggest that bicycle traffic and usage of the Greenway has not continually increased over the time span studied. While the dummy variable for 2008 is significant and large (1330), the dummy variable between 2007 and 2009 is smaller (1122), thus suggesting a decrease in usage from 2008 to 2009. It seems unlikely that this decrease in usage is due to the incomplete data set; there is no reason to assume that the traffic that would have been recorded at the Hennepin location would have varied drastically from the predicted values. Graph 1 clearly shows how the monthly averages for 2008 were higher than the subsequent year, and Graphs 2 and 3 (see next page) how the summer traffic tallies in 2009 are not as high as those in 2008 at all data collection sites.



Graph 2



Graph 3

While most of the inclement weather characteristics carried with them the predicted coefficients, some of the results were surprising. The observation of hail, for instance, had a significantly positive effect on the number of Greenway riders. Similarly, this model suggests a surprisingly positive correlation between the number of cyclists on the Greenway and presence of snow on the ground, daily observed snowfall, and observation of what NOAA categorizes as a "blowing storm." Also unexpected was the negative correlation between biking counts and the variable recorded "Departure from Average Temperature"; the negative correlation suggests that warmer-than-average weather actually attracts fewer cyclists to the Greenway. The fact that these weather observations are aggregated into daily measurements probably affects these results; a Midwestern rainstorm on a late-summer evening will likely significantly decrease the usage of the trail for the rest of the night, but if the rainstorm strikes in the evening after most of the daily Greenway traffic has already passed and been recorded, there will not be a large observed drop in the daily traffic despite the presence of inclement weather.

Possible future research could focus specifically on Greenway usage in specified summer or winter months; a heat wave in February that brings temperatures above freezing might have a significantly different impact on trail usage than a heat wave in August that pushes temperatures near triple digits.

The positive significance of the Saturday and Sunday dummy variables suggests that at all three locations surveyed along the Greenway, usage increases over the both Saturdays and Sundays relative to Mondays (See Chart 3). I also ran this model using each individual traffic count locations' bike count data (instead of the combined total from all three locations), which are displayed in Appendix A. Running this regression model with the Hennepin[3], Cedar, and West River count data (with R^2 values of .856, .885, and .835, respectively) shows that the weather coefficients stay relatively similar across locations but that the temporal data changes.

	All	**Hennepin**	**Cedar**	**West River**
Saturday Coefficient	626	323	121	201
Sunday Coefficient	715	380	127	248
Average Over Total Time Span	3879	1650	1530	673
Saturday (Coefficient / Average)	0.16	0.20	0.08	0.30
Sunday (Coefficient / Average)	0.18	0.23	0.08	0.37

Chart 3

[3] For the Hennepin traffic count data, I did not use the predicted values for the nine-month span in which the counter wasn't working, so the N value for the Hennepin data is 713 instead of 1027.

3.4 – Discussion of Traffic Correlates Results

It is unknown exactly why usage was down in 2009. Usage of the Midtown Greenway was generally expected to increase in step with the overall increase in bicycling as a viable transportation choice in the city of Minneapolis. The rise of commuting by bicycle in Minneapolis is well documented; the detailed report of the state of bicycling in Minneapolis released by the DPW cites Census and American Community Survey data suggesting that cycling claimed 3.8% of the commuting mode-share in 2007, up from 1.6% in 1990 and 1.9% in 2000 (City of Minneapolis Department of Public Works, 2009). If we assume that the majority of bicyclists on the Greenway are using the facility for either recreation or commuting purposes, there are possible explanations for decreases in each group of riders. June 2009 had significantly colder and wetter weather than average, which may have discouraged many recreational riders from bringing out their bikes at the start of the season and possibly affected their rates of riding throughout the rest of the season. The possible explanation that June's inclement weather affected trail usage for the rest of the summer is supported by Graph 2; monthly averages in 2009 were actually higher than 2008 from January through May, but then dropped off and failed to match 2008's summer traffic through September. In 2008, The Midtown Greenway also witnessed a well-publicized rash of crime and muggings along the trail; it is possible that concern for crime may have influenced public perception of the trail and thus the number of riders (Brandt and Channen, 2008). It is also possible that the increase of traffic on the Greenway has encouraged riders to seek alternate routes to avoid congestion. When the city of Portland, Oregon tallied a decrease in their city-wide biking traffic counts in 2009 for the first year since 1995, the city's Bureau of Transportation suggested that the decrease in gasoline prices from 2008 to 2009 may have lessened the financial incentive to avoid driving for many would-be cyclists, and cited the economic recession that created higher unemployment and therefore fewer commuting trips as an explanation for the 6% decrease in absolute bicycling rates (City of Portland Bureau of Transportation, 2010).

Across all three years and all three locations, the Midtown Greenway experienced a bump in bicycle usage on Saturdays and Sundays relative to Mondays, and the bump was higher and more significant than variation in any weekday traffic. The highest absolute bump in ridership on the weekends was recorded at the Hennepin area, but the highest bump relative to the amount of bicycle traffic at each location was recorded at the West River location. This is possibly due to the counter's specific location, which only records bicyclists who are using the Greenway at its terminus on the West River Boulevard, a parkway bordering the Mississippi River with high recreational use. The location of this counter likely undercounts the number of bicyclists who use the easternmost section of the Midtown Greenway and it oversamples the number of riders on the trail for recreational purposes. This theory is supported by the relatively low traffic counts recorded at this location and the high percentage of traffic observed on weekends, a time at which recreation use is expected to be at its highest relative to commuting.

Sticking to our assumption that weekend usage is representative of Greenway recreational and exercise riders than for commuters, this would suggest that riders using different sections of the Greenway are doing so for different purposes.

My regression model found a surprising uptick in bicycle traffic on Wednesdays that was not recorded on any other day of the week; on average, Wednesdays experienced an extra 245 bikers over Mondays. Further analysis of commuting trends or chronicling community bicycle-related community particular to Wednesdays might explain this phenomenon.

While this model predicts a significant amount of traffic, there are several possible improvements to make to this model. For starters, a larger number of data collection sites, equipped with technology to count both cyclists and pedestrian Greenway users, would give us a better picture of the holistic traffic patterns on the Greenway. The lack of data on non-cyclist users on the Greenway not only undercounts the number of people who find a use for the trail but encourages the somewhat limited thinking of the Greenway as merely a transportation corridor for those on two wheels. Additional traffic counters on other bike lanes and connecting facilities might also help to understand how connected the Greenway is to the larger, surround network of bicycle and pedestrian paths. Using the combined total at all three locations is an imperfect model at best of capturing the true usage of the Greenway for a variety of other reasons. There are a not insignificant number of cycling trips that pass over two or all three counters, and are thus over counted by aggregating the total traffic count. Similarly, due to the relative spacing of these three sites of data collection, it's also entirely possible to imagine a substantial amount of bike traffic isn't tallied at all. In my own survey data, of the four locations at which I administered surveys, the Midtown location at 5th Avenue actually registered the highest traffic count, and was the only of my four locations that isn't in close proximity to one of the three loop detectors. The extent to which both this overcount and undercount of traffic cancels each other out or affects the total is unknown, and could be explored through further surveys that ask riders to identify the length of their trip on the Greenway or to list their entry and exit point onto the facility. Operating under the assumption that a majority of the traffic is counted multiple times as it passes over numerous observation points, I ran a final regression model (see Appendix A) in which all of the traffic observations were ran into the regression model; instead of aggregating the three location's data into one set, or analyzing each data set individually, this final model (R^2 = .800) suggests that, on average, the Hennepin Location and the Cedar Avenue Location respectively record 1030 and 864 more cyclists than the Brackett Park Location. This regression includes 2742 data points, and it would be more applicable to studying correlates of daily Greenway use if further research of individuals suggested that a majority of Greenway users were being overcounted by these traffic data collection methods.

Even with the potential shortcomings of the data, this quantitative analysis of daily usage provides us a broad picture for how, on aggregate, bicyclists are using the Greenway. Usage has been increasing, but dropped off in 2009 relative to 2008, and there is increased traffic recorded on the weekends to various degrees at different locations on the Greenway. Greenway users heavily prefer to bike on the trail during the summer, and traffic usage across the facility is very sensitive to changes in daily weather features such as temperature, precipitation, sunshine, and presence of fog. This broad perspective of how the Greenway is used on aggregate will help guide the Part 3's inquiry into the demographics, opinions and other characteristics of surveyed Greenway users.

4.0 – Accessibility through Proximity and Spatial Equity

With knowledge of how frequently the Greenway is used and how different sections of the Greenway experience different patterns of use based on temporal correlates, we can expound further on the demographic traits of the neighborhoods in south Minneapolis that the Midtown Greenway bisects. This section, in conjunction with the daily trail usage correlates, will help provide context for the results of the survey I administered, for which methodology, results and discussion are discussed in following sections (see 5.0.0).

4.1 - Review of Equity Literature

Greenways, as a linear facility, are inherently designed to create linkages and connections across neighborhoods and communities. The earliest intellectual underpinnings of linear corridors, as discussed in Searns (1995), had their roots in attempting to connect citizens with resources and open space. Charles Little (1990) in *Greenways for America*, noted that "To make a greenway…is to make a community." He continues to explain that the construction of greenways have the potential to reshape the landscape and foster increased interaction and connection between different areas.

Indeed, multiple planning documents produced in the lead-up to the Midtown Greenway's construction eagerly state connectivity as an intended consequence of the implementation of the facility. While improved mobility is anticipated and an obvious, stated goal of the project, the language of the Greenway's planning documents all advocated for the Midtown Greenway under the guise of a holistic connection that provides transportation options as well as increased social interaction, linkage between recreational amenities and "community identity." (City of Minneapolis: Department of Public Works and Hennepin County Regional Railroad Authority, 1996, p. 5) Another planning document from 1998 stated that:

> "…transportation policy…is only part of the Midtown Greenway story. Both policy makers and community leaders are hoping that the greenway will serve as catalyst to improve and connect the neighborhoods in South Minneapolis in many ways that transcend transportation." (Hennepin Community Works, 1998)

This extent to which this linkage is successfully realized in connecting diverse neighborhoods socially and culturally is of considerable interest to urban planners and policymakers pursuing the varied benefits of these linear spaces; Charles Little (1990) writes extensively about the importance of perceived linkages in the landscape as well as tangible:

> "Indeed, *linkage* carries a powerful symbolic message and is, clearly, the philosophic core of the greenways movement...The point is that this movement is not merely an aggregation of conservationists undertaking similar projects but a cadre of civic leaders, however disparate, who devoutly believe in the emblematic, as well as actual, importance of linkage of recreational and cultural resources…and most of all, of neighborhoods and towns and cities and people of all colors and stations

not only in the use of greenways but also in the making of them." (Little, 1990)

Geographers and social scientists have many tools to analyze the extent to which this desired "connectivity" has taken place, and to understand the degree to which different communities have access to a facility such as the Midtown Greenway. While there is extensive literature around the complicated role that parks and open space play in determining the racial landscapes of urban areas, a few prominent studies exist exploring the direct relationship between race and greenway trails. As linear paths that transsect various neighborhoods and communities within a city or region, greenways and trails have the potential to link disparate neighborhoods of varying socioeconomic and racial demographics.

One way to address the issue of equity is to consider residential proximity to amenities. Lindsey et al. (2001) explore the networks of greenways in Indianapolis through this lens, analyzing socioeconomic and racial demographic data of census tracts within a half mile of six urban trails across the metropolitan area. The 1999 population in this buffer zone was poorer and had a higher percentage of African Americans than the surrounding county.

Lindsey has also used a framework of sustainability to evaluate the Indianapolis Greenway system (2003), analyzing the stated economic and environmental goals of the Indianapolis trail system with an eye on how the plan succeeds in reflecting one definition of what a "sustainable" urban governance policy would look like. His perspective paints a picture of uneven attainment of sustainability goals across the region, but Lindsey encourages further exploration of ways in which construction of greenways can potentially contribute to regional sustainability goals, be they environmental, economic or equitable.

Studies of specific trails across the country yield a set of demographic patterns that are similar but not necessarily consistent. One study of a network of greenways in Michigan studied census demographics and compared them to results from administered surveys of users; their work carried an optimistic tone on the mismatch of racial demographics and trail demographics observed, noting that the linear design of urban trails "…inherently encourages movement along their route, but the extent of this movement does not appear to be hindered by the racial disparity between users and those living around the greenway" (Coutts and Miles, 2010 p. 12).

Studies of race relations in urban areas are manifold in methodology, and a significant literature is growing about urban parks as an important place for crosscultural interaction (Ho et al., 2005). As Byrne and Wolch write, "Parks are rarely innocuous elements of the landscape, especially in cities," (2009, p.743) and their review of the existing literature around parks, social spaces, cities and race is helpful in placing the study of racial demographics of Greenway usage into a larger context. A notable study by Solecki and Welch (1995) coined the term of a "Green Wall," in which an urban park that lies between racially different neighborhoods can reinforce racial barriers and thus discourage usage of the facility. The research explored how physical and biological conditions of flora in Boston parks can be used as a proxy to determine whether the maintenance and usage of a park is hindered by its location between racially different populations. The phrase “Green Wall,” has taken a life of its own in recent leisure studies to describe phenomena in which park space can play a role in upholding stark racial segregation of surrounding urban communities. One response to Solecki and Welch’s article suggests expanding the paradigm of evaluating border parks to include recorded social interactions and documented passive and active use, noting how park design and social programming can keep parks along boundaries from becoming “Green Walls” and instead “Green Magnets,” in which social interaction is harbored and encouraged (Gobster, 1998). Coutts and Miles (2010), in their discussion about demographics of trail users in Michigan, discuss the implications of the “Green Wall/Green Magnet” concept as it relates to their findings.

> “…if Greenways serve neighborhoods and not just communities (Furuseth and Altman 1994) and if access through proximity leads to use, we would expect to find a relationship between the racial composition of the neighborhoods surrounding the greenway and the users on corresponding segments, but this was not the case. Despite the equitable proximity to access points, we did not find a significant pattern of higher proportion of African-Americans using the greenway on segments in neighborhoods with a higher proportion of African-American residents nor white users in white neighborhoods. If on the other hand greenways serve larger communities, they may provide public spaces in which people of different races coexist regardless of how close they live to access points. For this potential to be realized, all greenway segments need to be perceived as traversable, not as barriers.” (Coutts and Miles, 2010, p.13).

4.2 Data and Methods

Accepting the premise posited by previous research that one way to monitor accessibility to the Greenway is to look at the trail’s neighborhood demographics as they relate to the region as a whole, I use 2000 Census Data to analyze the racial and socioeconomic demographics of nearby neighborhoods to get an idea of the makeup of citizens with the closest spatial access to the Midtown Greenway. This research, in conjunction with survey data of Greenway users, will give us a better understanding of whether the Midtown Greenway exists as a "Green Wall" (or in this case, a "Green Trench"), in which people travelling under the neighborhood street grid have different characteristics than those living on the streets above, or whether the Midtown Greenway is a "Green Magnet" that is bringing the diverse people who live in its surrounding areas together.

Using ArcMap, I isolated census tracts that were bisected by the Greenway or had a centroid within either a quarter mile or full mile of the trail. Census data were also collected for block groups within different scales of study; my study areas include the City of Minneapolis, Hennepin County, the combined Hennepin and Ramsey Counties and the entire Seven County Metro Area. Demographic data were collected from the 2000 Census Data Form 1 to determine the percentage of residents who identified as each race and from Form 3 for the percentage of residents below the poverty level.

In this analysis of racial demographics, I specifically used the Census Data sets aggregating all individuals who belonged to a particular racial identity, whether or not they also belonged to another. I used these data sets so that the percentages of racial identity in neighborhoods matched the survey questions I administered, in which participants were allowed to identify as more than one race. Because individuals identifying as more than one race are counted multiple times, the total of these racial categories is therefore larger than 100%. Map 3 (see p. 45) shows which block groups were chosen for each buffer zone around the Greenway, and Maps 4-7 show the 2000 racial demographics of these block groups.[4] The quarter mile buffer doesn't include any block groups outside of the city of Minneapolis, but the 1 mile groups include four in Saint Paul and twelve bin Saint Louis Park, as well as six in southeast Minneapolis on the east (opposite) side of the Mississippi River.

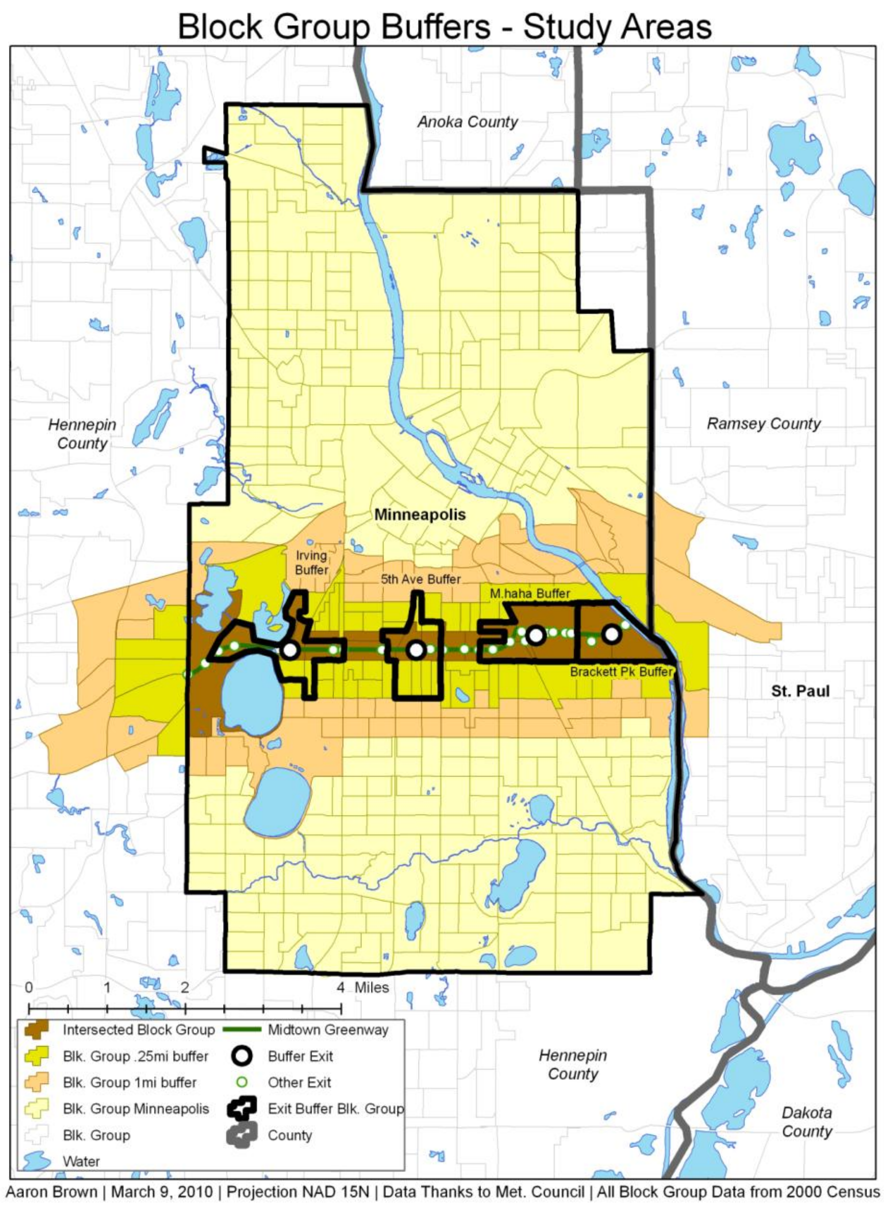
While including the census tracts in Saint Paul and Saint Louis Park may somewhat obscure the comparison between the population demographics found within these buffers and the demographics of the city of Minneapolis, the population included lives within the studied buffer area; the populations in this area is relatively small, and therefore should not have a significant impact on the overall validity of the demographic comparison.

4.3 – Results of Spatial Demographics Test

Analysis of Block Group data (see Chart 4, p.46) suggest that the residents who live near the Midtown Greenway largely mirror the racial and socioeconomic data of the city of Minneapolis as a whole, and have larger populations identifying with races or ethnicities other than White who are more likely to be under the poverty line than the entirety of the seven-county Twin Cities region. The block groups included in the buffers used in this research all had exceptionally similar percentages of Whites, African Americans, Asians and Native Americans to that of Minneapolis. The only demographic group with significant variation from the city of Minneapolis as a whole were Hispanics; block groups intersected by the Midtown Greenway had twice (16%) the representative

[4] Block group 1065.001, whose population base is comprised area north of Lake of the Isles, was omitted for the sake of accuracy despite the centroid of the block group's proximity to the Greenway because the population living in this tract is located outside of the intended study area.

population of those identifying as Hispanic than that of the entire city. However, as the buffers around specific survey locations show, this Hispanic population is heavily concentrated in the middle of the corridor near the Minnehaha and Fifth Avenue survey locations. Included in Appendix B are larger scale maps of White, Black/African-



Map 3

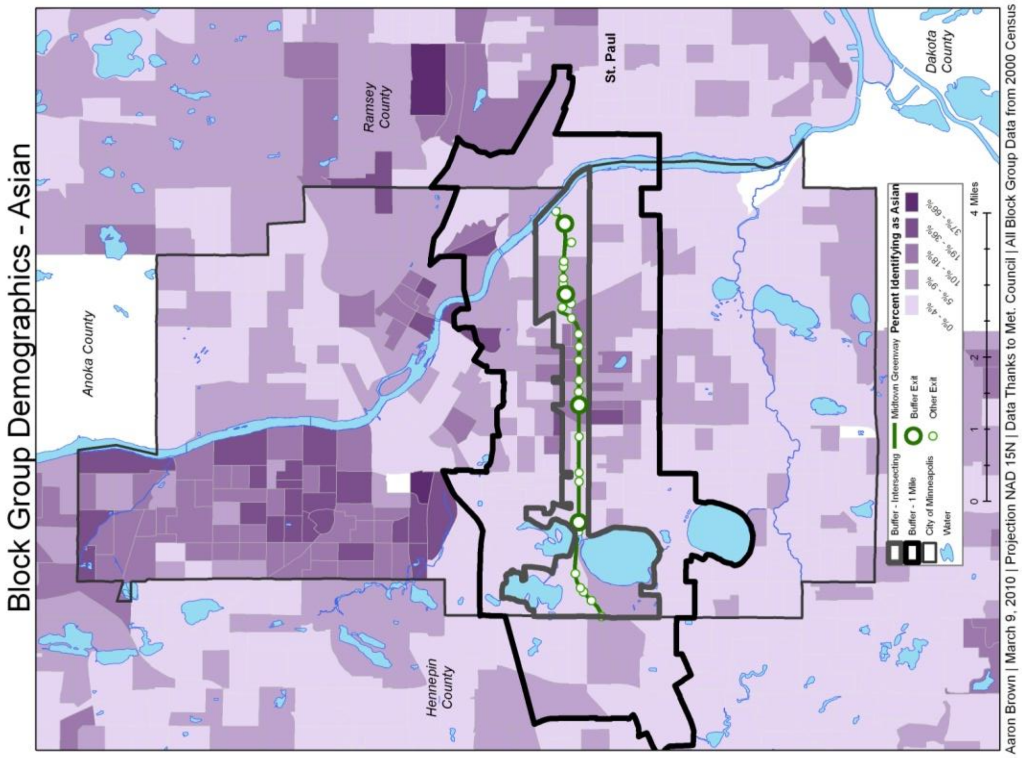
American, Asian and Hispanic/Latino populations by 2000 block group.

