August 2011

The Chicago Community Area of Rogers Park:

A Bicycle Infrastructure Analysis of North Sheridan Road Between North Touhy Road and Juneway Terrace Park

Prepared By:
Benjamin Anson, Amy Kirsling, and Paige M. Largent
(names are listed in alphabetical order)

DePaul University
Chaddick Institute for Metropolitan Development
Chicago, Illinois
http://las.depaul.edu/chaddick/

A Report for the Rogers Park Business Alliance

Table of Contents

I. Introduction

Many urban residents want a vibrant and accessible community so they can enjoy the various activities they have come to love while living in smaller, perhaps suburban areas. Bicycling may be more difficult in urban areas; however, it is possible for residents to bicycle to work, for practicality, and leisure if the proper infrastructure is in place such as bicycle lanes or paths. The Rogers Park Business Alliance (RPBA) requested that the Chaddick Institute for Metropolitan Development (Chaddick Institute) assess several criteria in an effort to implement bicycle lanes on North Sheridan Road between North Touhy Road and the street curve near Juneway Park Terrace. First, pedestrian safety on the sidewalks of North Sheridan Road. Second, traffic calming on North Sheridan Road and on the side streets adjacent to North Sheridan Road. Third, moving parallel parking to adjacent side streets off of North Sheridan Road in an effort to make sufficient room for bicycle lanes.

This report consists of six sections. The first section (noted above), is an explanatory preface to this report detailing why this research is needed. The second section is a literature review that presents peer-reviewed research from scholars and experts in the fields of urban planning and transportation. The third section covers the methodology of how and where the research was collected and/or analyzed. The fourth section presents the findings discovered during the research process. The fifth section summarizes the main points in the report and lists the future actions. The sixth and seventh sections focus on the works cited in this report and the appendix. Pedestrian safety and traffic calming will be addressed through the implementation of bicycle lanes and vehicle diagonal parking.

II. Literature Review

Bicycle culture in an Urban Environment

In Chicago, a culture of bicycle commuters in the summer is readily visible. This same culture exists in places such as Amsterdam year-round, where an estimated 55% of residents commute from home to work (Roney, 2008). Despite its colder climate and much smaller population density, Canada has more bicycle commuters, as a percentage of the overall population, than does the United States (U.S.) (Buelher et al., 2005). One possible explanation is a stigma associated with bicycling in the U.S. The stigma people attach to cyclists in the U.S. is that they are either poor or cannot afford a car. Despite this stigma, people still continue to bike in cities such as Chicago because of a wider set of beliefs including sustainability, outdoor living, and civic involvement (Pelzer, 2010).

People are more likely to bike if others who are similar to them are bicycling (Xing et al., 2010). For example, if there are more immigrants than college students bicycling in a particular area, the immigrant will more than likely bicycle than the college student. This is illustrated in the mass amounts of people commuting to work in the summer in Chicago and in cities like Copenhagen where it is estimated that by 2015, half of the population will bicycle to work or school (Roney, 2008).

Bicycling culture within an urban area could determine whether or not people avail themselves of this mode of transportation, but that is not the only determinant. Bicycling culture is defined as: *both a material and socially constructed dimension* (Pelzer 2010). It is the experience that makes peoples, within a given area in the U.S., want to ride a bicycle (Pezler, 2010). Portland, Oregon residents feel a bond with other bicyclists because of the danger associated with bicycling. There is also a bond formed because bicyclists are going against American car culture, and this unifies bicyclists and forms an identity (Pezler, 2010).

Traffic conditions, bicycle theft, and the density of a city all are additional components to determining whether or not people will ride a bicycle. Americans take more risk than the Dutch due to the use of land in urban areas (Xing et al., 2010). In cities like Chicago where cars travel at a fast pace, the most effective thing to do in order to get more people to bicycle is to advocate for traffic calming (Smith, 2011). The bicycle culture is already alive in many cities in the U.S.; now policymakers have the chance to boost bicycle levels by increasing safety. In order to explore the topic of bicycle culture, analyzing specific groups will help describe the culture within immigrant and college student populations. Examining the factors that allow these bicyclists to thrive provides an understanding of why so few Americans bike, and what encourages the ones that bike to do so.