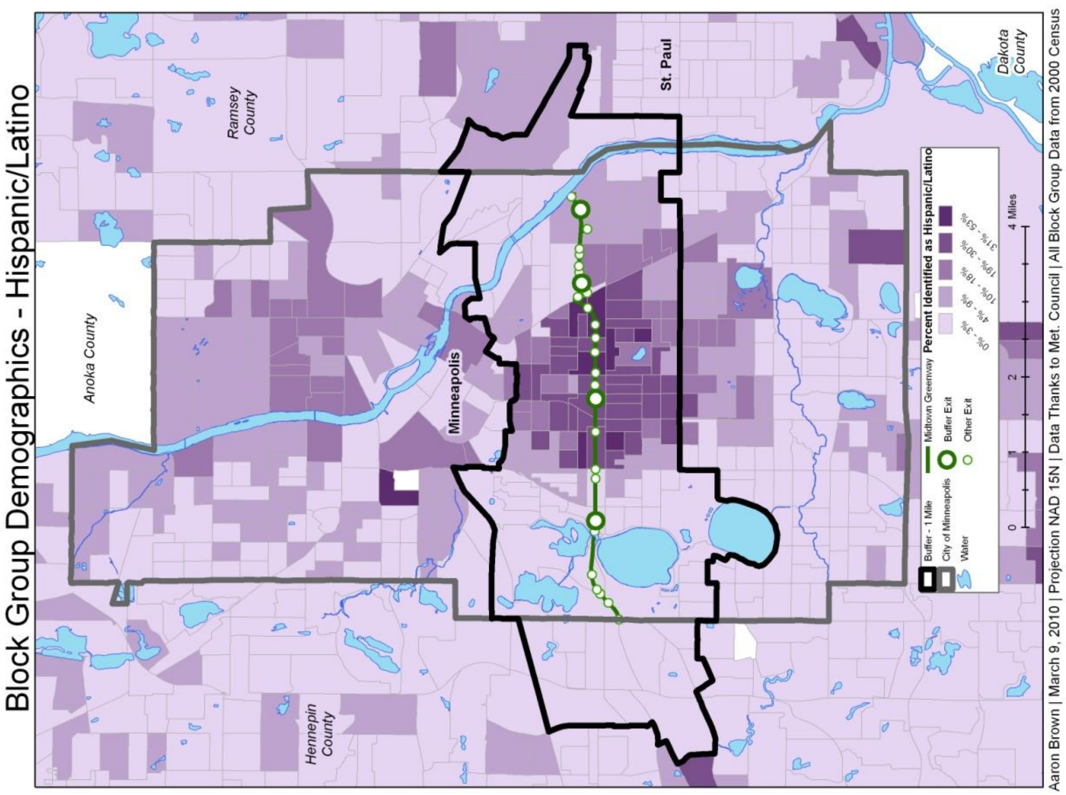
	Total races tallied: Total races tallied	White	Black or African American	American Indian and Alaska Native	Asian	Some other race	Hispanic or Latino: Total	Income in 1999 below poverty level
Intersecting Greenway	1.05	0.68	0.16	0.04	0.05	0.12	0.16	0.16
.25 Miles	1.05	0.66	0.18	0.05	0.06	0.11	0.14	0.17
1 mile	1.05	0.68	0.18	0.04	0.06	0.08	0.11	0.17
City of Minneapolis	1.05	0.68	0.20	0.03	0.07	0.06	0.08	0.16
Hennepin County	1.03	0.82	0.10	0.02	0.05	0.03	0.04	0.08
Hennepin and Ramsey Counties	1.03	0.82	0.10	0.02	0.05	0.03	0.04	0.09
7 Co Metro Area	1.02	0.88	0.06	0.01	0.04	0.02	0.03	0.07
Buffer around Survey Locations								
.25 Mile around Brackett	1.04	0.87	0.07	0.03	0.03	0.04	0.05	0.08
.25 Mile around Minnehaha	1.08	0.57	0.22	0.09	0.08	0.13	0.18	0.29
.25 Mile around Fifth	1.08	0.37	0.40	0.05	0.10	0.17	0.21	0.32
.25 Mile around Irving	1.02	0.93	0.03	0.01	0.03	0.01	0.02	0.07

Chart 4

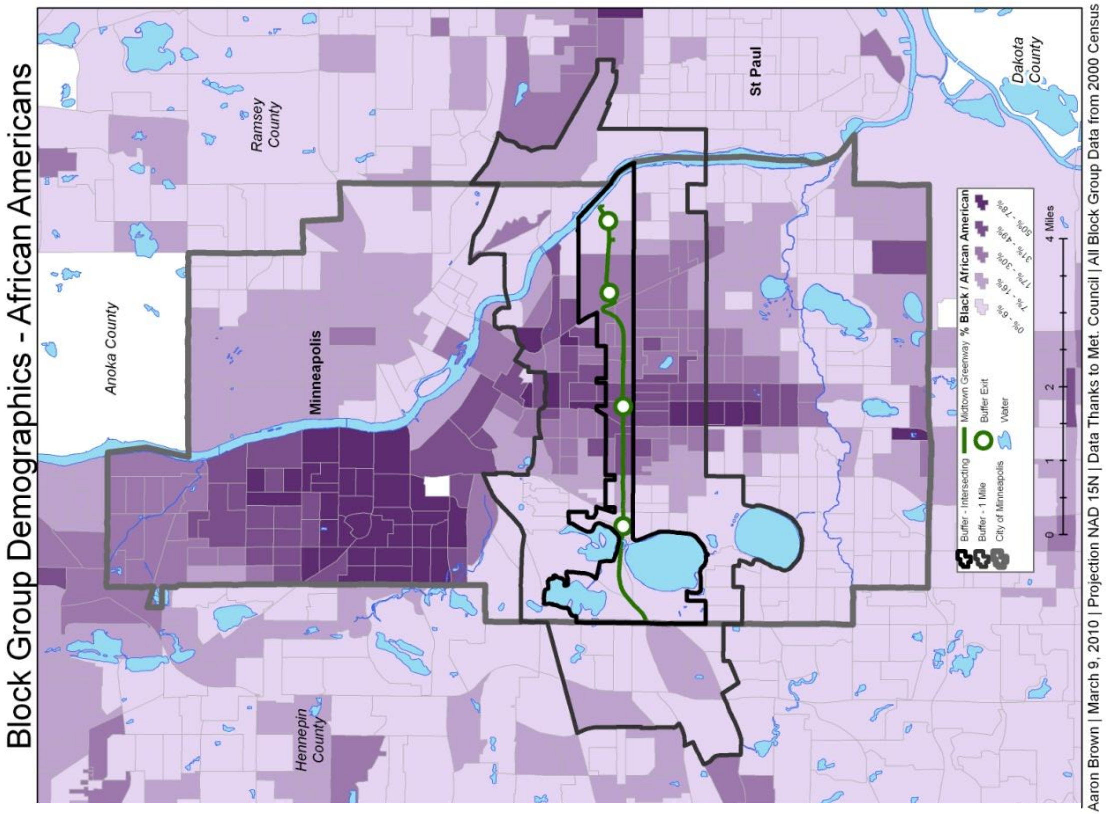
4.4. Discussion of Spatial Equity Results

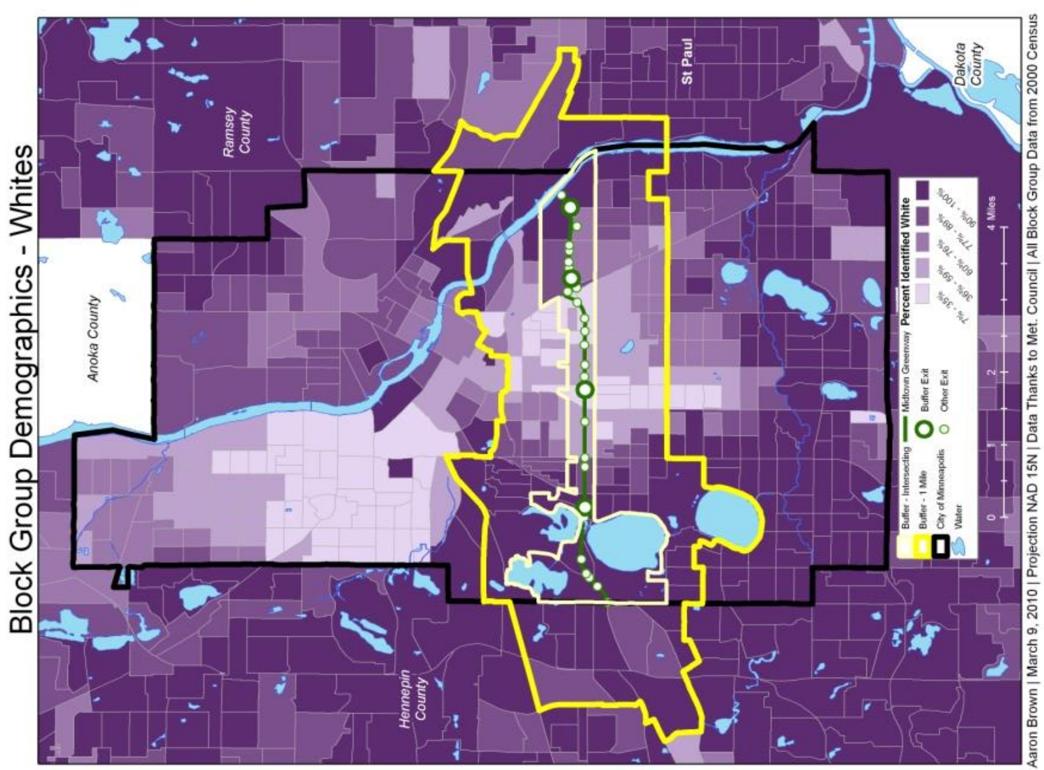
While the Greenway's nearby neighborhoods as a whole largely mirror the population demographics of the city of Minneapolis, the analysis of larger-scale neighborhoods along the facility suggest a significant level of segregation exists between these racial communities, and that each of these neighborhoods carries distinct identities and demographic makeup. While 87% of the population in census tracts within a half mile of the Irving Exit in Uptown on the Greenway identified as white, only 37% did





Maps 4 and 5 – See Appendix B for larger-scale maps





Map 6 and 7 – See Appendix B for larger-scale maps

so in block groups surrounding the Fifth Avenue Exit in Midtown. Similarly, buffer zones around the Brackett Park and Irving Exits have only 8% and 7% of the population under the poverty line, while the buffers around Minnehaha and Fifth Exits had 32 and 29%, respectively. These differences reinforce the notion that the Midtown Greenway is situated to run through neighborhoods with distinct racial demographics, and that it will be no small accomplishment for the Greenway to be a "Green Magnet" and to foster interaction between these diverse populations.

Unfortunately, by conducting this research in 2009 and 2010, the most recent data about the dynamic, ever-evolving Lake Street corridor is somewhat outdated. The demographic data obtained here offers us a snapshot of what south Minneapolis looked like as the Greenway project was breaking ground in 2000. Further research would compare these survey results with results from the ongoing 2010 census to understand how these neighborhoods have changed in the past ten years.

Through the lens adopted by Lindsey et al. (2006) and Coutts and Miles (2010), the Midtown Greenway could be defined as an amenity situated to allow equal access to the various populations that live in the city. When one considers how the demographics of the Greenway buffers compare to the metropolitan region as a whole, people of color actually have a disproportionately higher percentage of total population living near the Greenway than whites across the region. This is due more to the fact that the Twin Cities' suburbs are historically white than because of any innate proximity of the facility to heavily nonwhite areas. Further research could compare the demographics of block groups not only along the Midtown Greenway but of the entire Grand Rounds trail network, which snakes through both North and farther South Minneapolis, to see if the populations living near the entire network of Minneapolis' linear corridors are just as equally served. On a metropolitan scale, the results might differ if this methodology was applied to the entire trail network in Hennepin County, which extends far into outer ring suburbs and rural areas west of the metropolitan region.

It should be strongly cautioned that measuring residential proximity to a bike path by no means translates into a facility being "accessible" to all. Trail accessibility must be evaluated not only spatially but socially and culturally as well; Lindsey writes that "the degree to which facilities such as parks truly are public and accessible depends on metaphorical as well as physical boundaries." (2001, p. 341). Even if the Greenway runs through diverse neighborhoods, it by no means suggests that the amenities of the facility are being enjoyed by each community equally. The design of these facilities has important implications for how the space is used; if pedestrians do not feel safe on the Greenway due to the presence of speeding bicycles, populations who are more likely to use the Midtown Greenway for nonbicycling purposes may not find the corridor appealing. Barriers to entry to enjoying this facility need to be studied in depth; as the survey results suggest, usage patterns vary widely between race and gender. If certain populations are less likely to ride a bicycle, able to afford a bicycle, or even interested in cycling, and the facility is designed and policed in such a way as to discourage other uses, measuring equitable access through residential proximity do not explain the true nature of segregated uses of the urban space. Lindsey notes that multiple definitions of "equity" are needed to evaluate the degree to which the network of trails serve the entire population fairly; equal spatial accessibility is important, along with equal opportunities to feel safe on the trail, equal opportunities to have exposure to various forms of recreation, and equal opportunities to be able to afford the necessary equipment. This calls for a new understanding of park use that "draw[s] on the cultural landscape, environmental justice and political ecology perspectives" to understand the interconnected relationship between sociodemographic identities and park use (Bryne and Wolch, 2009, p.749).

While this analysis of residential demographics can not address these broader, social questions about why certain populations choose to ride a bicycle, it is heartening to see that the Greenway is not a facility that runs only through a series of wealthy white neighborhoods and that, in theory, the demographics of the groups of people who stand to benefit from its proximity are similar to the demographics of Minneapolis as a whole. When paired with other data obtained by survey of individual Greenway users, it provides a clearer picture of how this facility is affecting the social landscape of the city.

5.0 – Survey of Greenway Users

Sections 3 and 4 of this paper situate the Midtown Greenway into its surrounding urban context and give us a general understanding of its aggregate pattern of use. Section 5 of this paper looks at individual users on the Greenway, therefore giving us an intimate look of the individuals who make up the macro-level trends studied in previous sections. While the study of overall traffic on the Greenway is helpful for understanding the amount of use and changes over time, a localized study of individual Greenway users is necessary to get a more accurate picture of the ways the facility is used by different individuals. My survey aims to dig deeper then aggregate traffic counts to get a better idea of who exactly is on the Greenway, how different people use the facility, and how the built form of the Greenway contributes to these factors. The background literature for this section is therefore varied and interdisciplinary, chronicling how traffic engineers, urban planners and social theorists have attempted to apply their respective fields of study to examine how a linear corridor like the Midtown Greenway is received and used by the public.

5.1 – Previous Studies of Active Transportation Infrastructure and Usage

Studies of the design and implementation of urban active transportation[5] infrastructure are growing steadily, mirroring the pace at which American cities are beginning to implement these infrastructural networks for alternative transportation. Led by academic John Pucher, a series of professors of civil engineering and public policy have begun to research the role that urban physical infrastructure plays in promoting walking and biking as transportation mode. His most recent work (Pucher et al., 2010) is an extensive literature review which supports the idea that more infrastructure for active transportation will lead to higher levels of usage.The field is vast, and this review of literature on bicycle travel methods focuses specifically on work that is relevant to multiuse paths and how different types of bicycle infrastructure are received by pedestrians and bicyclists of different needs and abilities. Much research of active transportation infrastructure exists on the aggregate municipal level, finding correlation

[5] "Active Transportation" is defined here as any form of nonmotorized, self-propelled movement, usually referring to bicycling and walking but also including roller-blading, skating, and the term also includes those requiring the assistance of wheelchairs.

between commute mode share and the number of off-street bike lanes per square mile in a city (Dill and Carr, 2003). Another paper comparing infrastructure improvements in the 1990s in six American metropolitan areas noted "bicycling facilities are most effective in highly-accessible urban areas where a large number of commute trips can take place across short distances" (Douma et al., 2008).

Because characteristics of mode share of bicyclists are measured through metrics that are aggregated to the municipal level, these studies of correlation between bicycle usage and metropolitan characteristics are popular, and generally suggest that cities that build spaces for bicyclists and pedestrians will see those facilities used. While these studies are helpful to understand generic differences between different cities and their respective networks of infrastructure, individual decisions to walk or use a bicycle for a particular trip are inherently hyperlocalized; studying aggregated totals of bike lanes or paths in a city obscure how individual facilities, their proximity and attributes affect the decisions of individual people to use them. Barnes et al. (2005) compared 1990 and 2000 census data about commuting mode-shift statistics in buffer zones near seven facilities in the Minneapolis/Saint Paul region; they note that these buffered areas experienced a higher increase in active transportation mode share than the two cities as a whole, especially near downtown Minneapolis and the University of Minnesota, where most of the bicycle facility improvements were concentrated. By focusing the scale of inquiry more sharply on this one particular piece of infrastructure, we gain better insight as to how the specific characteristics of facilities determine a project's effectiveness.

Studies of how different types of infrastructure are received have begun to produce important results. A detailed study sponsored by the Oregon Transportation Research and Education Consortium collected GPS data from 166 cyclists in the Portland area and analyzed the trips taken by cyclists based on characteristics such as personal demographics, available infrastructure, weather, and residential proximity to bicycle infrastructure (Dill, 2008). Dill's research showed that half of the trips made by bicycle were up to .27 miles longer than the possible shortest route, suggesting that cyclists are willing to extend the length of their trip to utilize facilities such as bike lanes, bike boulevards or off-road paths if they are made available. "Over half of [the Portland region's] bicycle travel occurred on these facilities, while only just over one-third would have if they had taken the shortest route available" (p. 35). Her report finds that women were more likely to travel a farther distance to use low-traffic streets and bicycle boulevards, and that only 19% of the total miles tallied by cyclists were on streets expected to have high volumes of traffic without separate facilities for a bicycle.

These studies of individual facilities also provide us an opportunity to estimate the effectiveness of infrastructure of meeting their goals for construction, whether defined as drawing people to use the facility, providing safer means of travel[6], or encouraging health through recreation. For urban planners and geographers, there are important reasons to study the spatial buffer around these linear trails that explain the spatial extent of their

[6] Active transportation advocates have happily joined forces with academics in fields of public health to explore how the built form, with particular regards to transportation infrastructure can play a role in fostering healthy communities. See Reynolds et al. (2009) for a study of how separate-use facilities like the Greenway reduce the likelihood of serious injuries as a result of collisions, Sallis and Glanz (2006) for how the built environment can shape individual's health, and chapter 11 of Mapes (2009) for how public health advocates are becoming part of the political coalition for advocacy of nonmotorized transportation facilities.

impact on the landscape. Understanding exactly how far people are travelling to use a facility explains how the facility is functioning in the larger network of transportation and what purposes the facility is serving. This “trailshed” can provide a clue of the size of a population a proposed trail serves, and can be compared to trailsheds of other facilities to understand how much cyclists and pedestrians value the facility.

The research of Krizek et al. (2007) explores how, theoretically, certain trails for bicycling and recreation are considered more valuable by the population they serve because people are willing to travel farther out of their way to enjoy the amenity. By using a computer-based adaptive stated-preference survey, Krizek et al. demonstrated how cyclists were willing to increase their travel times to use bike lanes on streets without parking, noting that women tended to prefer “safer” facilities and that older individuals were more likely to choose a higher quality facility such as an off-road facility. Dill’s research (2008) also notes that multiuse paths have the highest trailshed of all bicycling facilities included in the research, believed to be due to users enjoying the facility more and believing it safer than local roads. A 1997 report of the Burke-Gilman trail in Seattle surveyed cyclists on the trail and determined trail users would travel up to 0.5 to 0.75 miles out of their way to use a trail for their trip versus travelling on a car with roads or inferior cycling facilities. It is worth noting, however, that a previous study of the Burke-Gilman trail in 1978 showed that the pattern of trail usage was not affected by distance; seeing as many cyclists drove their cars to access the trail, especially on weekends, the researchers concluded that the Burke-Gilman existed as more of a regional recreational facility for the greater Seattle area than as explicit infrastructure for local travel. These conflicting reports suggest the difficulty of capturing an accurate representation of a trail's users and the capacity for the results to change over different temporal scales, both small (weekday versus weekend, or even morning versus afternoon) and large (1978 versus 1997). Surveys of this trail conducted in 2000 by the Puget Sound Regional Council found that the proportion of utilitarian trail use of the Burke-Gilman trail had increased six-fold in fifteen years, adding further evidence that usage of trails can change (Kim, 2003).

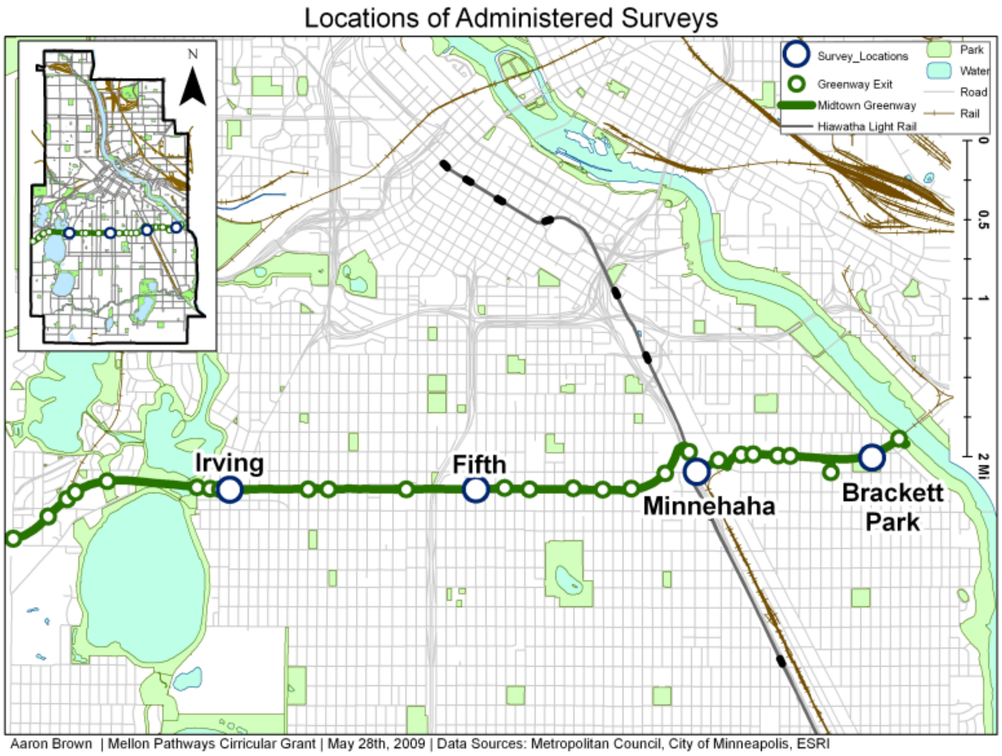
The buffer of one-half to three-fourths of a mile is relatively consistent across studies of travel distance to cycling facilities, although variation exists. A network of greenways around Raleigh, North Carolina drew 58% of surveyed users from within a three-mile buffer, although no data exist as to the motivation for the trip (recreating versus commuting) or the method by which users accessed the network (Furuseth and Altman, 1991). Furuseth and Altman conclude that their results "suggest that greenways do not serve the entire community but neighborhoods," (1991, p. 333) although their three-mile buffer implies a larger definition of a "neighborhood" than I will explore in my research of the higher-density Twin Cities area.

Implicit in these studies are the understanding that spatial proximity to a trail plays a significant role in determining an individual's choice to use it, and that different facilities in different contexts will have different trailsheds. Some transportation planners have started using a "distance decay" method to analyze the distances people will travel to use these facilities; these models attempt to mathematically demonstrate how most trails will draw a majority of their users from a short distance and that an inverse relationship exists between distance to the facility and the number of possible users who are willing to travel that far to use the trail. Distance decay and purpose of bicycling trip have also been explored in the context of gender (Krizek et al., 2004). Another study noted that this distance decay seems to vary widely for bicyclists depending on the purpose of the trip; commuting and school based trips were much more likely to involve trips over ten miles than shopping, education and recreation, which tended to be much shorter in length (Iacono et al, 2008). This model of assessing the accessibility and usage of a greenway is based upon a “gravity-based measure,” which is “derived from the gravity model of spatial interaction. In deriving gravity-based measures of accessibility, destination opportunities, such as employment, are weighted by the cost of their interaction” (2008, p. 4) in which the costs are the extra time and effort needed to reach the facility from farther distances. Knowing that a certain percentage of residents are willing to travel a certain distance to use a greenway allows us to estimate which neighborhoods, employment centers, retail centers, parks and other amenities are likely to benefit from the implementation of a future greenway or are feasibly connected to the larger transportation network.

Other studies of greenways and linear trails have also explored demographic characteristics of trail users and the purposes for which the trail users were making their trip. Krizek et al. (2005) mailed out surveys with questions regarding cycling frequency, demographic profile and lifestyle characteristics to residents living near the Midtown Greenway and two other suburban trails in the region to pinpoint specific factors of inducing active transportation. The previously cited study of Indianapolis’ trail system that studied trail usage and its correlation with various factors found that racial and socioeconomic demographics of nearby neighborhoods could explain roughly 24% of the variation on local trails. Concluding that traffic on the trails in Indianapolis are "significantly correlated with neighborhood characteristics," there was a positive correlation between traffic volume on segments of trails and the higher percentages of people who identify as "black" and "other" in nearby neighborhoods, despite the fact that both groups were highly underrepresented in trail counts themselves (Lindsey et al., 2006). Kim's (2003) study of the Burke-Gilman trail also explored how the trail was used for different purposes, and noted that different purposes for the trip were correlated with other demographic characteristics.

5.2 – Methodology of Conducted Survey

I administered my survey in the late summer and fall of 2009 at four locations on the Midtown Greenway. The sites were chosen to represent the different Phases (I, II and III) of the Greenway and to attempt to reach as many Greenway users as possible by meeting people at locations with major intersections that generally encouraged pedestrians and cyclists to come to a stop. Surveys were administered at the Midtown Greenway's intersection with Irving Avenue (just west of the Hennepin underpass and connecting Uptown to the Lake of the Isles), Fifth Avenue (the Phase II's only at-grade crossing with the Minneapolis Street grid, located just near the Freewheel Bike Center), Minnehaha Avenue (just east of the Martin Sabo Bridge where the Greenway passes over Hiawatha Avenue and the light rail) and at Brackett Park (near the terminus of Phase III of the Greenway) (See Map 8).



Map 8

During each of the eight instances in which I administered surveys, I brought a small table with copies of the survey with clipboards and asked every passing Greenway user if they would to participate. Each sitting lasted for roughly three hours in the afternoon, generally between 3:00 pm and 6:00 pm. Chart 5 on the next page shows when the surveys were conducted, the weather observed on each count day, and the total traffic volume recorded by the Department of Public Work's official three counters. The study asked participants questions about demographics, home address, current mode of transportation, reasons for using the Greenway, and other opinions about the Greenway. Copies of the survey in Spanish were also available; I have included the English and Spanish survey sheets in Appendix C. Survey participants were encouraged to answer any and all questions they felt comfortable with, and with all questions circle any and all answers that applied. The survey asked for participant's home address to get a sense for the "trailshed" of the Midtown Greenway; I geocoded these addresses and found the distance from each participant's house to the nearest Greenway entry point and to the location of the survey. Because the streets in south Minneapolis generally fit the perpendicular grid pattern, I calculated the Manhattan distance with the Lat/Long coordinates using GIS software to get a more accurate measure of the distances Greenway users would have to travel to access the facility.

While administering surveys, I also counted how many Greenway users passed through an invisible line at each survey location. I recorded these data on the basis of gender and mode of travel. My observed male/female, bike/pedestrian and location-based counts are then compared to the male/female, bike/pedestrian and location-specific data of my sampled surveyed.

	Time		**Weather**			**Total Bike Count Recorded**[7]
	Day	**Date**	**Average**	**Dept. From Normal**	**Preciptation**	
Minnehaha	Tuesday	7/21/2009	70	-4	0.92	4203
	Saturday	10/24/2009	42	-3	0	n/a
Fifth Avenue	Wednesday	10/7/2009	44	-9	0	3259
	Thursday	10/29/2009	48	6	0	1355
Bracket	Friday	10/16/2009	41	-8	0	n/a
	Tuesday	10/27/2009	45	2	0	n/a
Irving	Sunday	10/18/2009	49	1	0	n/a
	Monday	10/19/2009	52	4	0	n/a

Chart 5

[7] Unfortunately, five of the eight days in which I administered my survey were days in which no data were collected from the official traffic detectors located along the Midtown Greenway.

By comparing my sample study to the overall Greenway traffic observed during these study times, I can control to see how effectively my survey sample represents the target population of overall Greenway users.

5.3.0 - Results of Survey

	Surveyed	Total traffic During Survey Time	Ratio Surveyed
Location - Brackett	40	264	0.15
Location - Minnehaha	60	535	0.11
Location - Fifth Ave	61	1152	0.05
Location - Irving	62	757	0.08
Weekday	163	2186	0.07
Weekend	60	522	0.11
Male	151	1890	0.08
Female	71	768	0.09
Biking	189	2328	0.08
Nonbiking	34	379	0.09
Total	223	2708	0.08

Chart 6

With a total of 223 participants, the survey provides insights into demographic characteristics and transportation patterns of users of the Midtown Greenway, circa late summer/early autumn 2009. The comparison between the observed characteristics of Greenway users and the demographics of those surveyed suggest that my survey sample accurately captures a proportional representation of men and women on the trail, cyclists and noncyclists, and that my survey over-sampled Greenway users on the facility on the weekend. Due to the varying levels of traffic on different sections of the Greenway, I was able to sample a much higher percentage of Greenway users at the Brackett Park and Minnehaha locations, while I under-sampled the much larger traffic volume experienced during my two sittings at the Fifth Avenue location (see Chart 6). Because it is extraordinarily difficult to stop moving bicyclists and pedestrians and ask them to fill out a survey on the side of the trail, my sample population represents a relatively small fraction of the intended target population; statistically, of all the traffic that passed during my observations, I surveyed 8% of all the observed traffic during these times; it is therefore important to understand how this sample might over- or under- represent particular trail users.

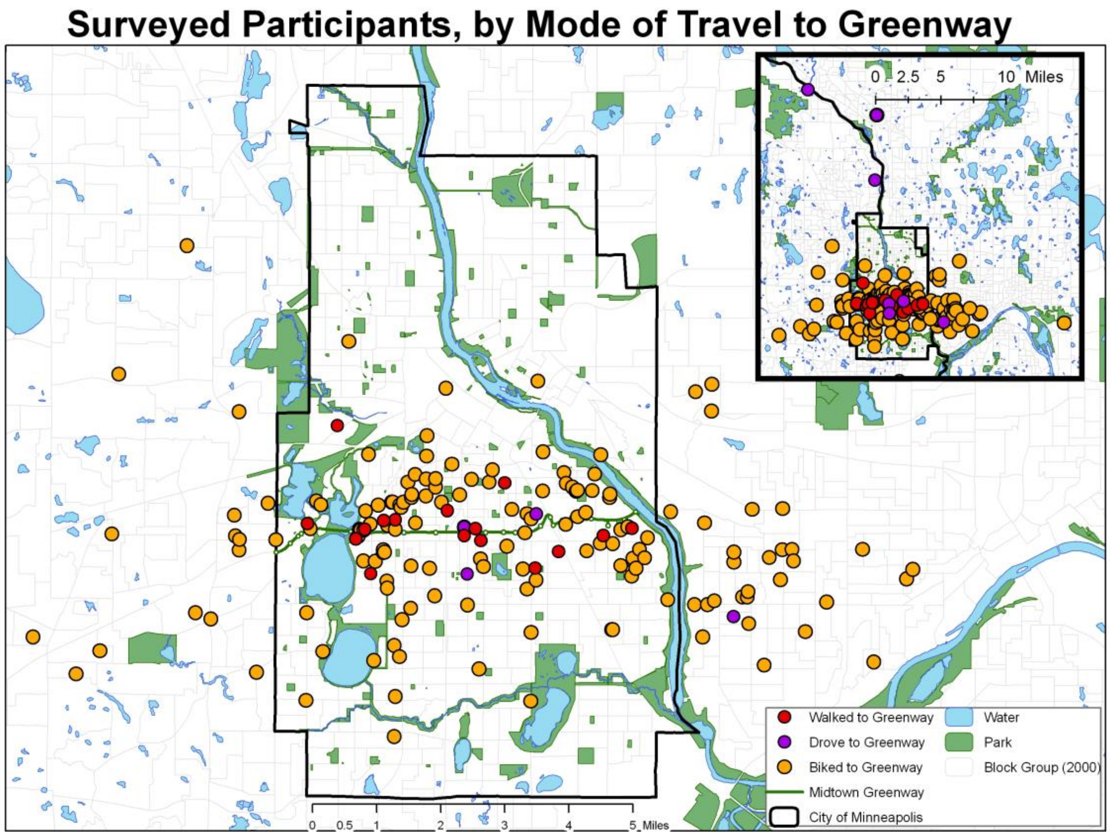
The results of this survey are broken down into specific topics. I first will focus on survey results relating to distance to the facility, and analyze distance decay models for Greenway users to examine the distance that the average person travels to use the facility. I will then analyze the self-reported social demographics of Greenway users, comparing these results to the spatial access tests undertaken in Section 4 of this paper. I finish with a discussion of gender and other characteristics of Greenway users.

5.3.1 – Proximity to Facility, Travel Mode, and Distance Decay Models

Of the 223 participants in the survey, 197 (88%) provided an address that I was able to geocode and determine a residential proximity to the closest of the twenty-five Greenway entrances, as measured in Manhattan distance.[8] I believe this methodology provided accurate Manhattan distances from each individual's residence to the facility, although this methodology may be inappropriate for determining the distance travelled for some participants residing in the western suburbs, where the street grid network

[8] Of this sample, 107 (54%) provided exact addresses, 82 (42%) provided the nearest intersection or block (participants were encouraged to give an address such as 29XX Hennepin if they were concerned about privacy, see Appendix C for a copy of the survey), 7 (4%) provided enough information to reasonably approximate their location, and 1 was excluded from the survey for providing an out-of-state address.

breaks down, and for any other participants living farther away from the facility, where natural topography (such as nearby lakes and rivers) likely makes these distances harder to estimate properly through calculation of Manhattan distance.

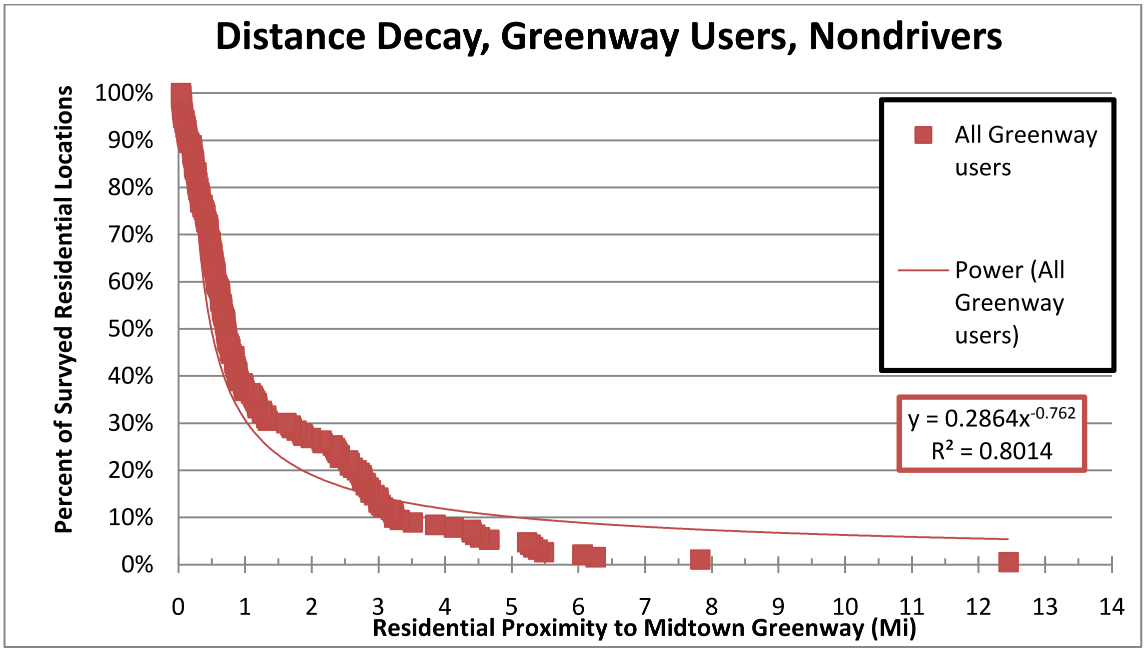


Map 9

Seventy percent of the 196 participants who gave a residential address live within the city of Minneapolis, and 64% live within one mile of the trail; 50% of the Greenway users live within 0.70 miles or closer to an entrance to the facility. Recalling that Furuseth and Altman (1991) found that 58% of trail users in the Raleigh system lived within three miles of the facility, we can make some inferences on how the dense, urban landscape in which the Midtown Greenway is situated encourages the facility to be used by people who live much closer to the trail than others located in sparsely-populated suburban or rural areas. Results showing that the Midtown Greenway is used predominantly by locals suggest that the facility has been fully integrated into the local neighborhoods; no small feat for what was originally an abandoned railroad corridor resting in a trench below the grade of the rest of the community.

It is exciting to note the overwhelming percentage of Greenway users who travelled to the facility through nonmotorized means; 84% of survey participants biked to the trail and 96% used a method not involving a private automobile. This suggests that the Midtown Greenway has been effectively linked into a larger, regional infrastructure of trails and bike paths in which the Greenway is not *the* destination to drive to and recreate but rather a *means* to which citizens are able to access jobs, errands, and recreation along the corridor while still retaining place-like qualities worth visiting for recreation. I believe these are important findings; this implies the Greenway has been successfully constructed and marketed as a facility that promotes a new way to get around town and is contributing to citizens' quality of life not only through the recreational and economic development potential but as a functional transportation facility.

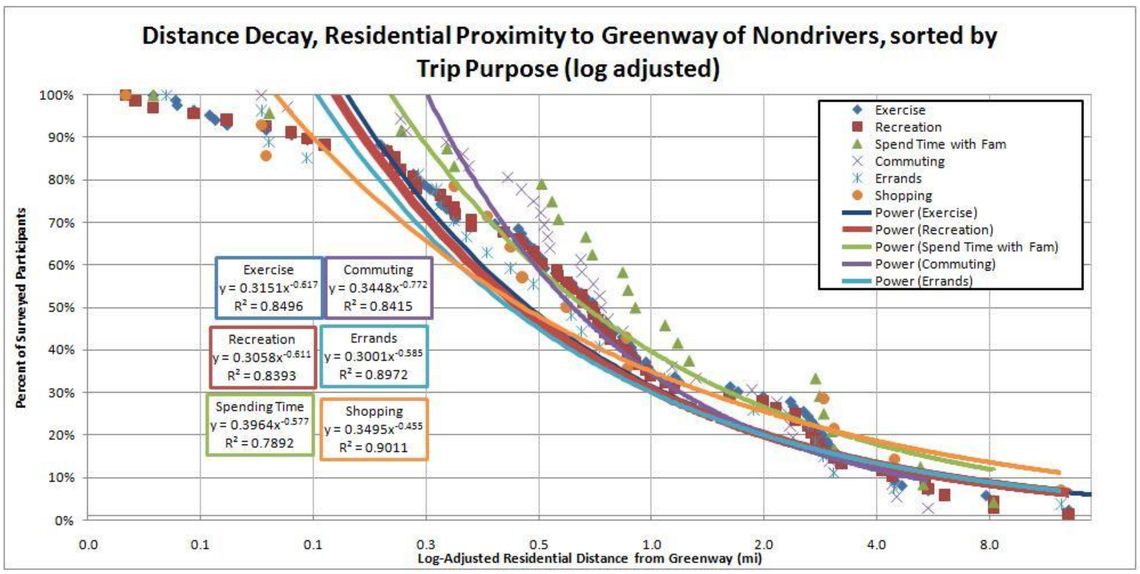
As mentioned in the review of literature, many transportation planners are interested to see how far people are willing to travel to use bicycle- and pedestrian-specific facilities. By calculating the sphere of influence that these facilities hold, urban planners can determine how close these facilities need to be placed in order to adequately serve an entire metropolitan region. I borrow heavily from the distance decay models utilized by Iacono et al. (2008) and Krizek and Johsnon (2006) to model how Greenway users are concentrated in close geographic proximity to the trail and how with minimal increases in distance the number of users who live within that buffer tapers off quickly.



Graph 4

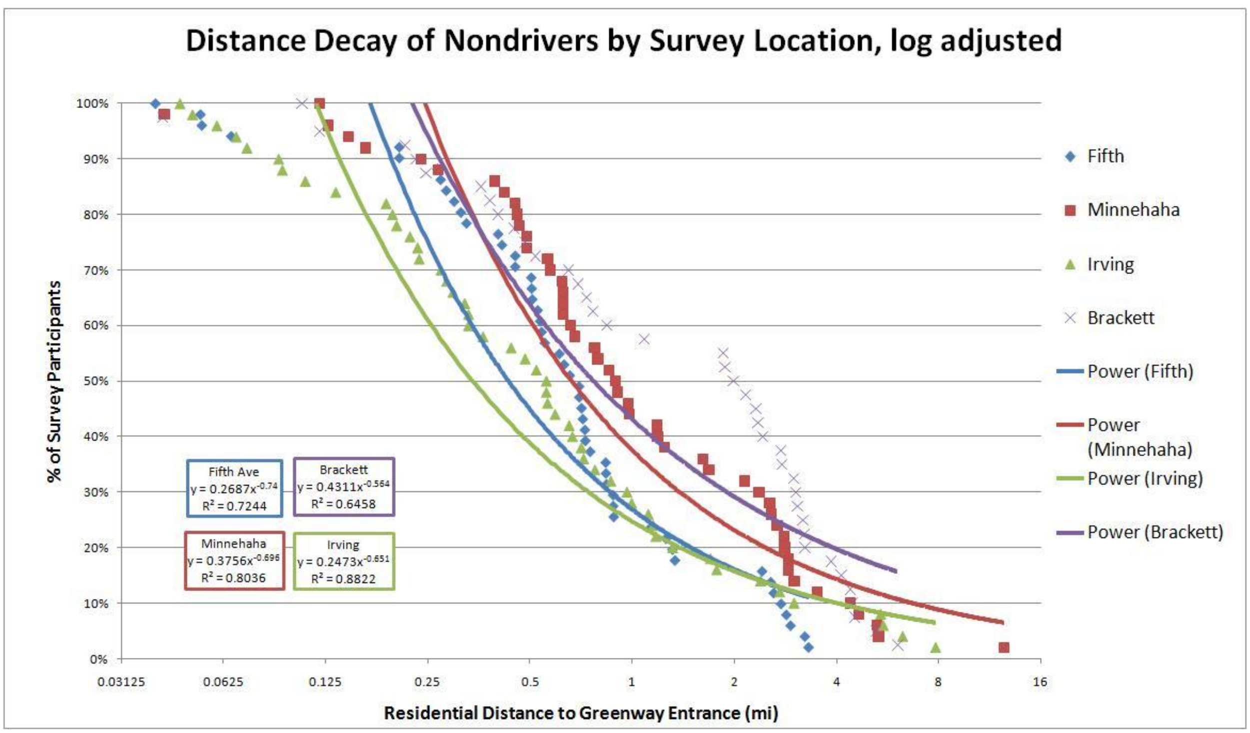
Following Iacono et al.'s (2008) methods, I found that I could model the distance decay for the Midtown Greenway users to a fairly high (R^2=0.8014) degree. Graph 4 shows how almost 90% of those who do not travel by automobile to the Midtown Greenway (almost all of the observed participants) tend to live within three miles or less of the Midtown Greenway.