Bicycling on College Campuses

Bicycling is prevalent on college campuses. Compared to the general population, college students bicycle at a much higher rate (Balsas, 2002). A higher level of education has also been correlated with higher rate of bicycling (Buehler, Handy 2010). The top ten bicycling university campuses are mostly located in the temperate climate of California. University of Minnesota in the Twin Cities is one that, despite the frigid winter temperature, made the list of top ten bicycling universities (American League of Bicyclists, 2011).

Weather is a poor indicator of whether a college campus or city is bicycle friendly. The Yukon Territory boasts bicycle commuting that is twice as high as California (Buehler at al., 2005). Consequently, if the weather is not predicting whether or not people bike within a campus, perhaps it is the attitude that is portrayed in the community towards bicycling. A campus can be a gateway to bicycling behavior for the city, which may be the reason that Minneapolis was recently named one of the best bicycling cities in the U.S. (Friedman, 2011).

College administrators that choose to foster an environment of bicycling can impact behaviors not just of the present students, but also reshape the behaviors of people in the long-term (Balsas, 2002). Amsterdam bicycling is prevalent because it is a social standard for Dutch citizens, and part of their assimilation into society (Pezler, 2010). Because of this, it is natural for Dutch citizens to bicycle and this is the same behavior that college administrators can shape in students by promoting bicycling safety, providing lanes, and places to park bicycle on college campuses. Present travel behaviors are heavily influenced by past travel behaviors (Smart, 2010).

Immigrants and Bicycling

Immigrants are twice as likely as Americans to bicycle, especially immigrants living in dense urban areas that make less than $35,000 annually (Smart, 2010). Immigrants come to U.S. holding their own belief systems and perceptions. Rather than bicycling being a form of identity, immigrants are more likely to ride out of necessity and because bicycling is seen as another form of transportation (Pezler, 2010). Since immigrants are the most likely to not use a single occupancy vehicle, it is important to understand the behaviors in choosing their modes of transportation (Beckman at al., 2008).

Whether or not new immigrants utilize bicycles more frequently than immigrants who have been in U.S. for awhile has been an area of interest for research. Some research has discovered that the longer immigrants stay in U.S., the more chance they have of purchasing a single occupancy vehicle (Beckman et al., 2008). As mentioned earlier, there remains a stigma attached to riding a bicycle and this could be the reason that some choose not to bicycle in an urban environment. This stigma could be what is influencing immigrants to assimilate into purchasing vehicles rather than bicycles, even though their past behaviors and habits have been to use a bicycle. Age also remains a large indicator of whether or not a person will use a bicycle and this encompasses individuals from immigrants to Americans (Beckman et al., 2008).

Health Issues in America

Based on the research conducted by Nazelle et al. (2011), this past decade has seen a decline in enthusiasm for planning cities for better health because of urban sprawl, traffic congestion, and a high-density population. Based on 2011 figures, 21.5% of the world's population has heart disease, 11% have strokes, 14% have diabetes, 16% have colon cancer, and 10% have breast cancer. The World Health Organization (WHO) recently estimated overweight and obesity to be responsible for 2.8 million deaths annually, while physical inactivity is responsible for an additional 3.2 million deaths. Nazelle et al. (2011) also found that some of the diseases plaguing many individuals in the 21st century world-wide are diseases that can be prevented with physical exercise and a healthy diet.

Yang et al. (2010) also found that physical activity reduces the risk of cardiovascular disease, type 2 diabetes, some cancers, and a variety of other chronic conditions. Therefore, the researchers found that an active lifestyle is associated with lower mortality rates and improved quality of life. Fortunately, an easy way to be physically active in an urban area can be through cycling for leisure, exercise, commuting to work, or short trips like grocery shopping, etc. Yang et al. (2010) found that bicycling could be included in many people's daily routines as a means of travel from place to place. Therefore, it would be easier to adopt and maintain than other forms of physical activity.