Iacono et al. (2008) also suggest that these distance decay curves vary considerably depending on the purpose of the bicycle trip. To test if this was applicable for Greenway users, I created six distinct sets of bicyclists based upon their survey responses: cyclists indicating their intent to use the Greenway for exercise, commuting, recreation, errands, spending time with family/friends, or shopping. Because the survey encouraged respondents to check more than one trip purpose if relevant, some data points are included in multiple data sets. The distance-decay models are shown in Graph 5, and the x-axis is log-adjusted to more fully demonstrate the differences between the six curve sets.



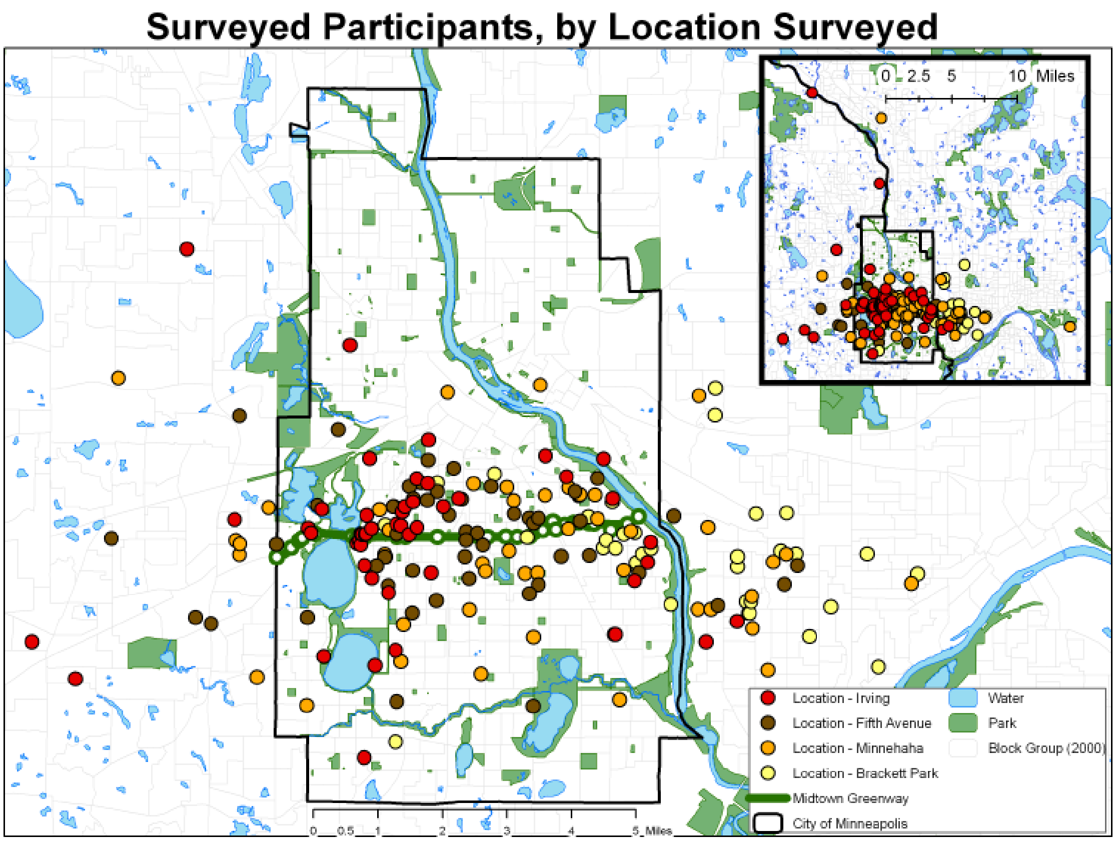
Graph 5

The caveat must be applied that this collection of survey data vastly oversamples participants surveyed at Brackett Park relative to the day's traffic; the extra trail users between two and three miles that disrupt the curve are largely representative of Greenway users who live in Saint Paul. This "bump" in users who live between two and three miles away may be made less prominent with a more accurate sample of Greenway users, especially by including more Greenway users from the Fifth Avenue survey location. This suggests that while usage of bicycle facilities may exhibit these sorts of distance-decay patterns of usage, the demographics of the surrounding populations and the sorts of trips they need to make have a significant impact on who uses the facility. Many from St. Paul use the Midtown Greenway to commute to downtown Minneapolis, and other neighborhoods at similar length away from the Greenway may not have a trip to make that uses this trail. To get a sense of how the over- and under- sampling of traffic at different locations may have affected results, I conducted a distance decay model with participants separated by location at which they were surveyed. As predicted, the surveys collected from Brackett showed that Greenway users surveyed at that location tended to live farther from the Greenway than the other survey participants. (See Graph 6, which like Graph 5, is also log-adjusted on the x-axis).



Graph 6

While the models are fairly close, the disparity between the curves suggests that the over-sampling of Greenway users at the Brackett Park location and the under-sampling of Greenway users from the Fifth Avenue location likely have somewhat altered the results of my distance decay models. By oversampling a selection of



Map 10

Greenway users who tend to live farther away, this model may overestimate the distance around the Greenway at which most residents consider using the facility. Map 10 is helpful for spatially asserting the argument that oversampling Midtown Greenway users at the Brackett Park location likely oversampled residents who live east of Minneapolis in Saint Paul; this has important implications not only for the distance decay methods but for other social characteristics of Greenway users who are different also exploring how the social demographics and opinions of participants surveyed at Brackett Park are somewhat different than the other three stops. The full results of the survey, disaggregated to show how the complete set of survey results from all 223 surveys differs from survey participants specifically separated into groups such as age, gender, municipal residence, and weekday/weekend sampling, are located in Appendix D.

These particular models of distance decay, as mentioned earlier, measured Manhattan Distance from one's house to the closest entrance to the Greenway, and not the total extent of one's trip, which may not have necessarily started or ended at either location. One Greenway user could be using the entire five mile trail but live one block away, and another could potentially only use the Greenway for half a mile but live in Golden Valley. This study does not explore the total length of any particular trip but rather the distance people who are using the Midtown Greenway live from the facility. This is a critical aspect of understanding how the Midtown Greenway is used as a transportation facility, and needs to be studied further. Like any model, these distance decay models would benefit from a larger sample, although all of the Power regression curves modeled retained somewhat high R^2 values.

While the distance decay models are somewhat abstract, they are important in that each of the mathematical equations suggest a spatiality to Greenway users that helps us understand how the facility is being used for the non-motorized purposes. Understanding whether most Greenway users live within one mile or ten miles allows us to better predict what impact these sorts of facilities can have on an urban landscape, and exploring how these buffers are related to demographics and trip purposes encourages a more holistic understanding about how people are finding ways to use the Greenway.

5.3.2 – Racial Demographics of Greenway Users

Chart 6 compares the self-reported demographics of Greenway users at the four locations to the racial demographics procured from 2000 Block Group Data. The demographics of people who use the Midtown Greenway are significantly different than the demographics of those who live near the locations surveyed. Particularly at the Minnehaha and Fifth Avenue survey locations, the surveyed users were much more likely to identify as white than those who live near the facility. This is noteworthy since my previous study of accessibility as defined by spatial proximity suggested that non-white populations have a larger than proportional share of access to the facility, and that my distance decay studies showed that fifty percent of the Greenway users live within 0.7 miles of the trail. While the survey data strongly suggests that the facility draws its users from nearby neighborhoods in south Minneapolis, the people who choose to use the facility (87% of whom identified as white) are not representative of the demographics of the nearby neighborhoods or representative of the city of Minneapolis. This contests the methodology of measuring equity of trail networks merely through residential proximity; in the case of the Midtown Greenway, spatial proximity to the facility clearly is not enough to overcome ethno-racially differentiated park use. I again quote Byrne and Wolch, who state that:

Location		Total Race Ethnicity Tallied / Total Pop	White	Black or African American	American Indian and Alaska Native	Asian	Hispanic or Latino: Total	Income in 1999 below poverty level
Irving Avenue (Phase I)	Block Group Demographics, .25 Mile around Irving	102%	93%	3%	1%	3%	2%	2%
	Demographics of Surveyed Greenway Users at Irving (n = 61)	102%	93%	3%	3%	3%	0%	
	Surveyed Participants Living within Irving Buffer (n = 15)	100%	80%	7%	7%	0%	7%	
Fifth Avenue (Phase II)	Block Group Demographics, .25 Mile around Fifth	108%	37%	40%	5%	10%	21%	32%
	Demographics of Surveyed Greenway Users at Fifth (n = 62)	103%	90%	3%	2%	0%	5%	
	Surveyed Participants Living within Fifth Ave Buffer (n = 8)	100%	50%	13%	0%	0%	38%	
Minnehaha Avenue (Phase III)	Block Group Demographics, .25 Mile around Minnehaha	108%	57%	22%	9%	8%	18%	29%
	Demographics of Surveyed Greenway Users at Minnehaha (n = 60)	102%	84%	7%	7%	2%	5%	
	Surveyed Participants Living within Minnehaha Buffer (n = 8)	113%	100%	0%	0%	13%	0%	
Brackett Park (Phase III)	Block Group Demographics, .25 Mile around Minnehaha	104%	87%	7%	3%	3%	5%	8%
	Demographics of Surveyed Greenway Users at Brackett (n = 40)	103%	84%	2%	3%	2%	6%	
	Surveyed Participants Living within Brackett Buffer (n = 6)	83%	0%	0%	0%	0%	83%	
All Surveyed Greenway users	Residential Address <.25 miles of Greenway Entrance (n = 34)	103%	82%	3%	9%	0%	9%	
	Residential Address < 1 mile of Greenway Entrance (n = 125)	101%	86%	2%	5%	2%	6%	
	Residential Address > 1 mile of Greenway Entrance (n = 74)	103%	96%	4%	0%	0%	1%	

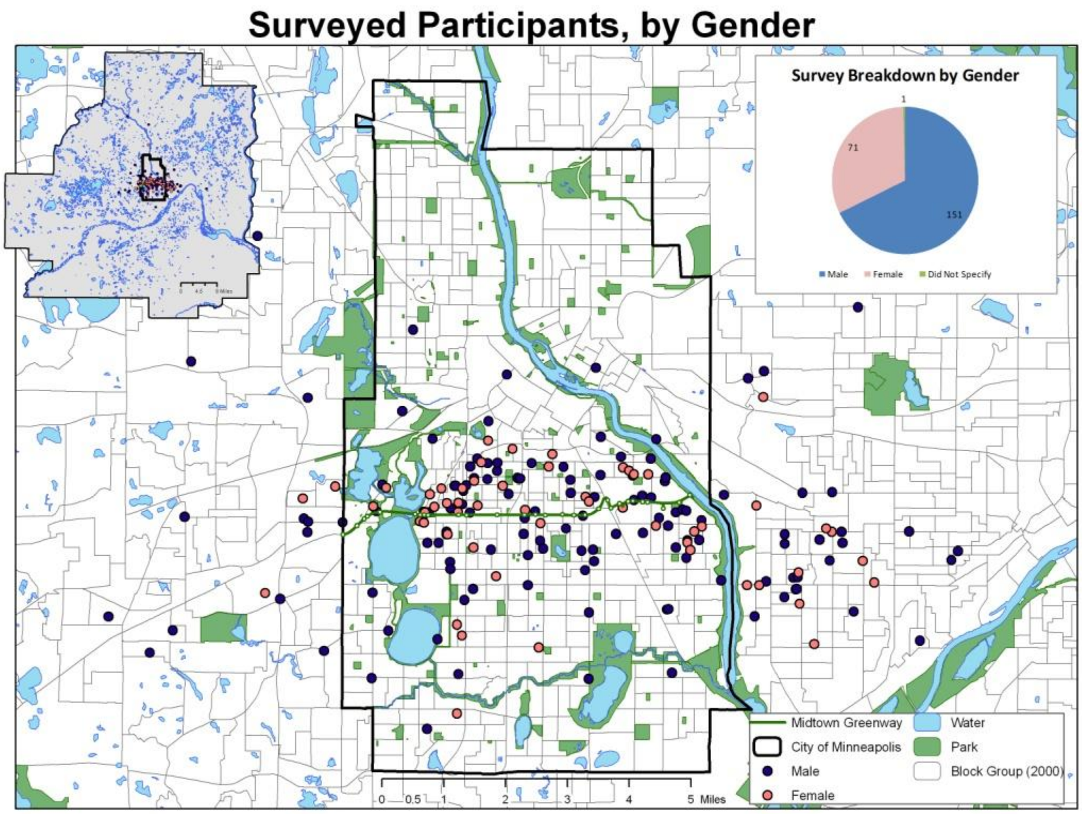
Chart 7

> "These empirical findings beg the question: '*why* do different groups visit and use parks in different ways?' Within leisure research, the answers to this question revolve around the positionalities and cultural preferences of individual potential park users, rather than the characteristics of parks themselves." (pg 763, 2009)

Byrne and Wolch note that theorists on leisure propose explanations of social marginality, race/ethnicity, assimilation and acculturation and discrimination as probably causes for this observed pattern of differentiated park use. There is much research about leisure patterns as they relate to racial identity (Ho et al., 2005; Shinew et al., 1995), and bicycling as a recreational, leisure activity has historically been disproportionately favored by whites in America (Floyd et al., 1995). Jeff Mapes' *Pedaling Revolution* (2009) and Wray's *Pedal Power* (2008) both provide remarkable overviews of the history of urban cycling, but neither of their authoritative accounts of the origins of the movement define the movement explicitly as it relates to racialized identities. While it would be valuable to study explicitly why whites and non-whites utilize and experience the Midtown Greenway differently, the number of participants who identified as non-white is too small to make any claims that could be verifiably accurate. This could be an exciting avenue of research; understanding that certain groups are more likely to use the facility in certain ways encourages future discussion about how the built form alongside the Greenway could include amenities more likely to turn the facility into the coveted "Green Magnet." It is clear that more research is necessary to understand the social and cultural barriers to cycling, especially in regards to race, if the Midtown Greenway and the opportunity to partake in active transportation are to be accessible to all.[9]

5.3.3 - Greenway Users and Gender

Somewhat discouraging is the heavily distorted male to female ratio of users on the Greenway. It is already established in transportation literature that men tend to bike more frequently and longer distances than women, and it would stand to reason that the most-heavily used trail with extensive amenities for safe riding without automobiles



Map 11

would encourage more women to ride the trail. Many of the studies in the review of

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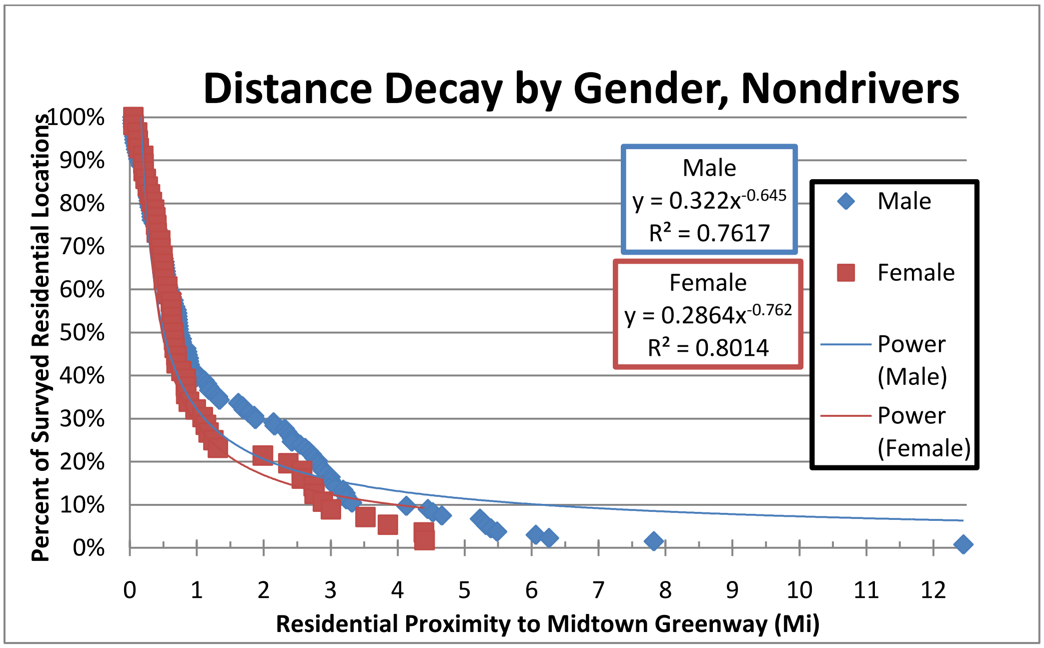
[9] For a helpful example of the possibilities for qualitative research methods to help understand how cyclists navigating identities and urban space, see McKenna and Whatling, (2007).

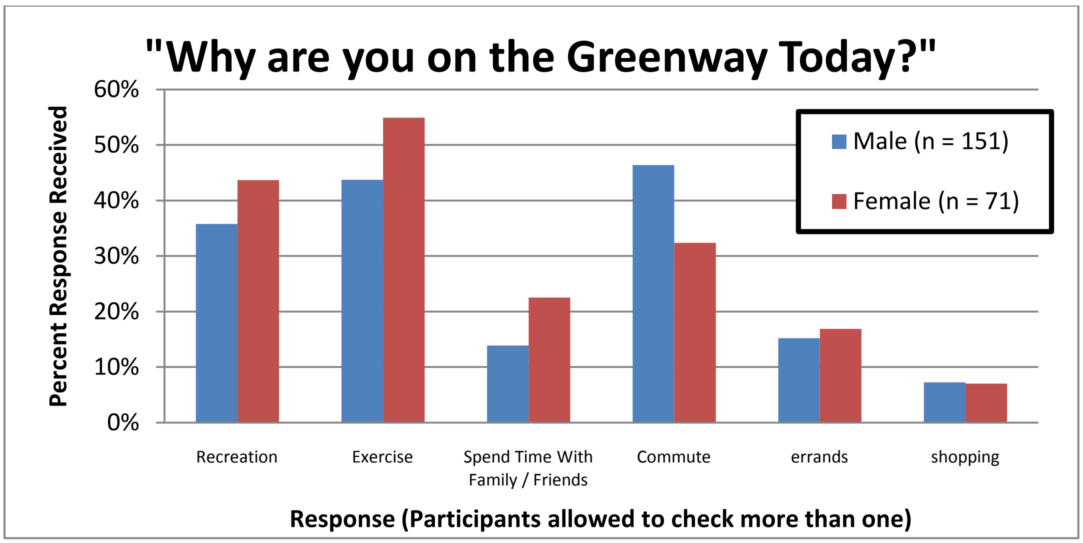
literature (including Dill, 2008; Krizek et al., 2005) suggest that women are more likely to use a bicycle for recreation and transportation purposes with the construction of safe, controlled facilities such as the Midtown Greenway, so the near 2:1 gap between male and female users suggest that the Greenway in of itself is not enough of an amenity to encourage equal numbers of women as men to jump on a bike. Also discouraging to note that the gender gap does not appear to have significantly changed since 2005, when Hennepin County undertook a significant study of people on portions of the Midtown Greenway and other regional trails; their study of over 3100 respondents found that 62% of those surveyed were male (Hennepin County, 2005). Men were also more likely to be using the Greenway to commute than women (46% to 32%). One possible explanation for this disparity is possibly refuted by my survey data; despite the previously mentioned concerns about crime and safety on the facility, women and men answered they felt either "safe" or "very safe" when on the Greenway in equal numbers (87% and 86%, respectively; see Appendix D). The distance decay power-curves between men and women are remarkably similar (Graph 7); this suggests that the average woman cyclist is willing to travel as far as the average male cyclist, but that perhaps the overall number of women willing to use the Greenway is smaller. The flaw in this methodology is that by surveying individuals who are using the Greenway, it is difficult to gauge the barriers preventing others from using the facility; even if an overwhelming number of men and women sampled say that they perceive the Midtown Greenway to be a safe place, there may be many people who have a different opinion and explicitly avoid the facility, and their perspective would obviously not be included.

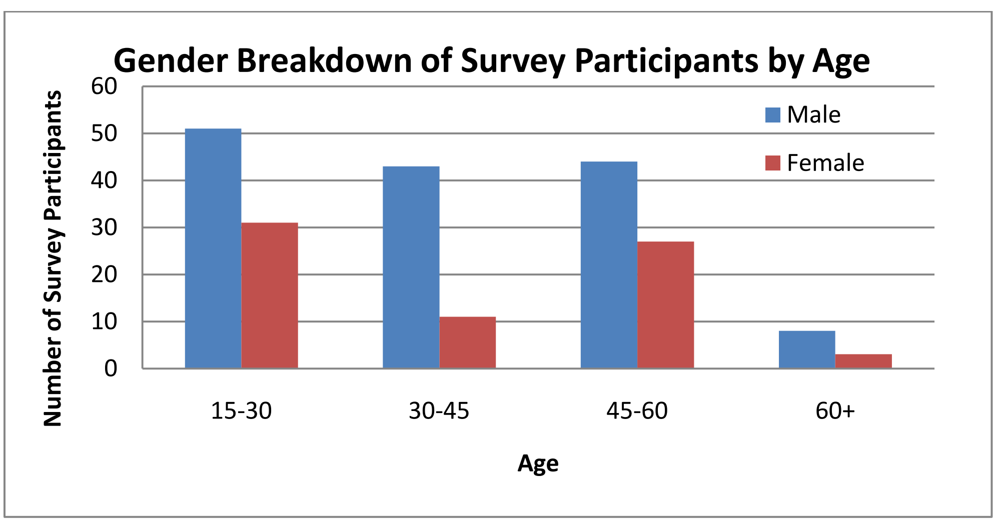
Interestingly, gender parity is closest amongst both younger and older riders; further research could explore why middle-aged women are not on the Greenway and if this is indicative of a larger cultural structure in which younger and older women have more opportunity and time to partake in recreational cycling and jogging.



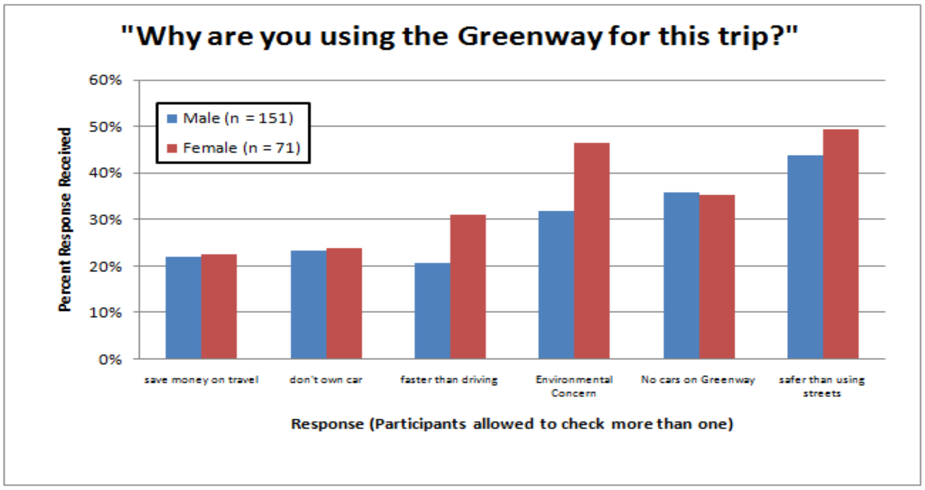
Graph 7

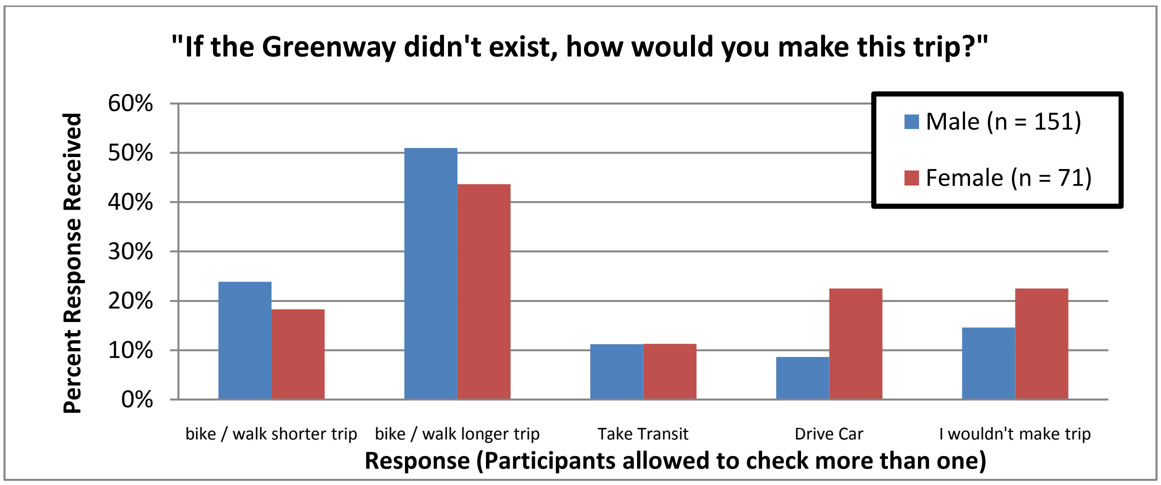
While the Midtown Greenway is used predominantly by men, results from my survey question "If the Greenway didn't exist, how would you make this trip?" (see Graph 8, next page) suggest that a higher percentage of women than men (23% to 15%) would either not make that particular trip or use an automobile. Nearly half of women also noted that they were on the Greenway because it was safer than using streets, and both men and women noted that they liked the lack of automobiles on the trail (Graph 10). This supports other findings (Dill, 2008; Krizek et al., 2005) that construction of safer off-road facilities might help close the gender gap on active transportation. By studying how these linear spaces are used and perceived differently by men and women, we can draw larger conclusions about what types of individuals are using the Midtown Greenway and the degree to which the facility has met its goal of being an amenity accessible to all. Documenting that a discrepancy in usage patterns exists encourages further research both into how the built form could encourage more users but also how the interests of women could be more fully represented in the political and design processes of future improvements.





Graphs 8 and 9





Graphs 10 and 11

5.3.4 – The Greenway and the Environment

Also of note is the 37% of those surveyed who cited "Environmental Concern" as a reason they were using the Greenway, a percentage that rises to 46% among survey participants under the age of thirty (See Appendix D). While greenway projects historically were designed by landscape architects to embody a particular vision about the relationship between nature and the city, it is interesting to speculate how an abandoned railroad corridor without much environmental aesthetic has been transformed into a place in which individuals perform a particular act of environmental consciousness. This qualitative observation is beyond the scope of this paper, but it is interesting to note how a trail that does not physically resemble the Olmstedian "Emerald Necklace" design of greenways is now considered a place in which individuals are explicitly considering their interaction with the natural environment around them. Contemporary concerns about air pollution and carbon emissions may have replaced, or at least supplemented, the environmental ethos that guided previous greenway developments in which open space of manicured landscapes were seen to provide "lungs" for the city to breathe and improve citizen's quality of life. It may be possible to interpret this rehabilitated railroad corridor as emblematic of a new environmental ethos increasingly concerned with sustainability, climate change and the holistic reuse of urban spaces.

5.4 – Discussion, Limitations, and a "Green Trench?"

Relative to the full spectrum of people who use the Greenway, commuters are likely over-represented as a fraction of the overall Greenway users in my survey. My surveys were conducted largely on weekday afternoons, and the commuter rates were much lower on the two weekend dates than the other six. This is particularly interesting considering that while my two weekend counts generated low counts, the regression model created in Section 3 shows that Saturdays and Sundays on average bring over 600 extra riders a day. Over-sampling commuters likely has implications for the rest of the demographic trends observed; people riding home from work on a weekday could easily have different characteristics than the weekend recreation riders, whether in terms of residential proximity to the facility, demographics, or frequency of usage of the trail. My survey results indicated, for instance, that men were more likely to bike for commuting purposes than women.

I chose locations to administer the survey in which pedestrians and cyclists already had to slow down/stop to engender a higher rate of survey completion. I asked every passing Greenway user at the four survey locations to fill out a survey, although this was difficult considering the general speed of a cyclists and the occasionally heavy traffic at survey locations. As mentioned, I only managed to survey under 8% of the 2708 total Greenway users who passed me while I was conducting my research. While the locations were not sampled evenly, the rates of participation in the survey of all of the Greenway users across gender and mode of transportation are even. Furthermore, my own positionality as a young, white male with limited Spanish language skills may also have influenced the results of my survey; it is possible that these factors played a role in determining which individual trail users chose to stop and fill out my survey or which information they chose to report.

Do my findings suggest that the Midtown Greenway is a "Green Trench?" It is encouraging to see that the facility seems to be considered as an integral backbone of a larger transportation infrastructure, and that a significant number of people who use the facility live remarkably close to the facility. However, it appears that the recreational and transportation-based amenities offered by the facility are only being utilized by a specific portion of the population with different racial and gender proportions than the immediate surrounding neighborhoods in which the majority of Greenway users live. To make the assertion that the Midtown Greenway is a "Green Trench" in which the social and cultural constructions of race and gender are not only reflected but reinforced by the usage patterns of the facility, more surveys would need to be administered at different times of day, and at different times of the week, to verify that the trends identified here are consistent across a broader temporal and spatial scale. The survey results do suggest that while the demographics of Greenway users and local residents don't match, their addresses do; our distance decay models showed an overwhelming number of people using the trail not only live close to the facility but also are very likely to walk or ride a bike through the city to get there. Survey participants who were identified as living within one mile of the Greenway were more likely to be non-white than those that lived farther; this suggests that the demographics of Greenway users who live in these nonwhite neighborhoods more closely match their local neighborhood's demographics than that of the Greenway as a whole. This makes sense; because the populations of the surrounding suburbs are more white than those neighborhoods in Minneapolis, the people using the facility and live farther away are more likely to skew the overall demographics of Greenway users to be more white (see Chart 7). This somewhat softens the criticism that the Greenway is a "Green Trench," although even this subset of Greenway users still doesn't match the demographics of surrounding neighborhoods. I believe this independent research begins the important discussion of analyzing the demographics of Greenway users and broadly understanding the ways in which this resource is utilized. Further research could also utilize qualitative data from semi-structured interviews with Greenway users to understand why usage of the facility varies so widely across race and gender. With cautious optimism, I note that the results of efforts to create community linkages with this facility are still mixed but worthy of continual study and advocacy. Organizations such as the Midtown Greenway Coalition (see Section 7.0) continue to address these issues, publishing pamphlets in multiple languages and maintaining a Board of Directors with members representing different neighborhoods. To again quote Charles Little:

> "The point is that this movement is not merely an aggregation of conservationists undertaking similar projects but a cadre of civic leaders, however disparate, who devoutly believe in the emblematic, as well as actual, importance of linkage of recreational and cultural resources, of wildlife populations, and most of all, of neighborhoods and towns and cities and people of all colors and stations not only in the use of greenways but also in the making of them…" – (Little, 1990).

6.0 - Changes in Property Values

The implementation of such a successful, influential amenity as the Midtown Greenway is likely to have a litany of impacts on the burgeoning, evolving communities along the Lake Street corridor. Understanding how property values have changed in neighborhoods near the Midtown Greenway since the project's implementation is important for a variety of reasons. Much of the justification of the construction of this facility lies in the economic redevelopment potential of building for the surrounding neighborhoods.

Hennepin County has long understood the importance of building and maintaining park space as it relates to economic development; in 1994, the county's Parks and Public Works departments advocated for the creation of an interdepartmental coordination aimed to produce recreational and natural amenities for the purposes of retaining residents (and therefore tax base). "The Parks and Public Works Commission confirmed [with] overwhelming historical evidence that: well designed and carefully integrated parks and public works projects maintain and enhance the long-term tax base of neighborhoods while improving their quality of life" (Hennepin County Parks and Public Works, 1994, p.2). In 1998, Hennepin Community Works noted that: "…by integrating issues of community design, alternative transportation benefits, greenspace development, and economic development, this amenity illustrates that the impact of a transportation enhancement goes far beyond the development of an alternative transportation mode" (Hennepin Community Works, 1998, p. ii).

6.1 – Literature Review of Greenways and Property Values

Because many of the linear facilities that predated the era of urban transportation infrastructure were located outside of dense areas, the research collected on how trail development affects nearby residential prices is important more for interpreting their methodology than comparing their results. Crompton (2001) reviewed the then limited literature on how property values along linear trail corridors are changing, noting that empirical literature was relatively weak and generally reliant on "surveys of attitudes and opinions of homeowners and realtors" (p.117). Crompton also notes the difficulty of collecting enough data across temporal and spatial boundaries to conduct reliable hedonic regression analysis at an empirically significant level. [10] His research suggests further use of econometrics, as well as continued study of the presence, degree, and extent of an economically significant impact through the implementation of greenways.

[10] For an example of how survey-based economic measurements were carried out, and an explanation of the limitations of the approach, see Lindsey and Knaap (1999).

Crompton also notes that the assumption that a greenway trail will necessarily increase property values can be heavily contested; “Rather than increasing property values, some argue that in these narrow corridor contexts, greenway trails will cause property values to decline because they encourage a flow of non-local people to pass through neighborhoods,” citing a “loss of privacy, trespass, litter, noise, increased crime and vandalism” (p. 127) as a set of concerns espoused by would-be neighbors to trails (this is also elaborated in Schneider, 2000; Markeson, 2007). The fear about safety of these facilities is not uncommon, and similar concerns were raised about the construction of the Midtown Greenway. A 1999 article in the local alt-weekly *City Pages* quoted a Minneapolis police officer about his experiences with the corridor before the construction of the Greenway:

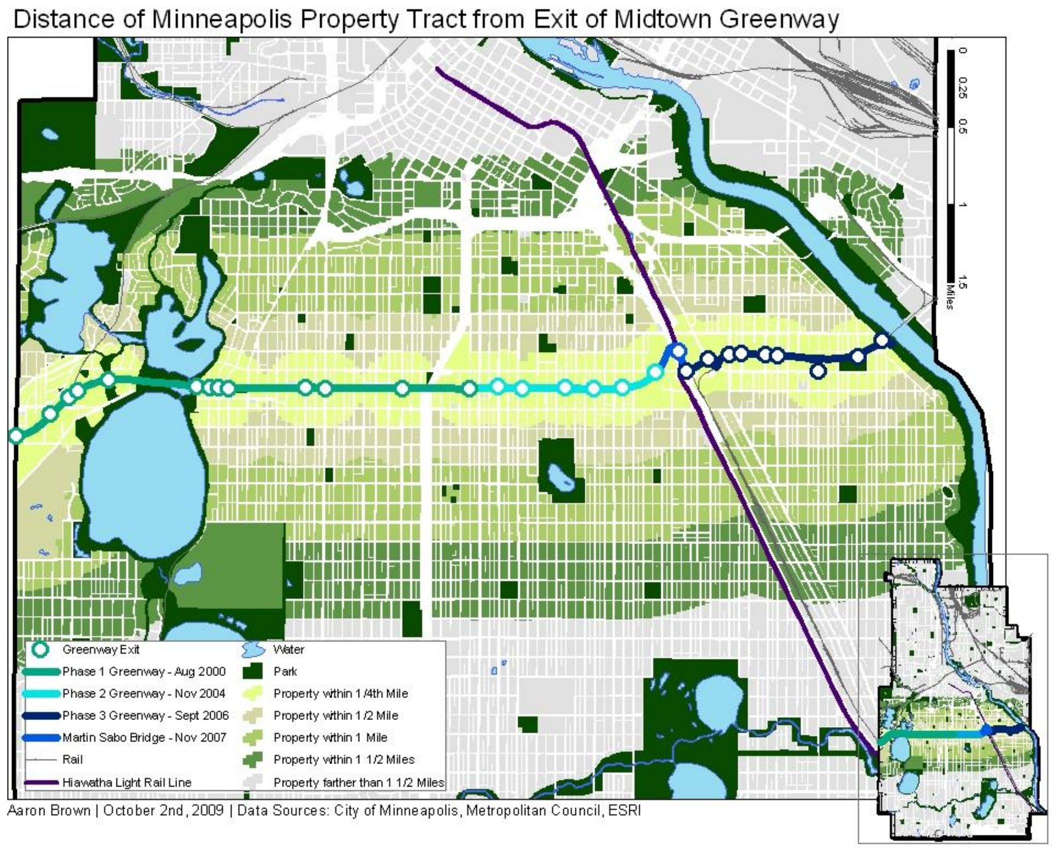
> "If you knew that a shooting suspect had escaped nearby, you could just park squad cars on the bridges and look for movement. Three or four years ago we did a stakeout at the Bloomington-Lake bridge, looking for drug users; they would show up like clockwork. It was a big place for prostitution, too. I would never recommend taking a walk there when the sun is going down--it's a boxed canyon with steep walls that don't allow you to scramble to safety" (quoted in Reckdahl, 1999).

The introduction of Geographic Information Systems (GIS) methodology allows for more statistically rigorous interpretation of the relationship of proximity to amenities and property value. One economic hedonic analysis of multi-use trails in Indianapolis found that only one out of the eight greenways studied showed statistically significant positive increases in home prices of proximal properties; 334 houses within a half mile of Indianapolis’ heavily trafficked Monon Trail on average sold for 11 percent more than the average metro residential price with an estimated 14% ($13,506) of the price due to the proximity of the trail (Lindsey et al., 2004).

Anderson and West (2006) used a hedonic regression model to analyze home transaction data from the Twin Cities metro region to show that the extent to which proximity to open space affects listing prices is affected by contextual neighborhood characteristics such as population density, distance to the central business district and median income. Their findings did not include the Midtown Greenway as "open space" and the facility was not considered in their analysis, but their findings do support the hypothesis that the Midtown Greenway has increased the value of homes in proportion to the property's proximity. Paul Mogush et al. added a variable into the hedonic regression model to measure the distance of properties to off-road urban multi-use trails in Hennepin county, and similarly found that urban residential plots in the city of Minneapolis had a significant, positive correlation to proximity to trails, but that this correlation was not significant in the suburban municipalities of Hennepin County (Mogush et al., 2005). Along with measuring the economic impact of proximity to the facility, these observations are also valuable for its contribution to exploring how different types of facilities affect property values; while residential properties experienced a boost from proximity to off road trails such as the Greenway, other facilities such as bike lanes and trails adjacent to roads did not have a similar effect. Striking in both Anderson and West's and Mogush et al.'s research is the finding that these amenities have a larger economic impact on the surrounding properties in areas with higher density.

6.2 – Data and Methodology for studying Changing Property Values

As a proxy to determine how property values have been impacted by the development of the Greenway, I analyzed the taxable property value of parcels within various buffers of the corridor. Using ArcGIS to manipulate Hennepin County parcel data, I selected properties within .25, .50, 1, and 1.5 mile buffers from each of the Greenway exits by Greenway Phase, and compared the relative rise in property value of these parcels to the city of Minneapolis as a whole. I chose to separate the Greenway into the three phases to identify how changes in property value are happening at different rates along different stretches of the corridor; as mentioned before, the Midtown Greenway connects many neighborhoods with different degrees of economic development. Because I compared the relative growth in taxable property value to that of the city of Minneapolis as a whole, I only surveyed properties within the city of Minneapolis, even though a handful of properties on the eastern side of St Louis Park were within the buffer zone. Similarly, while properties on the other side of the Mississippi River in southeast Minneapolis were within the half- and full- mile buffer zones of the easternmost Greenway exit, they were excluded from analysis because of the physical barrier imposed by the river. I did, however, include properties within a half-mile buffer of the easternmost point of the Franklin Bridge, since the western terminus of the bridge is roughly a mile from the nearest entrance to the Greenway and would therefore be within the 1.5 miles of travel to the facility. All of the buffers larger than one half mile begin to overlap, and therefore my methodology counts properties that are included in more than one buffer in each data set.



Map 12

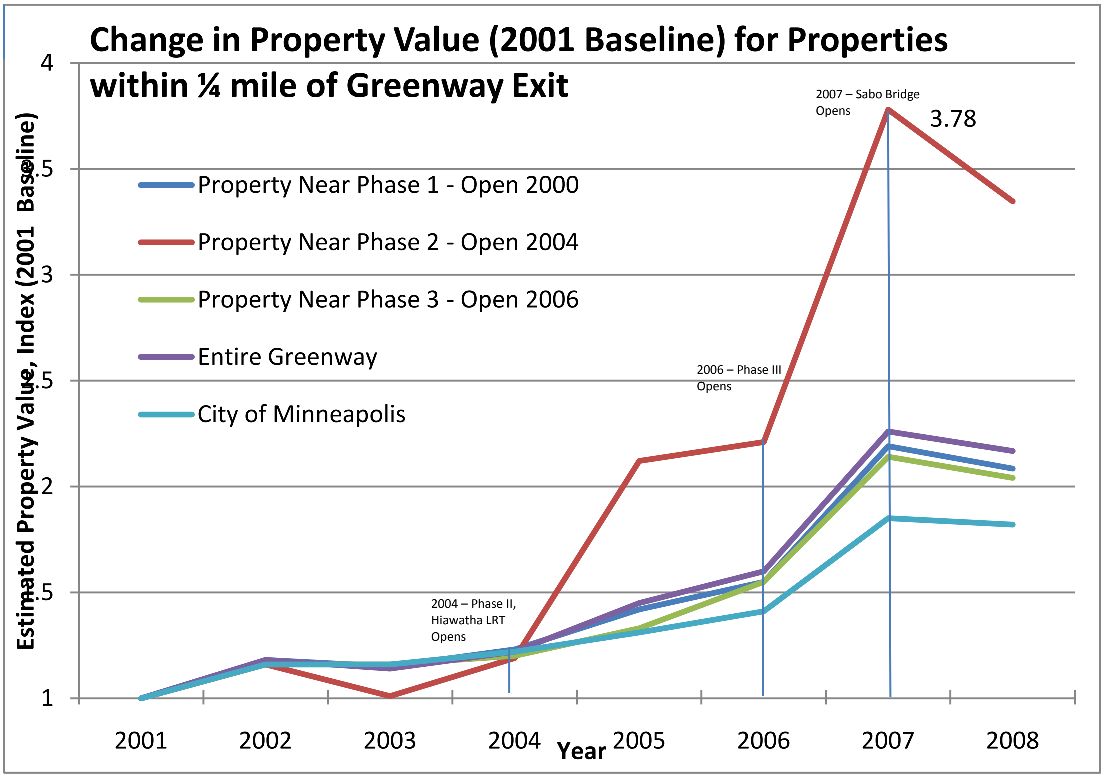
6.3 – Results

For comparison purposes, the aggregate value of estimated taxable property value for the land inside each buffer through each year was normalized to the original 2001 value. Chart 7 shows how these relative values have changed from 2001 to 2008. All of the buffers studied experienced a growth of property rates that was slightly higher than the average increase in rates (82% increase from 2001 to 2008) in the city of Minneapolis as a whole. The fasted acceleration of property values was located in properties near Phase II of the Greenway. Along all three phases, the highest increases were concentrated in the smallest buffer; this suggests that while values have been increasing around the entire area, the fastest rates of appreciation are located directly near the entrance points to the Midtown Greenway.