Cycling and Health

Based on the research of Pucher et al. (2011), cycling can contribute to daily physical activity, aerobic fitness, and cardiovascular health. The researchers also found that cycling can help prevent against obesity, diabetes, and various other diseases. Foster (2011) discovered that cyclists have a lower mortality risk than non-cycling individuals, independent of physical activity levels. Yang et al. (2010) also found that although walking can be a more accessible form of exercise, cycling is more likely to raise the heart rate sufficiently to improve cardiovascular fitness. Also, cycling has shown improved health results in young people and adults.

Another benefit of cycling found in research conducted by Yang et al. (2010) is that it helps reduce traffic congestion, air pollution, and carbon emissions caused by automobiles. Nazelle et al. (2011) found that disease and mortality associated with vehicle emissions do pose public health issues in many cities around the world. Their research discovered that urban air pollution, world-wide, accounts for one to three percent of the mortality rate in children under the age of five years old. The researchers also state that these figures get worse as the proportion of the population living in urban cities continues to rise. Nazelle et al. (2011) state that currently 50% of the population lives in an urban city and 70% of the population is projected to live in an urban city by 2050.

Cycling and the Environment

Nazelle et al. (2011) reports that another important impact of vehicle usage is traffic injuries, which are the second leading cause of death for people between the ages of 5-29 years old according to WHO. Research has shown that traffic congestion does impact the percentage of people who use cycling as a form of transportation or leisure. Foster et al. (2011) found that a higher level of traffic around the home is associated with less leisure cycling. Although traveling by bicycle does pose risks, such as injury and accident, the health benefits of cycling have been shown to outweigh these risks based on research conducted by Foster et al. (2011) and Yang et al. (2010).

Public Policy and Bicycle Infrastructure

In recent years, international groups, including local and federal governments have implemented policy changes to help combat health problems associated with inactivity, pollution, and traffic injuries. According to Nazelle et al. (2011), transportation and planning policies promoting cycling, as an alternative to vehicle use, can contribute to public health initiatives, such as increasing physical activity, and decreasing traffic congestion and air pollution. Pucher et al. (2000) state that federal funding for bicycling and pedestrian facilities has increased somewhat over the past decade; however, it is still a small percentage of total transport funding. The researchers also state that although most public policies focus on motorized forms of travel and land-use policies promoting low-density sprawl that generates long distance trips makes cycling difficult.

Pucher et al. (2000) also state that high-speed roads, narrow or non-existent sidewalks, and lack of bicycle lanes also impair cycling opportunities. The research also found that 90% of trips in the U.S. are made by private vehicle with little public support on policies that would reduce or inconvenience motorists. In the 1950s and 1960s, the U.S. built over 100,000 miles of highways throughout the nation and now these roadways are in desperate need of repair. This ultimately results in less money being allocated to bicycle infrastructure and more money being used for roadway and bridge repairs.

Changes in how the U.S. designs and builds cities is important to minimizing the risk of traffic accidents involving cyclists and creating a safe cycling environment. This research also states that infrastructure improvements and education / promotional campaigns have good potential in increasing cycling in urban environments worldwide. Regardless of these trends, based on the research conducted by Gotschi (2011), spending money on bicycle infrastructure is often a low priority compared to investments in highways, roads, and public transportation, like trains and buses. Yet, Gotschi's (2011) research shows that bicycle infrastructure has continued to be proposed as a health prevention measure during the healthcare reform debate in the U.S.

Lack of Cycling in the U.S.

Yet, Pucher et al. (2000) found that, in metropolitan U.S. areas, 49% of all trips are shorter than 3 miles, 40% are shorter than 2 miles, and 28% are shorter than one mile. Therefore, the researcher determined that even with the lower levels of cycling in the U.S. when compared to other countries, long distances cannot solely be attributed to long distance trips. Pucher et al. (2000) state that there are several reasons for the low rate of cycling in the U.S., specifically:

- the much lower cost of auto ownership and use compared to Europe;
- the ease, low cost, and young age for obtaining a driver's license;
- the lack of appropriate facilities for cycling and walking;
- American culture and lifestyle, which are almost entirely oriented to the car, and which require extremely high levels of mobility, with maximum possible comfort, ease, convenience, and speed; and
- the real or perceived danger of cycling and walking in American cities.