		2001	2002	2003	2004	2005	2006	2007	2008
Phase I	.25 mile	1	1.18	1.15	1.23	1.42	1.55	2.19	2.08
	.5 mile	1	1.19	1.16	1.25	1.40	1.55	2.13	2.06
	1 mile	1	1.20	1.18	1.27	1.41	1.57	2.12	2.07
	1.5 mile	1	1.18	1.17	1.26	1.37	1.54	2.06	2.02
Phase II	.25 mile	1	1.16	1.01	1.19	2.12	2.21	3.78	3.35
	.5 mile	1	1.21	1.15	1.26	1.96	2.19	3.51	3.18
	1 mile	1	1.2	1.18	1.29	1.70	1.86	2.85	2.61
	1.5 mile	1	1.19	1.17	1.27	1.50	1.62	2.30	2.19
Phase III	.25 mile	1	1.16	1.16	1.20	1.33	1.55	2.14	2.04
	.5 mile	1	1.17	1.16	1.21	1.41	1.53	2.05	1.98
	1 mile	1	1.20	1.19	1.28	1.48	1.55	2.12	2.04
	1.5 mile	1	1.20	1.19	1.31	1.49	1.55	2.15	2.05
Entire Greenway	.25 mile	1	1.18	1.14	1.22	1.45	1.60	2.26	2.17
	.5 mile	1	1.18	1.16	1.24	1.43	1.57	2.15	2.08
	1 mile	1	1.20	1.18	1.27	1.42	1.55	2.10	2.11
	1.5 mile	1	1.19	1.18	1.27	1.38	1.52	2.02	1.99
All Minneapolis		1	1.16	1.16	1.22	1.31	1.41	1.85	1.82

Chart 8

Graph 12 directly shows how the property within quarter-mile buffers of the Midtown Greenway appreciated faster than the Minneapolis average, and how property near Phase II increased in value much faster than the other areas. The Phase II properties had some of the lowest property values on the corridor to begin with, and therefore any increase in value has a larger proportional effect than it has in other locations. Furthermore, the Phase II buffer included fewer parcels than buffers around Phases I and III because of the relative length of the facilities; this likely made it easier for the Phase II buffer to outpace property value growth through this metric. Still, even at the 1.5 mile buffer, the growth experienced in the vicinity around Phase II outpaces growth along any of the other Phase buffers.



Graph 12

6.4 – Discussion of Results, Future Potential Development of Greenway Corridor

Before reaching conclusions about the role that construction of the Midtown Greenway played in the rise of property values along this corridor, it is crucial to consider the limitations of methodology and to instead view results as indicative of a larger set of trends that are defining the changing economic landscape in southern Minneapolis.

There are flaws and limitations to the methodology that should be addressed. Perhaps the largest limitation of the data is that all assessed property values are inherently the work of Hennepin County tax assessors. While the assessors did not explicitly increase the estimated property value based on proximity to the Greenway, using tax assessments is an admittedly indirect way of assessing changing economic values. A more appropriate study would use economic hedonic regression analysis to filter out the extraneous housing characteristics and features to determine if a relationship existed between a change in property values and proximity of the parcel to the facility, of the sort of model utilized by Lindsey et al. (2004), Anderson and West (2006), Mogush et al. (2005). By using a regression model to normalize housing based on square footage and other amenities, it would be possible to see if a house within one half-mile of the Midtown Greenway garnered a higher property value than an otherwise identical house two miles away. Of course, due to the relative newness of the Greenway, and that fact that almost any parcel near the Greenway is also proximal to the busy Lake Street corridor that brings with it an entirely different set of externalities, it would be difficult to reach a definite, concrete answer to the question of whether the Midtown Greenway has had a demonstrated impact on property values. To fully understand the extent to which proximity to the Greenway would affect property value relative to proximity of the Lake Street corridor, a hedonic regression analysis could focus how properties in the eastern neighborhoods (Seward, Longfellow and Cooper) were valued, since these properties are the only in the region where the distance between the Greenway and the Lake Street corridor are varied and would therefore provide a less schedastic data set. However, as my research suggests that property values accelerated the quickest on properties near the corridor, a hedonic regression model might provide us with clues of the distance to which property values are affected by this facility. This hedonic regression model, coupled with the “trailshed” calculated in the examination of survey data and residential locations of survey participants, would provide two specific examples of the geographic sphere of influence of a multi-use facility. Estimating numeric values to the sizes of these buffers could significantly help planners across the country estimate the impact of similar projects.

It is also possible that some of the increases in property value stem from vacant lots or lots with nontaxable entities that were developed, at which point extra value would be added to the buffer without actually directly increasing any individual parcel’s value. This impact is expected to be insignificant; even the smallest buffers include thousands of parcels, and the addition of new development should not have impacted the results significantly.

Even a hedonic regression model would have to account for a litany of other complicated factors that influence the economic landscape of the corridor. The neighborhoods that parallel Lake Street make up a dynamic, rapidly evolving corridor, and the demographic, economic and social changes to various sections of Lake Street are likely more responsible for changes in property value along the corridor than the reconstruction of the railroad trench.

All of the buffer zones of all three phases and of the entire Greenway as a whole showed a higher rate of increase in value than the city of Minneapolis between 2001 and

2008. The neighborhoods studied in this region of south Minneapolis, however, have remarkably different demographics and property values than neighborhoods in other areas of the city such as North and Northeast Minneapolis. There are also significant demographic differences; North Minneapolis has a large African American population, and both North and Northeast have seen historically lower levels of both private and public investment than south Minneapolis. The comparison of property values in these buffers to the city of Minneapolis as a whole does not exactly compare similar neighborhood types, but rather compares how the same tax assessment program evaluates these neighborhoods differently over time.

When considering the assertion of whether or not the Midtown Greenway is contributing towards gentrification in the area, many current scholars note the importance of the presence of renewed public investment and infrastructure toward making inner city neighborhoods more palatable for private investment (Smith, 1996). Indeed, the Midtown Greenway represents but one significant piece of new infrastructure and investment in the corridor brought about by government entities; the most significant project that likely affected property values in this area is the 2004 completion of the Hiawatha Light Rail Line. The implementation of this transit project might explain part of the quick jump in property values in the Phase Two Buffer, which borders the Hiawatha Line. However, interestingly, a corresponding jump was not recorded in the Phase Three Buffer, much of which is just as close to the light rail line (although separated by the busy Hiawatha Avenue) as the neighborhoods included in the Phase Two Buffer.

Phases 1 and 2 demonstrate that the highest changes in property value happened immediately adjacent to the Greenway; the assessed values in parcels within a quarter mile of an exit of Phase 2 increased by over 335%, while parcels within a mile and a half increased by 219%. In Phase 3, the increase in the quarter-mile buffer was higher than the half and full mile, although equal to the increase of property values in parcels within the 1.5 mile buffer. This evidence supports the claim that rising tax values are localized to the improvements in the Lake Street corridor, and that areas of historical disinvestment are beginning to see their land value appreciate, as defined through the eyes of governmental assessors. As mentioned before, the neighborhoods adjacent to the Midtown Greenway are particularly varied; while properties near the Greenway west of Hennepin averaged a cost of $68 per square foot of land in 2006, this value dropped to $50 between Hennepin and Chicago and $27 east of Chicago to Hiawatha (City of Minneapolis Department of Community Planning and Economic Development, 2006). In this sense, the efforts by Hennepin County and the city of Minneapolis to invest in this corridor for the long term goal of creating additional tax base seem to be literally paying dividends.

Continued research of this corridor is necessary for a variety of reasons. Numerous planning documents by the city of Minneapolis and Hennepin County see the area as a location for continued intensive economic development; Minneapolis' aforementioned land use study noted "The Greenway …plays an important role for housing in the City….These areas are characterized as possessing available land and being appropriate locations for redevelopment with higher density types." (2006, p. 11)

Because my research analyzes only the changes to assessed property value, this analysis leaves out potential increases in taxes because of housing upgrades that have taken place in the past decade. While my research allows us to specifically focus on the changes in property value, it obscures how portions of neighborhoods near the Greenway may be undergoing physical change over the same period of time.

Observed changes to the economic landscape are encouraged by efforts by the city of Minneapolis to rezone large swaths of south Minneapolis to allow and even encourage higher-density development. In 2009, Minneapolis' Planning Division released their new zoning plans which called for significant upzoning along the corridor, particularly along Phases 2 and 3 of the Greenway in the vestigial industrial spaces grandfathered into neighborhoods from their location along the original railroad. Many of the residential, single-family houses currently zoned as "R2" are also planned to shift to R3 designation, which would slowly encourage the creation of larger, denser multi-unit developments on parcels particularly close to the corridor. While these plans represent the codification of long-term visions established by urban planners from years past (City of Minneapolis Department of Community Planning and Economic Development, 2006), many local neighborhoods were upset by the possible physical changes to their neighborhood they successfully lobbied the city to rescind 474 of the 1766 proposed zoning changes to slow the densification of development (City of Minneapolis Planning Division, 2009b; City of Minneapolis Planning Division, 2009a). The zoning improvements that were approved around Phase III of the Greenway still encourage the disassembly of the existing light industrial parcels and gradual replacement with commercial, retail and residential mixed-use space. The built forms encouraged in these neighborhoods have significant long-term implications for future economic investment in this area, and this will undoubtedly affect not only the economic value of nearby properties but will likely have long-term impacts on the demographics of those living near the corridor (Brown, 2010).

As mentioned previously, the Hennepin County Regional Railroad Association (HCRRA) purchased this corridor for the development of public transportation, with particular emphasis on eventually building a light rail or streetcar-type facility connecting the Hiawatha Light Rail Line to the Uptown neighborhood and the future Southwest Light Rail intended to connect Minneapolis to the southwestern suburbs of Edina and Eden Prairie projected to open in 2017. The City of Minneapolis has endorsed the Midtown Greenway as a potential corridor for a streetcar line, although both rail projects are subject to the successful completion of Environmental Impact Statements and the acquisition of federal funds. The Midtown Greenway Coalition has also funded its own research about the viability of a streetcar in the corridor, advocating for its construction and integration into a larger regional public transportation network (Midtown Greenway Coalition, 1999).

It is likely that such a project would rapidly expedite many of the trends of neighborhood revitalization and gentrification already beginning along this corridor. Nationally, the extent to which gentrification has occurred along corridors of new rail transit developments is ambiguous; one study of fourteen American cities that implemented new rail transit lines between 1970 and 2000 found that nine had statistically significant increases in indicators of gentrification, and that the implementation of “walk and ride” stations oriented towards density and pedestrian usage like the potential Midtown Greenway line (as opposed to suburban-oriented park-and-rides) seems to induce higher levels of a few metrics of gentrification (Kahn, 2007).

The most recent available data are 2009 Hennepin County Parcel Data, which include assessments on property for the year 2008. Judging by the immediate slowing of property value increases recorded in 2008 as compared to the previous year, it appears that the beginning of the national recession brought property values down in 2008. Research of future property value assessments could provide evidence of how these localized neighborhoods are affected by changes in the financial markets at a much larger, global scale, and comparisons could be drawn to see how these neighborhoods weather changes in the global economy relative to other neighborhoods in Minneapolis or other communities in the entire seven-county Metro region.

While we must be careful to with conclusions, it is safe to say that the Midtown Greenway is becoming an integrated part of an evolving urban form in South Minneapolis in which property values are rising at a rate above the city average and in which the average property is above the mean and median property value of the city as a whole. The highest rates of property value increase are geographically concentrated around the Lake Street corridor. The significant differences in rising property values associated with land prices and distance to the Greenway should encourage more research to explore how the Midtown Greenway has impacted the value of land in South Minneapolis. Considering Hennepin County’s and Minneapolis’ vested interest in acquiring extra tax base, developer's interests in ever-larger condominium projects, and concerns of gentrification and displacement among Lake Street's financially fragile immigrant groups, there is a significant need for further research on what is happening to the landscape surrounding this corridor and how the implementation of the Midtown Greenway is related.

7.0 – Spatial Patterns of Donations to the Midtown Greenway Coalition

Because the Midtown Greenway is a facility that was constructed in large part due to substantial citizen activism and participation, taking a look at which neighborhoods are the most involved in current advocacy gives us a different perspective towards understanding how residents of different neighborhoods view and appropriate the Midtown Greenway. For this final analysis, I observe and analyze the spatial patterns of donations by current members of the Midtown Greenway Coalition (MGC), the nonprofit organization officially founded in 1995 that has been credited for supplying the leadership and vision necessary to see the corridor fully implemented. With the Greenway complete, the organization now is involved with different projects concerning the future of the Greenway, ranging from attempting to prevent the construction of a large power-line along the trail to the implementation of more public art installations to the organization of group rides and events that take place along the Greenway.

The articulation of a larger vision for the Midtown Greenway has been valuable for the historical construction of the facility, and the MGC remains relevant today by continuing to articulate their vision of how the Greenway should look and attempting to shape the developments that take place along the corridor. Their mission statement includes this vision of "a green urban pathway that…provides the anchor for a regional, sustainable transportation network; and encourages healthy diverse communities to prosper, participate, and connect to the region." By analyzing spatial patterns of donations to the coalition, we can observe how engaged the organization is with the "diverse communities" it intends to connect to the region. The Midtown Greenway also receives significant funding from other grants, foundations and organizations, but the purpose of this study is not to measure the MGC's financial relationships to these entities but rather to explore the spatial residential patterns of donors and to understand how engaged local residents were with the organization as it varies by neighborhood both within Minneapolis and within the Twin Cities region in general.

7.1 – Methodology

I aggregated the full list of donors to the Midtown Greenway Coalition by zip code, noting the number of donations received and the total sum of dollars received from each spatial unit. These data were then analyzed and mapped in ArcGIS.

7.2 – Results

The 382 current members of the Midtown Greenway Coalition has contributed a total of $84,643.50 to the organization. This figure is heavily bolstered by one particular out-of-state donation of $50,000, which represents over 59% of the total funds raised by these current members. Because I am interested in examining how stakeholdership and interest in the Midtown Greenway is spatially located within the region, this large donation is excluded, along with the other nineteen that came from outside of the seven-county metro region. Of the 376 individual MGC members that provided a zip code, 347 (94%) lived within the seven-county region, representing 88% of the money donated to the Greenway by current donors.[11] The zip codes intersected by the Midtown Greenway (55406, 55407, 55408, and 55416) had a total of 197 donations worth 54% of all donations, although zip code 55416 extends to cover most of nearby Saint Louis Park and therefore obscures the number of donations located in the immediate vicinity of the Greenway and the number from residents of Minneapolis. Of note are the lack of donations from the two North Minneapolis zip codes (55113 and 55114), the handful of donations from zip codes in Saint Paul and the presence of donations coming from western suburbs Edina, Golden Valley and Hopkins. Interestingly, the areas from which donations were received generally mirror the same pattern of neighborhoods in which participants of my survey lived (See Map 15).

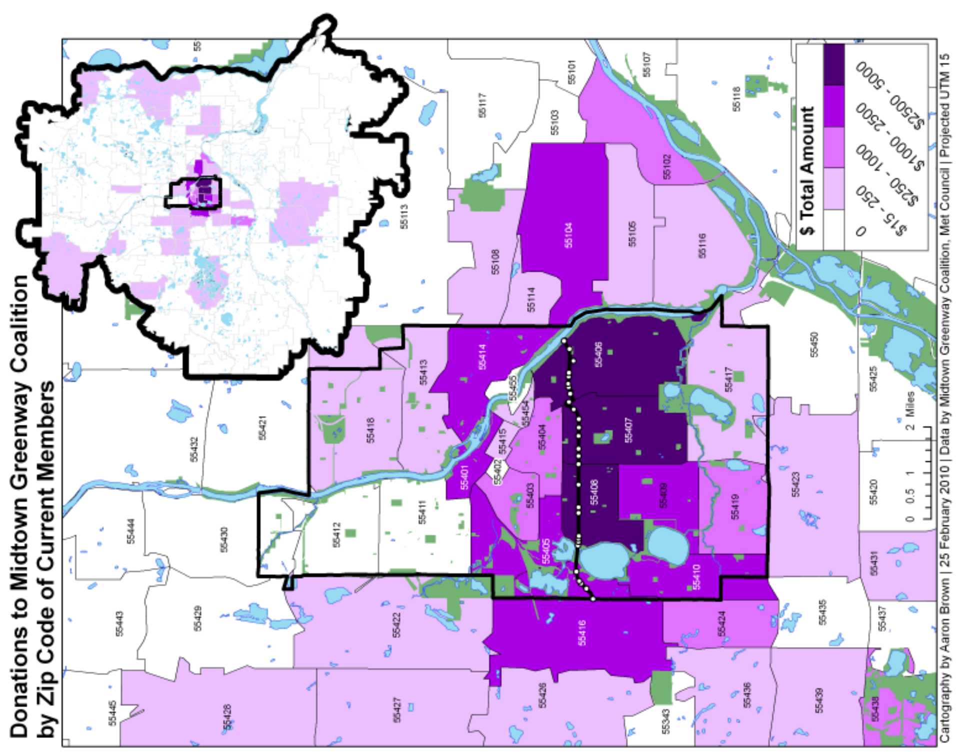
	In Region	**Out of Region**	**Minneapolis**	**Saint Paul**	**Total**
Donations	347	21	277	27	368
Sum ($)	30544.15	53587	24927.18	2345.5	84131.2

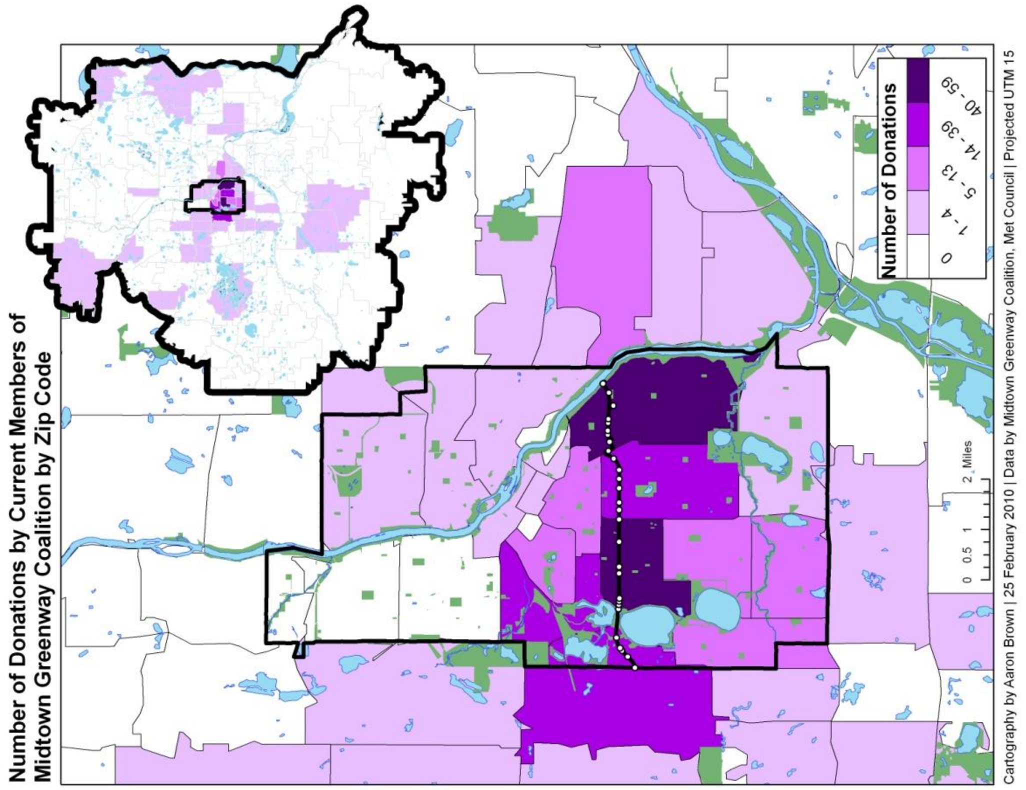
Chart 9

7.2 – Discussion of Results

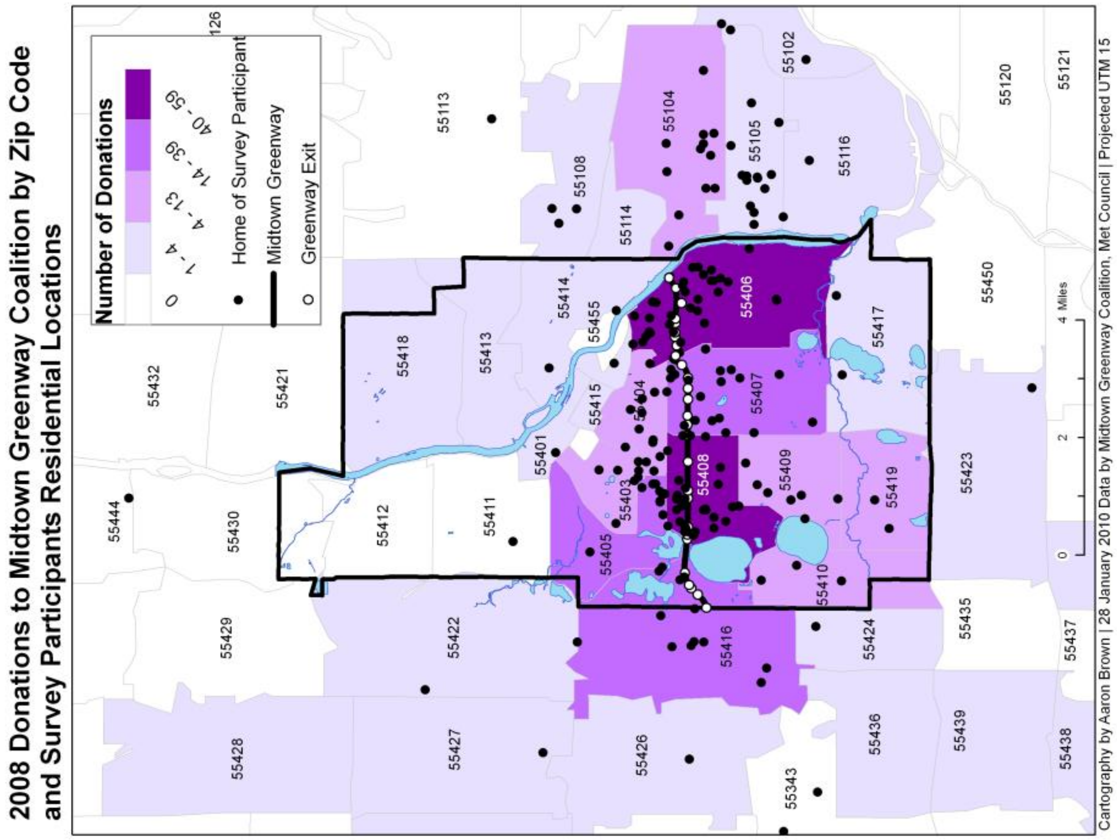
As expected, donors to the Midtown Greenway Coalition came largely from citizens living in zip codes within the city of Minneapolis, and the majority of the Minneapolitan donations, in both aggregate dollar sum and in total number of donations, were located in zip codes intersected by the Midtown Greenway.

[11] Again excluding the largest, $50,000 donation.





Maps 13 and 14



Map 15

This reinforces the notion that the Midtown Greenway is a facility used and supported by people living in the nearby neighborhoods that surround the trail and that this support erodes with distance. While there are a substantial number of donations from residents of both Saint Paul to the east and the suburban communities of Edina and Saint Louis Park to the west, this metric again suggest that the Greenway is a space most relevant to the most proximal neighborhoods, a pattern that mirrors the residential locations of surveyed Greenway users. Of the ten zip codes with the highest dollar donation, nine were within the city of Minneapolis, and those same nine also boasted the highest number of donors.

There are many other ways to demonstrate an interest in advocacy for the Greenway other than donating to the main nonprofit associated with the facility. It's possible that this methodology overlooks a significant population of people interested in the Midtown Greenway that are unwilling or unable to donate financial resources to advocacy for the trail. This spatial analysis of people interested in promoting the facility could be bolstered by also examining the residential addresses of individuals who participate in volunteering efforts with the coalition, such as volunteering to lead group rides such as the Green Way to Go program. It is possible as well that this metric ignores individuals who are interested in promoting the facility but chose instead to donate to other organizations. Significant political stakeholdership, for instance, may instead be expressed through neighborhood and community coalitions organized through municipal political systems instead of through the realm of this nonprofit. This methodology does not provide us any information as to why this relationship exists, but rather encourages us to think about how defining populations through spatial delineation can provide insight for future research. Noting that donations to the Midtown Greenway Coalition seem to match the same spatial patterns of Greenway users, we can make inferences that suggest a correlation between the neighborhoods actively involved in advocacy for the facility and the neighborhoods that make up a significant portion of the Midtown Greenway's traffic.

8.0 – Summary of Findings and Conclusion

This paper has explored the spatial dimensions of how the Midtown Greenway has affected and is affected by the landscape of the Twin Cities region. By studying the spatial implications of how the corridor is used, who uses it, where these Greenway users live, how nearby property values are impacted, and how different neighborhoods have a sense of stakeholdership in the project, we can begin to establish parameters through which this unique intervention has impacted the surrounding urban landscape. By using established methodologies to interpret how this facility is used and how this facility is implicated in the shifting economic and social landscape of the city, this paper provides a holistic approach to understanding how explicit efforts to reshape transportation and recreation facilities are taking place in south Minneapolis. This information is valuable not only to city planners and community activists involved with active transportation infrastructure within the Twin Cities attempting to build on their successes but to politicians nationwide eager to stage interventions of their own towards establishing the infrastructure necessary for successful, sustainable and equitable twenty-first century cities.

The results of this exploration of the Midtown Greenway and its surrounding communities have important consequences; this research supports the argument that local neighborhoods are most likely to be impacted by this particular type of facility, whether experienced through higher rates of usage or higher property values, and that different communities along the facility are impacted differently based on a myriad of variables. Transportation advocates are eagerly anticipating a new era of investment in active transportation infrastructure, and this paper suggests that the success of these projects nationwide in establishing more livable communities will depend on how well they are integrated into the communities they serve, whether this integration is considered politically, economically, socially or physically. For example, this research underlines that a gender gap of Midtown Greenway users exists and the discrepancies of demographics of those on the trail and those who live near it are real; further research can begin to explore what barriers to using these facilities exist and the successes and failures of Minneapolis and other cities to tackle similar problems. Those interested in economic vitality of inner cities might use this information to understand how these investments will impact local businesses, or to advocate for political mechanisms to ensure that future linear amenities are designed for all Greenway users.

Photo 4 – A section of a larger mural on the walls of an industrial building facing the Midtown Greenway (photo by the author, 2008).

The construction of the Greenway is in many ways a fitting reshaping of the urban landscape; the city of Minneapolis is effectively finding a new use for the very artifice that historically brought tremendous economic growth to the region nearly one hundred years ago. While the corridor may now host swift, spandex-clad bicyclists headed to the lakes instead of mighty trains carrying wheat back from the fields of South Dakota, it is exciting to see a public space crafted from a previously industrial use seamlessly provide such tangible benefits to the next generation of residents of Lake Street's neighborhoods.

This paper has emphasized that the physical space of the Greenway represents more than an investment in a piece of transportation infrastructure but is instead a transformative intervention into the deindustrialized landscape to promote a variety of objectives for making Minneapolis a better place to live. Indeed, the efforts of the Midtown Greenway Coalition and other local community groups have led to finding new ways to appropriate the space for uses beyond travel and recreation; the burgeoning Soo Line community gardens near the Bryant Exit, the growing number of murals and paintings on adjacent walls, and the plans to use storm water runoff for a water-based art installation on the Greenway represent a significant commitment to claiming the formerly abandoned trench into a valuable amenity whose value reaches beyond quantifiable benefits into truly connecting residents to nature, to each other, and to the larger networks that make up the city as a whole. The Greenway boasts a series of sculptures, historical markers, and signage that contribute significantly not only towards enjoying the experience of using the facility but towards place-making and seeing the Greenway as more than just a functional corridor for quotidian use (Midtown Community Works Partnership, 2001). In response to incidents of crime on the facility, both the Midtown Greenway Coalition and concerned citizens found ways to "reclaim the Greenway," by asking police officers to increase their patrol and organizing volunteers to lead group rides at night. Located in the center of the Midtown Greenway trench, The Freewheel Midtown Bike Center opened in 2007 as a partnership between Minneapolis and Allina Health Systems, and is the first of what is hoped to be many businesses with a front door that open directly on to the Greenway. The Center provides bicycle maintenance services as well as a café, a public bike shop, showers and other facilities for bicycle commuters, and is home to the Midtown Greenway Coalition.

In his overview of the evolution of Greenway forms, Robert Searns concludes that "…the Greenway movement will endure because it is an adaptive response to expanding urbanization driven by basic human needs" (1995, p. 76). Perhaps this remark allows us to properly contextualize the Midtown Greenway's built form as an innovative response to American urbanization through the adaptive use of this otherwise under-used linear space in south Minneapolis. The Greenway will undoubtedly continue to evolve as the bicycle becomes increasingly accepted as a mainstream mode of urban transportation, whether for commuting or recreation-based purposes, and as this set of neighborhoods near the trail undergoes further changes in both its demographic makeup and physical form. As Minneapolis progresses through this new century that promises increased investment in favor of new forms of urbanization, the Midtown Greenway will continue to be appropriated by local residents, politicians, urban planners, and developers as an asset to reflect the ever-changing needs and desires of the respective stakeholders. This case study can serve as a historical baseline that seeks to understand exactly how this linear facility is relevant to Minneapolitan stakeholders, circa 2010, whether the facility is considered a transportation link, a recreational asset, a catalyst for development, or holistically as an adaptive, multi-use urban space.

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Appendix A: Charts of Traffic Correlates and Monthly Traffic Averages

Regression – Hennepin Avenue Location

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.925[a]	.856	.851	557.821

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	1.270E9	25	5.080E7	163.249	.000[a]
	Residual	2.138E8	687	311164.021		
	Total	1.484E9	712			

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
	(Constant)	-2299.174	127.640		-18.013	.000
Weather	Max temperature (F°)	53.020	4.272	.900	12.412	.000
	Min temperature (F°)	9.717	4.402	.150	2.207	.028
	Temperature Departure From Normal (F°)	-32.116	3.168	-.191	-10.137	.000
	Smoke / Haze Dummy	-45.404	46.316	-.014	-.980	.327
	Blowing Storm Dummy	48.722	206.166	.004	.236	.813
	Fog Dummy	-194.506	50.459	-.067	-3.855	.000
	Fog – Reducing Visibility Dummy	-50.345	125.446	-.007	-.401	.688
	Thunder Dummy	-307.407	88.898	-.062	-3.458	.001
	Ice Pellets Dummy	-11.759	252.604	-.001	-.047	.963
	Hail Dummy	850.838	257.131	.054	3.309	.001
	SS – 0 - 2 Dummy	621.236	102.401	.150	6.067	.000
	SS – 3 - 6 Dummy	469.253	85.783	.160	5.470	.000
	SS 7 – 7 - 9 Dummy	121.476	77.368	.039	1.570	.117
	Snow on Ground (in)	50.317	11.467	.100	4.388	.000
	Daily Snowfall (in)	167.048	40.760	.077	4.098	.000
	Water Equivalent of Daily Precipitation (in)	-897.485	116.362	-.149	-7.713	.000
Temporal	2008 Dummy	569.677	46.526	.197	12.244	.000
	2009 Dummy	714.023	89.645	.132	7.965	.000
	2010 Dummy	594.090	131.003	.083	4.535	.000
	Tuesday Dummy	-31.033	78.757	-.008	-.394	.694
	Wednesday Dummy	91.298	78.717	.022	1.160	.247
	Thursday Dummy	-77.700	78.875	-.019	-.985	.325
	Friday Dummy	-103.169	79.147	-.025	-1.304	.193
	Saturday Dummy	323.388	78.911	.078	4.098	.000
	Sunday Dummy	380.099	79.254	.092	4.796	.000

Regression – Cedar Avenue Location

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.941[a]	.885	.882	410.132

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.297E9	25	5.187E7	308.359	.000[a]
	Residual	1.685E8	1002	168208.311		
	Total	1.465E9	1027			

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
	(Constant)	-1763.045	78.741		-22.390	.000
Weather	Max temperature (F°)	42.713	2.545	.879	16.782	.000
	Min temperature (F°)	9.327	2.628	.178	3.549	.000
	Temperature Departure From Normal (F°)	-28.499	1.809	-.208	-15.752	.000
	Smoke / Haze Dummy	-49.896	28.595	-.019	-1.745	.081
	Blowing Storm Dummy	111.501	127.580	.010	.874	.382
	Fog Dummy	-151.288	31.315	-.062	-4.831	.000
	Fog – Reducing Visibility Dummy	54.176	79.945	.009	.678	.498
	Thunder Dummy	-204.369	56.223	-.048	-3.635	.000
	Ice Pellets Dummy	-140.450	146.155	-.011	-.961	.337
	Hail Dummy	554.231	183.638	.035	3.018	.003
	SS – 0 - 2 Dummy	422.175	63.077	.121	6.693	.000
	SS – 3 - 6 Dummy	337.273	53.050	.140	6.358	.000
	SS 7 – 7 - 9 Dummy	83.380	47.873	.032	1.742	.082
	Snow on Ground (in)	34.723	7.522	.078	4.616	.000
	Daily Snowfall (in)	98.363	24.542	.053	4.008	.000
	Water Equivalent of Daily Precipitation (in)	-703.133	73.199	-.138	-9.606	.000
Temporal						
	2008 Dummy	549.581	33.532	.220	16.390	.000
	2009 Dummy	512.624	33.420	.203	15.339	.000
	2010 Dummy	523.783	91.413	.074	5.730	.000
	Tuesday Dummy	18.894	48.289	.006	.391	.696
	Wednesday Dummy	109.917	48.197	.032	2.281	.023
	Thursday Dummy	-4.086	48.202	-.001	-.085	.932
	Friday Dummy	-36.508	48.206	-.011	-.757	.449
	Saturday Dummy	121.021	48.182	.035	2.512	.012
	Sunday Dummy	127.488	48.190	.037	2.646	.008

Regression – West River Location

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.914[a]	.835	.831	245.198

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.055E8	25	1.222E7	203.277	.000[a]
	Residual	6.024E7	1002	60122.121		
	Total	3.658E8	1027			

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
	(Constant)	-969.188	47.076		-20.588	.000
Weather	Max temperature (F°)	22.301	1.522	.918	14.656	.000
	Min temperature (F°)	2.598	1.571	.099	1.653	.099
	Temperature Departure From Normal (F°)	-13.987	1.082	-.204	-12.931	.000
	Smoke / Haze Dummy	-27.374	17.096	-.021	-1.601	.110
	Blowing Storm Dummy	74.277	76.274	.013	.974	.330
	Fog Dummy	-63.131	18.722	-.052	-3.372	.001
	Fog – Reducing Visibility Dummy	17.046	47.795	.005	.357	.721
	Thunder Dummy	-96.726	33.613	-.046	-2.878	.004
	Ice Pellets Dummy	-25.021	87.379	-.004	-.286	.775
	Hail Dummy	291.746	109.788	.037	2.657	.008
	SS – 0 - 2 Dummy	230.139	37.711	.132	6.103	.000
	SS – 3 - 6 Dummy	173.583	31.716	.144	5.473	.000
	SS 7 – 7 - 9 Dummy	42.103	28.621	.032	1.471	.142
	Snow on Ground (in)	21.577	4.497	.097	4.798	.000
Temporal	Daily Snowfall (in)	56.997	14.672	.062	3.885	.000
	Water Equivalent of Daily Precipitation (in)	-361.038	43.762	-.141	-8.250	.000
	2008 Dummy	235.050	20.047	.188	11.725	.000
	2009 Dummy	209.667	19.980	.167	10.494	.000
	2010 Dummy	203.150	54.651	.057	3.717	.000
	Tuesday Dummy	-17.110	28.870	-.010	-.593	.554
	Wednesday Dummy	34.299	28.815	.020	1.190	.234
	Thursday Dummy	-19.094	28.818	-.011	-.663	.508
	Friday Dummy	-15.973	28.820	-.009	-.554	.580
	Saturday Dummy	201.385	28.805	.118	6.991	.000
	Sunday Dummy	248.428	28.810	.146	8.623	.000

Regression – All Traffic Location Counts, Not Aggregated

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.895[a]	.800	.798	530.524

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.060E9	30	1.020E8	362.376	.000[a]
	Residual	7.633E8	2712	281455.432		
	Total	3.823E9	2742			

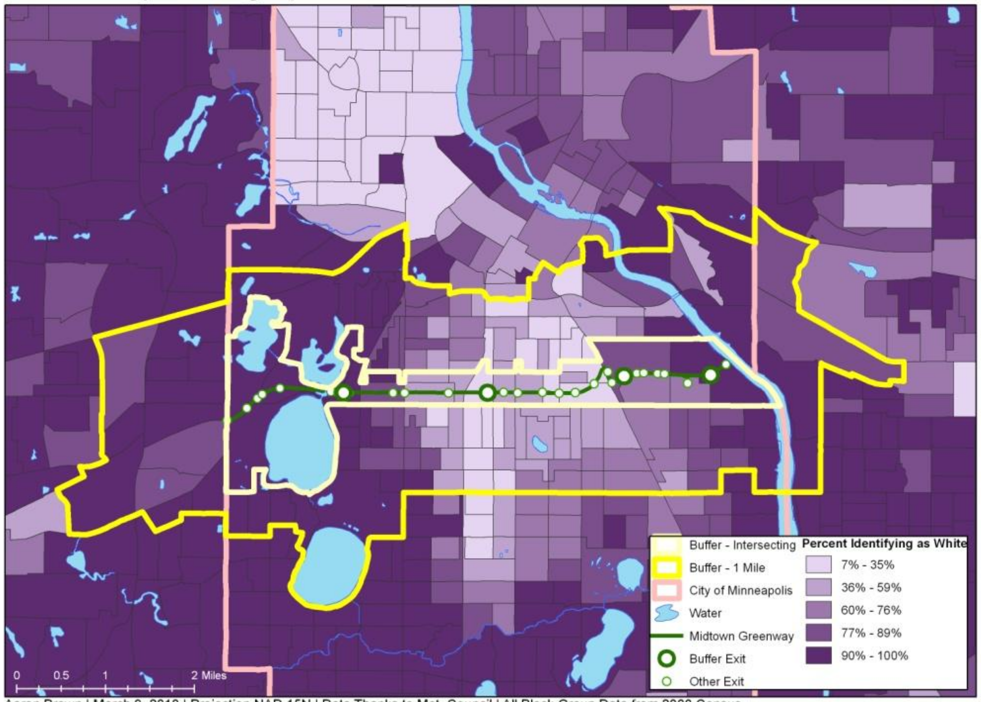
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2161.989	67.664		-31.952	.000
	Tuesday	-5.592	38.249	-.002	-.146	.884
	Wednesday	77.800	38.173	.023	2.038	.042
	Thursday	-33.770	38.213	-.010	-.884	.377
	Friday	-45.481	38.230	-.013	-1.190	.234
	Saturday	208.527	38.209	.062	5.457	.000
	Sunday	238.380	38.236	.071	6.234	.000
	2008	443.608	25.227	.183	17.585	.000
	2009	378.266	27.845	.143	13.585	.000
	2010	431.694	78.661	.055	5.488	.000
	Average Temperature (F°)	12.973	41.003	.256	.316	.752
	Temperature Departure From Normal (F°)	-22.911	1.453	-.168	-15.772	.000
	Water Equivalent of Daily Precipitation (in)	-609.727	57.271	-.122	-10.646	.000
	Daily Snowfall (in)	105.223	19.775	.058	5.321	.000
	Smoke / Haze Dummy	-36.098	22.647	-.014	-1.594	.111
	Blowing storm – Dummy	112.714	101.432	.010	1.111	.267
	Fog – Dummy	-127.717	24.757	-.053	-5.159	.000
	Fog Reducing Visability - Dummy	5.736	62.645	.001	.092	.927
	Thunder – Dummy	-189.196	44.032	-.046	-4.297	.000
	Ice Pellets – Dummy	-38.126	119.450	-.003	-.319	.750
	Hail – Dummy	547.271	138.235	.037	3.959	.000
	Freezing Rain- Dummy	-74.319	91.789	-.008	-.810	.418
	Ave Wind (mph)	-2.651	2.842	-.008	-.933	.351
	SS – 0 - 2 Dummy	434.844	50.514	.127	8.608	.000
	SS – **3** - 6 Dummy	338.835	42.169	.142	8.035	.000
	SS 7 – 7 - 9 Dummy	95.564	38.144	.037	2.505	.012
	Maximum Temperature (F°)	31.000	20.669	.641	1.500	.134
	Minimum Temperature (F°)	.053	20.533	.001	.003	.998
	Snow on Ground (in)	34.029	5.861	.076	5.806	.000
	Hennepin Counter Location – Dummy	**1030.088**	**26.628**	**.383**	**38.685**	**.000**
	Cedar Ave Counter Location - Dummy	**863.940**	**23.614**	**.352**	**36.586**	**.000**

Monthly Average Traffic

	Total	Hennepin	Cedar	W. River
Mar 2007	1330	588	515	227
Apr	3018	1349	1126	543
May	4486	2054	1675	757
Jun	5946	2680	2235	1031
Jul	6620	3028	2452	1140
Aug	5470	2442	2083	945
Sept	4885	2147	1872	866
Oct	2692	1097	1129	466
Nov	1849	697	837	314
Dec	374	142	176	56
Jan 2008	435	155	223	57
Feb	521	185	261	75
Mar	1066	407	484	175
Apr	3174	1335	1273	566
May	6081	2671	2338	1072
Jun	8231	3620	3129	1482
Jul	9064	4107	3382	1575
Aug	8285	3690	3144	1451
Sept	6243	2622	2525	1096
Oct	3998	1680	1660	657
Nov	2005	899	817	289
Dec	440	278	208	49
Jan 2009	286		128	39
Feb	561		254	74
Mar	1578		641	281
Apr	3971		1590	729
May	6467		2578	1198
Jun	6821		2734	1250
Jul	7862		3130	1430
Aug	6948		2789	1241
Sept	6460		2690	1057
Oct	2679	1660	1103	416
Nov	2774	1254	1105	437
Dec	673	291	300	82
Jan 2010	442	206	186	51