Pedestrian and Cyclist Safety

According to Zegeer et al. (2010), as vehicle transportation continues to rise, so does the mortality rate of cyclists. According to this research, approximately half of the fatalities constitute cyclists alone and cyclists colliding with pedestrians. Pedestrians are actually the most at risk in urban areas due to the large amount of vehicle and cyclist activity in these areas. While cyclists seriously injuring pedestrians are typically a low percentage, it does occur when cyclists and pedestrians are using the same corridor for travel, like a sidewalk. Zegeer et al. (2010) found that individuals with disabilities (use of canes, walkers, blind or have impaired vision, and individuals with cognitive impairment) are at a higher risk of being injured by cyclists on a sidewalk. Many of these individuals are unable to drive and, therefore, rely on pedestrian facilities, like sidewalks, to be in good shape and clear of a hazardous activity, like cycling. However, if the proper bicycling infrastructure does not exist, the number of cyclists riding on the sidewalk will increase due to fear of being hit or nicked by a moving vehicle or being doored by parked cars.

The U.S. can look to other countries like Germany and The Netherlands for examples on impressive bicycle infrastructures that work. Pucher et al. (2000) state that some of the measures European countries have taken over the last two decades are:

- better facilities for walking and bicycling;
- urban design sensitive to the needs of non-motorists;
- traffic calming of residential neighborhoods and restrictions on motor vehicle use in cities;
- rigorous traffic education of both motorists and non-motorists; and
- strict enforcement of traffic regulations protecting pedestrians and bicyclists.

Based on Pucher et al.'s (2000) research, bicycle fatalities declined by 57% in the Netherlands and by 66% in Germany, but only by 24% in the U.S. This is partly because of the lack of bicycle infrastructure, like bicycle lanes and paths, in the U.S. Traffic calming is key to reducing traffic accidents of pedestrians and cyclists and increasing the number of people who cycle everyday in urban areas. Based on the research read for this report, there are several ways to calm traffic, including installing speed bumps, lower the speed limit on main roads, implementing protective bicycle lanes, and changing the parking format from parallel to diagonal parking.

Diagonal Parking

As stated above, implementing diagonal parking can help with traffic calming. While it may change the function and perception of the street, most importantly, it promotes driver awareness of pedestrian movement based on research by Zhang (2007). Typically, vehicles will park on approximately a 45-degree angle in the direction of traffic flow based on research from Retting et al. (2003). The researchers also state that diagonal parking has shown to reduce the number of pedestrians entering the roadway in front of a parked vehicle as is more common with parallel parking.

However, research has shown some negatives associated with diagonal parking. Zhang et al. (2007) found that some big cities, like New York, are not enthusiastic with diagonal parking because emergency vehicles have trouble with parking and driving issues on a diagonal parking street. Also, the research found that when streets are narrow and drivers pull out, the oncoming traffic has to slow down and can also be blocked. In addition, Kliewer et al. (2009) believe that the width reduction of streets with diagonal parking adds possible disruptions to moving cars and slows down traffic. They also found that diagonal parking can be dangerous to cyclists because motorists may not look for or see cyclists as they are pulling in or out of a parking space. Therefore, motorists and cyclists have to practice extreme caution in areas with diagonal parking.

On the other hand, many urban communities use diagonal parking, especially in commercial districts, as a method to increase parking spaces without building parking garages or large parking lots. Implementing diagonal parking has the potential to increase parking spaces by 25% to 50% when compared to parallel parking (Hampden Happenings Organization, 2010). However, in an effort to maintain a conservative approximation of parking spaces, we will use an increase of 25% for the number of parking spaces diagonal parking create.

It is important to understand the implications diagonal parking can have on the parkway landscape area between the street curb and sidewalk; the width requirements of the street where diagonal parking would be implemented; and the length required for a curb cut or curb ramp, which is designed for pedestrian uses; fire hydrants; and street lights. The diagonal parking requirements for the city of Chicago will be discussed in the findings section of this report.

Different Types of Bicycle Lanes

Bikeways are streets and trails, which accommodate bicycle travel. According to the American Association of State Highway and Transportation Officials (AASHTO), which is a consortium of highway and transportation departments, there are five classifications of bicycle facilities or bikeways:

- shared roadways;
- signed shared roadways;
- bike lanes;
- shared use paths; and
- other design considerations.