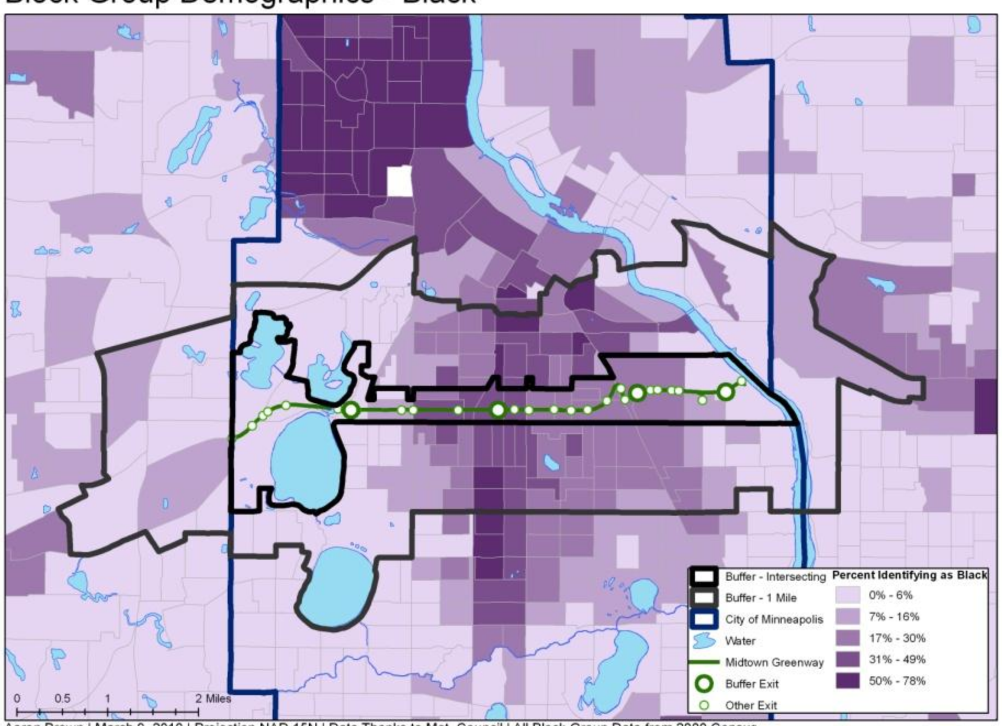
Appendix B: Detail Maps of the Racial Demographics Near the Midtown Greenway

Block Group Demographics - Whites



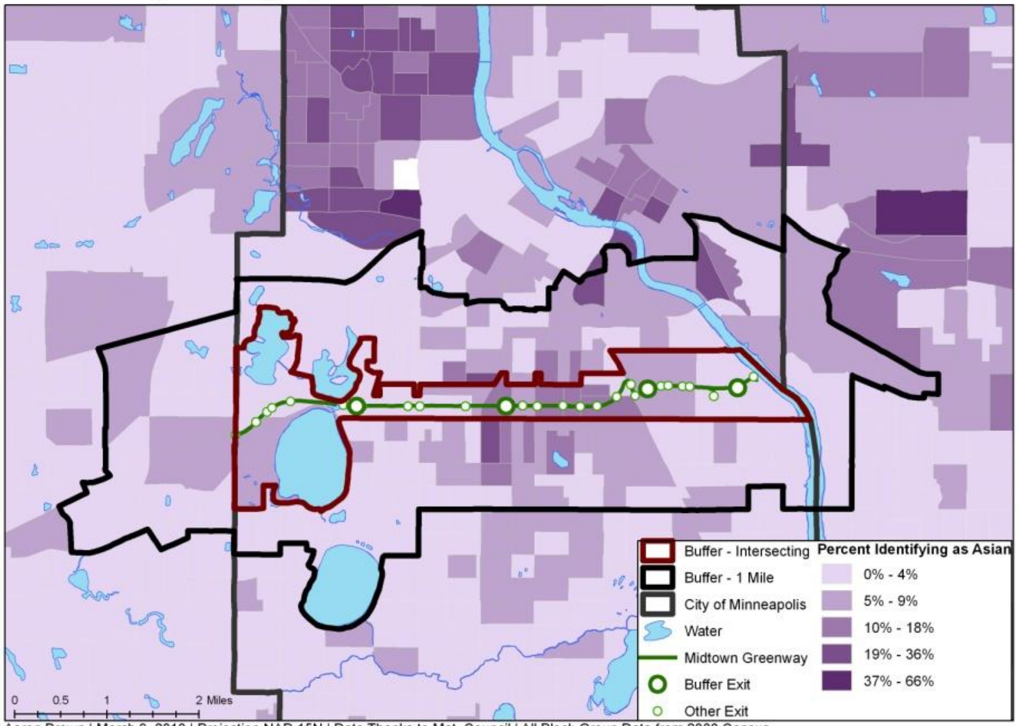
Aaron Brown | March 9, 2010 | Projection NAD 15N | Data Thanks to Met. Council | All Block Group Data from 2000 Census

Block Group Demographics - Black



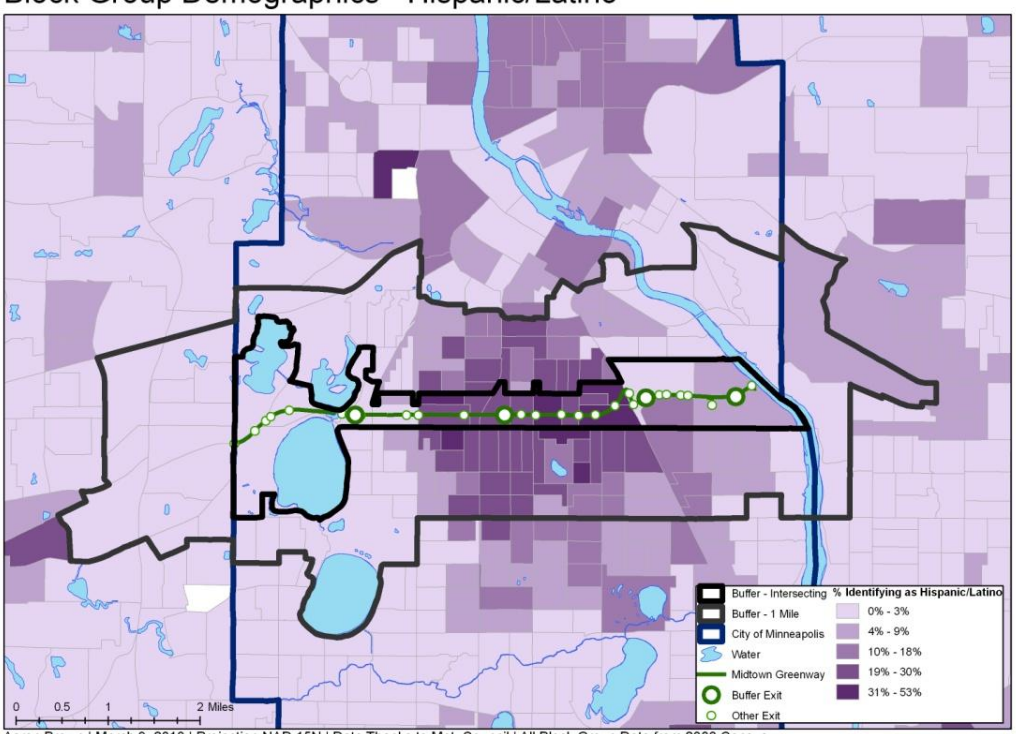
Aaron Brown | March 9, 2010 | Projection NAD 15N | Data Thanks to Met. Council | All Block Group Data from 2000 Census

Block Group Demographics - Asian



Aaron Brown | March 9, 2010 | Projection NAD 15N | Data Thanks to Met. Council | All Block Group Data from 2000 Census

Block Group Demographics - Hispanic/Latino



Aaron Brown | March 9, 2010 | Projection NAD 15N | Data Thanks to Met. Council | All Block Group Data from 2000 Census

Appendix C: Copy of Survey Administered

1

Hello! My name is Aaron Brown, and I'm a senior at Macalester College conducting an honors Geography Project on the Midtown Greenway. I'm interested in learning how people use the Greenway corridor, and how the trail has changed the urban and social landscape of the Twin Cities. I'm conducting a quick survey, and I'd really appreciate it if you would fill this out; it will only take a minute or two. Please fill out as much information as you feel comfortable; your responses are entirely confidential and will only be used for this project.

Age: ______________ **Gender:** ____________

How do you identify? *(Circle all that apply)*

American Indian   Asian   Black/African American

Hispanic   Pacific Islander   White

Other: ______________

How did you get to the Greenway today? *(Circle all that apply)*

Bike to Greenway   Transit to Greenway (Which line? ________)

Walk   Drove car   Skateboard   Skating

Did you or will you use any of these bikeways on this trip? *(Circle any/all that apply)*

LRT/Hiawatha Trail   Bryant Ave.   Lake St Bridge to St Paul

West River Road   Portland/Park Bike Lanes   Kenilworth Trail

Luce Line   Lake Calhoun/Grand Rounds   Other____________

In the summer, how many trips do you take on the Midtown Greenway in an average month? _______

In the winter, how many trips do you take on the Midtown Greenway in an average month? _______

Why are you making this trip today? *(Circle all that apply)*

Recreation   Exercise   Spend time with Family/Friends

Commuting   Running Errands   Shopping

Other:______________________

Why are you using the Greenway for this trip? *(Circle all that apply)*

Save Money on travel   Don't own a car   Faster than driving/transit

Environmental Concern   No Cars on Greenway

Safer than using streets   Other:______________

What is your home address? *(I'm asking only to assess your proximity to Greenway, I won't do anything with the address like send spam or give it away. Feel free to write down the intersection or cross street by omitting the last two digits of your address) Example: "28XX Bryant Ave", "14th Ave SE and 6th Street in Minneapolis", "16XX Selby Ave St. Paul"*

____

If the Greenway didn't exist, how would you be making this trip?

Bike/walk a shorter route   Bike/walk a longer route

Transit   Drive a car   I wouldn't be making this trip

Do you feel safe when using the Greenway?

Very Unsafe   Unsafe   Neutral   Safe   Very Safe

☐ Check here if you'd like more information on my project; please provide your email address (or, if you don't have one, a postal address) to receive updates on my research.

☐ Check here if you're enthusiastic about the Midtown Greenway and have stories to share about your experiences with the corridor and its surrounding communities. I'd be honored to have a few minutes with you in the next few weeks for an interview!

Your email/postal address:________________________

Thanks again!

Aaron Brown| ambrown@macalester.edu | Macalester College, Class of 2010

L	T	D	M

1

Hola! Mi nombre es Aaron Brown, y soy estudiante de último año de la realización de un Macalester College honores en el Proyecto de Geografía Midtown Greenway. Estoy interesado en aprender cómo se utiliza el corredor verde, y la forma en que la pista ha cambiado el paisaje urbano y social de las Ciudades Gemelas. Estoy realizando una encuesta muy rápida, y yo realmente apreciamos que si esto se llene, sino que sólo tendrá un minuto o dos. Favor de llenar toda la información que te sientas a gusto; sus respuestas son **totalmente confidenciales** y sólo se utilizarán para este proyecto.

Edad: ____________________ **Sexo:** ________________

¿Cómo identificar? *(Marque todas las que apliquen)*

Indio Americano   Asiático   African American

Hispanic   las islas del Pacífico   Blanco

Otros: ____________________

¿Cómo llegar a la Greenway hoy? *(Marque todas las que apliquen)*

Bicicleta   tránsito (¿Qué línea? __________)

A pie   Condujo el coche   Skateboard   Patinaje

¿Usted o se utiliza cualquiera de estas ciclovías en este viaje? *(Marque todas las que apliquen)*

LRT/Hiawatha Trail   Bryant Ave.   Lake St Bridge to St Paul

West River Road   Portland/Park Bike Lanes Kenilworth Trail

Luce Line   Lake Calhoun/Grand Rounds   Otros: ____________________

En el verano, ¿cuántos viajes te tomará en el Midtown Greenway en una media de mes? _________

En el invierno, ¿cuántos viajes te tomará en el Midtown Greenway en una media de mes? _________

¿Por qué hacer este viaje, hoy en día? *(Marque todas las que apliquen)*

Recreación   Ejercicio   Pase tiempo con la familia / amigos

viaje al trabajo   hacer mandados   Compras

Otros: ____________________

¿Por qué usar el Greenway para este viaje? *(Marque todas las que apliquen)*

Ahorre dinero   Yo no tengo coche   La preocupación ambiental

más rápido que la conducción tránsito   no Automóviles en Greenway

Más seguro que usar las calles   Otros: ______________

¿Cuál es la correo de su casa? (Estoy pidiendo sólo para evaluar la proximidad a Greenway, no voy a hacer nada con la correo, como enviar spam o regalarlo. Usted puede escribir la intersección o la ubicación por omisión de los dos últimos dígitos de su correo) Ejemplo : "28XX Bryant Ave", "14a Ave y SE 6a Street en Mpls", "16XX Selby Ave. St. Paul)

____

Si el verde no existe, ¿cómo hacer este viaje?

bicicleta / caminar un camino más corto   Conducir un coche

bicicleta / caminar un camino más largo   Tránsito

Yo no estaría haciendo este viaje

¿Se siente usted seguro cuando se utiliza el Greenway ?

Muy inseguro   Inseguro   neutral   seguro   muy seguro

- ☐ Marque aquí si desea más información sobre mi proyecto, por favor proporcione su dirección de correo electrónico (o, si no tiene uno, una dirección postal) para recibir noticias sobre mi investigación.
- ☐ Marque aquí si está entusiasmada con el Midtown Greenway y compartir historias sobre sus experiencias con el corredor y sus comunidades vecinas. Me honra tener unos minutos con usted en las próximas semanas para una entrevista!

Su correo electronic / correo postal : ____________________________

Gracias otra vez!

Aaron Brown| ambrown@macalester.edu | Macalester College, Clase de 2010

L	T	D	M

Appendix D: Extra Survey Data

			Mode Share		Demographics	
		Number of Surveys	Bike Share	Ped Share	Ave. Age	% Male
ALL		223	85%	13%	38.49	68%
Location	Minnehaha	60	97%	3%	35.07	70%
	Brackett	40	83%	15%	33.61	66%
	Irving	62	83%	11%	40.98	66%
	5th	61	79%	21%	36.57	66%
Gender	Male	151	85%	13%	38.90	100%
	Female	71	86%	13%	37.65	0%
Age	15-30	82	84%	15%		62%
	30-45	54	83%	13%		80%
	45-60	71	88%	10%		62%
	60+	11	82%	18%		73%
Residence	Minneapolis	134	84%	14%	36.89	68%
	Saint Paul	33	100%	0%	40.27	67%
	St Louis Park, Edina, Hopkins, Golden Valley Minnetonka	16	94%	6%	43.38	88%
Day Surveyed	Weekday	163	83%	16%	37.35	66%
	Weekend	56	91%	4%	40.48	73%
			Bike Share	Ped Share	Ave. Age	% Male
			Mode Share		Demographics	

		Number of Surveys	Racial Identification				
			amerind	asian	Black	Hispanic	white
ALL		223	4%	1%	4%	4%	87%
Location	Minnehaha	60	2%	0%	3%	5%	90%
	Brackett	40	2%	2%	2%	0%	93%
	Irving	62	3%	2%	2%	5%	84%
	5th	61	7%	2%	7%	5%	84%
Gender	Male	151	5%	1%	4%	5%	85%
	Female	71	1%	1%	3%	4%	92%
Age	15-30	82	5%	1%	4%	4%	90%
	30-45	54	4%	2%	4%	9%	80%
	45-60	71	1%	1%	3%	3%	88%
	60+	11	9%	0%	0%	0%	100%
Residence	MPLS	134	4%	2%	2%	4%	89%
	Saint Paul	33	0%	0%	3%	0%	97%
	Western Burbs	16	0%	0%	0%	0%	100%
Day Surveyed	Weekday	163	4%	1%	5%	5%	85%
	Weekend	56	2%	2%	0%	4%	93%
			American Indian	Asian	Black	Hispanic/ Latino	white
			Racial Identification				

		Number of Surveys	Travel Mode to Greenway				
			Bike	Transit	Walk	Drove	Skate
ALL		223	81%	3%	11%	4%	4%
Location	Minnehaha	60	92%	3%	3%	2%	0%
	Brackett	40	85%	2%	10%	0%	2%
	Irving	62	71%	5%	13%	6%	6%
	5th	61	77%	0%	16%	5%	5%
Gender	Male	151	80%	3%	11%	4%	3%
	Female	71	83%	3%	11%	3%	4%
Age	15-30	82	82%	5%	12%	2%	2%
	30-45	54	81%	2%	7%	2%	7%
	45-60	71	81%	1%	10%	6%	1%
	60+	11	73%	0%	27%	0%	0%
Residence	Minneapolis	134	79%	4%	11%	2%	4%
	Saint Paul	33	97%	0%	0%	3%	0%
	Western Burbs	16	100%	0%	0%	0%	0%
Day Surveyed	Weekday	163	79%	3%	13%	4%	2%
	Weekend	56	88%	2%	5%	4%	5%
			Bike	Transit	Walk	Drove	Skate
			Mode to Greenway				

		Number of Surveys	"Why are you making this trip?"					
			Recreation	exercise	Spend Time With Family / Friends	Commute	errands	Shop
ALL		223	38%	48%	17%	42%	16%	7%
Location	Minnehaha	60	33%	43%	20%	25%	23%	12%
	Brackett	40	32%	46%	20%	59%	17%	5%
	Irving	62	52%	56%	15%	37%	16%	10%
	5th	61	34%	43%	13%	49%	8%	2%
Gender	Male	151	36%	44%	14%	46%	15%	7%
	Female	71	44%	55%	23%	32%	17%	7%
Age	15-30	82	41%	39%	17%	46%	22%	9%
	30-45	54	30%	46%	19%	41%	17%	7%
	45-60	71	40%	54%	16%	43%	9%	6%
	60+	11	55%	55%	18%	18%	18%	9%
Residence	MPLS	134	39%	46%	12%	47%	17%	7%
	Saint Paul	33	33%	39%	24%	52%	24%	9%
	Western Burbs	16	38%	56%	13%	38%	6%	6%
Day Surveyed	Weekday	163	33%	45%	15%	49%	15%	6%
	Weekend	56	52%	55%	21%	21%	20%	13%
			Recreation	exercise	Spend Time With Family / Friends	Commute	errands	Shop
			Purpose for Trip					

		Number of Surveys	"Why are you using the Midtown Greenway for this Trip?"					
			save money on travel	don't own car	faster than driving	Envi. Concern	No Cars on Greenway	safer than using street s
ALL		223	22%	23%	24%	37%	35%	45%
Location	Minnehaha	60	17%	25%	13%	25%	22%	40%
	Brackett	40	29%	22%	37%	61%	41%	54%
	Irving	62	18%	16%	21%	32%	34%	50%
	5th	61	28%	30%	30%	38%	48%	39%
Gender	Male	151	22%	23%	21%	32%	36%	44%
	Female	71	23%	24%	31%	46%	35%	49%
Age	15-30	82	30%	37%	37%	46%	45%	51%
	30-45	54	17%	15%	24%	24%	28%	54%
	45-60	71	19%	15%	15%	34%	28%	34%
	60+	11	18%	27%	0%	45%	36%	45%
Residence	Minneapolis	134	25%	25%	27%	40%	37%	49%
	Saint Paul	33	36%	30%	30%	52%	48%	42%
	Western Burbs	16	6%	25%	19%	13%	31%	56%
Day Surveyed	Weekday	163	24%	23%	27%	44%	36%	41%
	Weekend	56	16%	25%	13%	20%	34%	57%
			save money on travel	don't own car	faster than driving	Environ mental Concern	No Cars on Greenway	safer than using street s
			Why on the Greenway?					

		Number of Surveys	Average Trips Taken		How would you make the trip without the Greenway?				
			Summer	Winter	bike shorter	bike longer	transit	drive car	wouldn't make trip
ALL		223	21.44	10.14	22%	49%	11%	13%	17%
Location	Minnehaha	60	16.15	7.26	17%	52%	8%	12%	17%
	Brackett	40	20.83	10.61	22%	61%	7%	20%	2%
	Irving	62	21.95	9.70	18%	47%	11%	11%	27%
	5th	61	22.26	10.86	31%	41%	16%	11%	15%
Gender	Male	151	23.01	11.65	24%	51%	11%	9%	15%
	Female	71	17.36	6.97	18%	44%	11%	23%	23%
Age	15-30	82	24.65	12.38	20%	6%	4%	15%	2%
	30-45	54	22.48	11.96	24%	41%	9%	13%	15%
	45-60	71	18.06	7.45	5%	14%	2%	4%	7%
	60+	11	19.18	4.27	1%	2%	0%	9%	27%
Residence	MPLS	134	25.47	12.64	12%	31%	6%	7%	9%
	Saint Paul	33	17.44	6.18	3%	9%	2%	3%	1%
	Western Burbs	16	18.94	12.00	1%	4%	1%	1%	2%
Day Surveyed	Weekday	163	22.61	10.91	17%	35%	10%	12%	9%
	Weekend	56	16.96	7.68	4%	13%	0%	1%	8%
			Summer	Winter	bike shorter	bike longer	transit	drive car	I wouldn't make trip
			Average Trips Taken		How would you make the trip without the Greenway?				

		Number of Surveys	Do you feel safe on the Greenway?					Average Manhattan Distance	
			Very Unsafe	unsafe	neutral	safe	very safe	Distance to Greenway	Distance Travelled to Survey Point
ALL		223	3%	5%	9%	54%	33%	1.62	2.97
Location	Minnehaha	60	7%	7%	7%	48%	35%	1.88	3.56
	Brackett	40	0%	5%	5%	54%	39%	1.82	2.50
	Irving	62	3%	5%	10%	56%	31%	1.76	3.12
	5th	61	0%	3%	13%	57%	28%	0.90	2.28
Gender	Male	151	3%	5%	8%	50%	36%	1.80	2.97
	Female	71	3%	6%	11%	61%	27%	1.21	2.31
Age	15-30	82	5%	11%	46%	40%	0%	1.15	2.54
	30-45	54	0%	7%	9%	54%	30%	1.31	2.57
	45-60	71	2%	1%	2%	18%	9%	2.18	3.51
	60+	11	0%	0%	9%	64%	27%	1.53	3.12
Residence	MPLS	134	1%	4%	6%	33%	19%	0.73	1.97
	Saint Paul	33	0%	0%	1%	9%	4%	2.99	4.00
	Western Burbs	16	1%	0%	0%	3%	3%	2.97	5.57
Day Surveyed	Weekday	163	1%	4%	7%	39%	23%	1.45	2.68
	Weekend	56	2%	0%	2%	13%	9%	2.13	3.86
			veryunsafe	unsafe	neutral	safe	very safe	Distance to Greenway	Distance Travelled to Survey Point
			Do you feel safe on the Greenway?					Average Manhattan Distance	