Shared roadways can be categorized as marked or unmarked. Unmarked shared roadways are roadways lacking pavement markings denoting shared use by both bicyclists and motorists. The decision to leave shared roadways unmarked is dictated by street width requirements and traffic volumes and operating speeds. The immediate advantage to unmarked shared roadways is that, in their current conditions, these roadways are viable for both bicyclists and motorists alike. Conversely, drawbacks to unmarked shared roadways are vulnerability to double-parking, proximity issues with moving vehicles, and insufficient door zones.

Marked shared roadways are identifiable by visible pavement markings denoting a preferred bike route. These roadways utilize striping and signage to alert both bicyclists and motorists. The decision to separate bicyclists and motorists is determined by street width constraints, traffic volumes, and operating speeds. The primary advantage to marked shared lanes is increased bicyclist and motorist awareness. Marked shared roadways are also prone to double-parking, proximity issues with moving vehicles, and insufficient door zones.

Bicycle lanes are separate travel lanes designated specifically for bicyclists. Variations of bike lanes include buffered bicycle lanes, contra-flow bicycle lanes, left-side bicycle lanes, and cycle tracks (NACTO 2011). The decision to install bicycle lanes is influenced by street width considerations, cycling volume, traffic volumes, and operating speeds. According to the National Association of City Transportation Officials (NACTO), several benefits include:

- increase in bicyclist comfort and confidence on busy streets;
- separation between cyclists and motorists;
- increase in predictability of bicyclist and motorist positioning and interaction;
- increase in total capacities of streets carrying mixed bicycle and motor vehicle traffic; and
- reminder to motorists of bicyclists' right to the street.

Disadvantages to conventional bicycle lanes and the various derivatives are the additional space requirements and added maintenance required for striping. Buffered bicycle lanes are a variation of conventional bicycle lanes, which increase safety by adding additional clearance or buffering from motorists and parked vehicles. Contra-flow bicycle lanes are designed to allow bicyclists to travel safely on one-way streets. The primary advantage of this bicycle layout is to increase connectivity and access to bicyclists traveling in both directions. Similarly, it decreases trip distance and allows bicyclists to utilize less trafficked roadways (NACTO, 2011). Left-side bicycle lanes are conventional bicycle lanes placed on the left side of one-way streets or two-way median divided streets. The primary benefit is increased safety by removing bicycle lanes from congested right-side travel lanes. Right-side lanes are subject to heavy interaction by delivery trucks, public transportation vehicles (i.e., buses and cabs), street side parking, and vehicles making right turns. Cycle tracks are conventional bicycle lanes placed along the curb and protected by a physical barrier such as bollards, planters, parked vehicles, or barriers. Implementation is generally on roadways with high traffic volumes, high parking turnover, and subject to heavy right-lane usage. According NACTO the benefits of cycle tracks include:

- dedicated and protected space for bicyclists, which improves perceived comfort and safety;
- elimination of risk and fear of collisions with over-taking vehicles;
- reduction in the risk of dooring compared to a bicycle lane and elimination of the risk of a doored bicyclist being run over by a motor vehicle;
- prevention of double-parking, unlike a bicycle lane; and
- more attractive for bicyclists of all levels and ages.

Disadvantages associated with cycle tracks are the additional space requirements and possible removal of travel lanes or on-street parking. Shared use paths or trails are multi-purpose facilities, which include bikeways. The main features of shared use paths are the absence of vehicular traffic and the physical separation, by an open space or barrier, from vehicle roadways (AASHTO, 1999). In addition, they are usually designed for two-way travel. Benefits include providing off-road transportation routes for bicyclists and other users that extend and complement the roadway network (AASHTO, 1999).

Other bikeway design considerations include bicycle boulevards and paved shoulders. Bicycle boulevards are individual local streets or series of local streets designed as a continuous bikeway. Bicycle boulevards are essentially shared lanes, which take advantage of local streets and their inherently bicycle-friendly characteristics of low traffic volumes and operating speeds (U.S. Department of Transportation, 2006). Distinguishing features include traffic diverters to control motorist access and traffic-calming features, such as roundabouts and speed bumps. The primary benefits are increased safety and alternatives to riding along heavy traffic thoroughfares. An added benefit includes the opportunity for traditional street grids to be converted into bicycle boulevards, which offers many miles of local streets (U.S. Department of Transportation, 2006). The main drawback to bicycle boulevards is the fact they are often located on streets that do not provide direct access to commercial land uses and other destinations (U.S. Department of Transportation 2006).

Paved shoulders are generally located on roadways free of space constraints such as rural roadways and inter-city highways. According to AASHTO guidelines, the distinguishing feature between bicycle lanes and paved shoulders is that a bicycle lane is a travel lane, while paved shoulders are not. In addition, bicycle lanes are located on the inside of right-turn lanes, and paved shoulders are located to the right of right-turn lanes. Benefits associated with paved shoulders are extending road life by reducing edge deterioration and providing space for disabled and emergency vehicles (AASHTO, 1999).

Best Practices: International and Domestic

An analysis of bikeway best practices begins in Europe. Much of Europe, especially Germany, the Netherlands, and the Scandinavian countries, has a long tradition of constructing extensive systems of bikeways. Separated bicycle facilities or cycle tracks are the cornerstone of Dutch, Danish, and German bikeway planning policies (Pucher et al., 2008). These include bicycle lanes independent of the road network; side paths alongside, but separated from roadways by a barrier such as a curb, fence, or parking lane; and traffic lanes reserved for cycling (Pucher et al., 1999). They are designed to provide a feeling of safety, comfort, and convenience for both young and old, women and men, and for all levels of cycling ability (Pucher et al., 2008).

It is neither possible nor necessary to provide separate bicycle paths and lanes on lightly traveled residential streets, but they constitute an important part of the overall cycling route network. Since most bicycle trips begin at home, Dutch, Danish, and German cities have utilized bicycle boulevards which feature traffic calming features on most residential streets, reducing the speed limit to nineteen miles-per-hour and often prohibiting any through traffic (Pucher et al., 2008).

In Bogota, Colombia, within a two-year period, 213 miles of separate bicycle paths or cycle tracks were built, connecting to public transport and major destinations (Pucher et al., 2010). The world’s largest ciclovìa (a.k.a. bicycle path) is in Bogota city limits, with seventy-six miles of streets closed to motorized traffic and reserved for use by pedestrians, runners, rollerbladers, and cyclists every Sunday and holidays (Pucher et al., 2010).

Copenhagen, Denmark has experienced a massive expansion of cycle tracks stretching more than 214 miles (Pucher et al., 2010). At the same time, car-free zones and reduced car parking zones have sprouted within the city center. Moreover, residential streets have been fitted with traffic calming mechanisms, adding bicycle boulevards to the network.

Based on a bicycle best practices review in the United States, Portland, Oregon has one of the best bicycle networks since they boast the highest bike share of work commuters (4%) among the fifty largest U.S. cities (Pucher et al., 2008). Portland has adopted several widely used bike facilities and designs. The total bicycle network extends 265 miles of which 165 miles are bike lanes, thirty miles of bicycle boulevards, and seventy miles of off-street paths (Portland Bicycle Master Plan, 2010).

Whereas European cities build cycle tracks, the most common on-street bikeways utilized by U.S. cities are shared lanes and bike lanes (Pucher et al. 2010). Residents of Boulder, Colorado enjoy a bicycle network consisting of seventy-four miles of bike lanes, over 100 miles of multi-use pathways, and bicycle lanes or adjacent pathways extending along 95 percent of major arterial roads (Pucher et al., 2010).

Minneapolis-St. Paul, Minnesota boasts a system of off-street bike paths unparalleled among major metropolitan areas in the U.S. totaling over 1,692 miles (Krizek, 2006). There are over forty-four miles of on-street bicycle lanes throughout the city; most of the bicycle lanes are in downtown Minneapolis or connections to downtown (Minneapolis Bicycle Master Plan, 2011).

Seattle, Washington has a bicycle network spanning sixty-seven miles. The network consists of over forty miles of multi-use pathways and twenty-five miles of bicycle lanes (Seattle Bicycle Master Plan, 2010). As of 2005, bicyclists in Washington D.C. ride seventeen miles of bike lanes, fifty miles of bike paths, and sixty-four miles of marked shared roadways (D.C. Bicycle Master Plan, 2005).

III. Methodology

For the literature review portion of this report, all journal articles are peer-reviewed and were found using DePaul library services. Specifically, a social science database called PAIS. Other information used in this section was found by utilizing the websites of various bicycle and urban planning organizations. All publications used in this report can be found in section seven, which is entitled references.

The city of Chicago requirements for diagonal and parallel parking and the streetscape design were found in the Chicago Department of Transportation (CDOT) *Street and Site Plan Design Standards* document from April 2007. This is the most recent street and site design guide from the city of Chicago. The side street measurements for North Eastlake Terrace (north and south of North Rogers Avenue), Howard Street, West Sherwin Avenue, West Touhy, and North Sheridan Road are not considered public information.

The Transportation Freedom of Information Act request was denied by the city of Chicago; therefore, we took street measurements by hand. We measured the width of each side street, the back of the curb, the carriage walk, the parkway landscape area, and the sidewalk. Please refer to the Streetscape Definitions: Chicago Department of Transportation *Street and Site Plan Design Standards* in Appendix (A) to view a list of streetscape definitions that may be found in this report. The definitions were taken directly from pages 40 and 41 of the *Street and Site Plan Design Standards* document.

IV. Findings

Identified Side Streets for Diagonal Parking

Before bicycle lanes can be implemented on North Sheridan Road, the parallel parking that runs along either side of the road must be reconfigured to be diagonal parking. Donald Gordon, a board member of the RPBA, identified four side streets between West Touhy Road and the curve on North Sheridan Road by Juneway Terrace Park. The four side streets are North Eastlake Terrace, Howard Street, West Sherwin Avenue, and West Touhy Avenue. The curve of North Sheridan Road by Juneway Terrace Park will not utilize diagonal parking. Instead, the recommendation from Donald Gordon was that the two lanes of traffic on either side of this section of street would be reduced to one lane. This recommendation will be addressed in the section under *Bicycle Lane Options on North Sheridan*.

Diagonal Parking Requirements: City of Chicago

There are several street and site design requirements that the city of Chicago states are needed when diagonal parking is implemented within city boundaries. For example, the distance from arterial streets, alleys, and driveways, the presence of ground and underground utilities, greenery, and bumpouts. However, we cannot account for the entire diagonal parking requirements the city of Chicago mandates. We do not have the resources to identify what a land surveyor or engineer could identify using blueprints and experience. Therefore, this section will focus on the street and landscape measurements required by the city of Chicago for diagonal parking.[1]

For on-street diagonal parking, there are two different layouts that the city of Chicago recommends. The first layout is one-way street diagonal and parallel parking and the second layout is two-way street diagonal parking on both sides. There are three other parking layouts; however, they are not layouts that fit the need of Rogers Park. To view the general street and landscape dimensions needed for these two layouts, please refer to the Typical Parking Standards Table: Chicago Department of Transportation *Street and Site Plan Design Standards* in Appendices (B) and (C). To view the visual renderings and important dimension requirements for the diagonal and/or diagonal and parallel parking layouts created by the city of Chicago, please refer to Diagonal Parking Layouts: Chicago Department of Transportation *Street and Site Plan Design Standards* in Appendix (D).

While there are different parking requirements for each parking layout, the clearance required from stop signs, crosswalks, alleys, and driveways is the same. Therefore, this makes it easier to evaluate if the four identified side streets can accommodate diagonal parking. The next two parts of this section will address the dimension requirements for the main parking layouts we will use on the five side streets: one-way street diagonal and parallel parking and two-way street diagonal parking on both sides. For both parking layouts, the number of parking spaces is based on the assumptions that there is typically a 125 foot lot depth from street to alley for diagonal and parallel parking. Also, all parking layouts include a 30 foot clearance space on an approach to stop signs, 20 foot clearance space from crosswalks, five foot clearance on an approach to alleys

[1] These requirements were found in the Chicago Department of Transportation *Street and Site Plan Design Standards*, the *Streetscape Guidelines for the City of Chicago Streetscape and Urban Design Program*, and the Illinois Department of Transportation *Bureau of Local Roads and Streets Manual: Chapter Thirty-One Cross Section Elements*

or driveways, and a 10 foot clearance space on the far side of alleys and driveways.

All of these parking dimensions are contingent upon the placement of light poles, street lights, fire hydrants, parking meters, trees, disabled parking spaces, alleys, driveways, and other obstructions that may hinder diagonal and/or parallel parking on the five designated side streets. The following landscape designs will remain the same because they fit the city of Chicago design requirements and the construction and labor costs may be too great to change:

- the curb cuts will remain the same on all five side streets and North Sheridan Road;
- the width of the crosswalks will remain the same on all five side streets and North Sheridan Road; and
- streetlights and light poles on North Sheridan Road will remain the same, as well.

Landscape Requirements: City of Chicago

Below are the landscape design requirements for all parking layouts implemented in residential areas found in the Chicago Department of Transportation *Street and Site Plan Design Standard*. Please note that that we did not take these landscape requirements into consideration when making recommendations for diagonal and/or parallel parking on the side streets. It may be possible for CDOT to waive some of the requirements listed below:

- all lengths in parking stalls must be coordinated with the breaks in the parkway planters. This means that the breaks between planters should be associated with a courtesy walk and must be provided every 50 feet;
- if more than six diagonal spaces are needed, then bumpouts at least five feet in width, with trees, are required every six spaces; and
- mature trees are preferred when using bumpouts.

Diagonal Parking: The Four Side Streets

Below are the parking layout recommendations for the four side streets that have been identified as viable for diagonal and/or diagonal and parallel parking layouts. Please note that the measurements are rounded up to the second decimal point. Also, the length of the side streets are not included in the measurement tables because each side street is long enough to accommodate both diagonal and parallel parking.

1) North Eastlake Terrace

Based on the requirements needed for one-way street diagonal and parallel parking on North Eastlake Terrace (Eastlake), the street was slightly too narrow to accommodate the parking layout. The street width must be 40 – 41 feet wide to fit diagonal parking spaces with a depth of 17 feet, aisle width of 16 feet, and parallel parking spaces between 7 and 8 feet wide. Even with cutting down the parkway landscape area to 2.10 feet wide as it is on North Eastlake Terrace (north of North Rogers Avenue), Eastlake's street width will only be approximately 39.64 feet wide. However, the city of Chicago may make an exception since the street width is nearly 40 feet wide. Please refer to Appendix (E) to view the current street dimensions for Eastlake. If the one-way street diagonal and parallel parking layout can be implemented on Eastlake, we propose that the parking layout is a replication of the parking layout of North Eastlake Terrace (north of North Rogers Avenue) and extends to West Birchwood Avenue. Since Eastlake is a one-way street, diagonal parking would be placed on the right side of the road and parallel parking will remain on the left side of the road, nearest to the park.

A potential downfall of diagonal parking on Eastlake is the removal of a large amount of parkway landscape area. However, there is more parkway landscape area (9 feet) on the west side of the road than on the east side of the road (5.46 feet). Since the east side of the road has less green area and a huge park, keeping parallel parking on this side will not detract from the beauty of the street or make the proposed parking layout less functional. There are some obstructions on Eastlake that may be a deterrent to diagonal parking, such as mature trees and parkway planters, ground electric boxes, light poles, and fire hydrants. However, North Eastlake Terrace (north of North Rogers Avenue) most likely had the same issues and they were resolved in an effort to make efficient and functional diagonal and parallel parking on a relatively narrow side street.

Also, we took a count of the number of parallel parking spaces on Eastlake, counting empty spaces, but ignoring restricted parking areas like fire hydrants. There were approximately 45 spaces on the east side and 39 spaces on the west side of Eastlake, totaling 84 spaces. Diagonal parking can potentially increase parking capacity by 25%. Therefore, parking on the right side of Eastlake will increase to almost 49 parking spaces, while the number of parking spaces on the left side of Eastlake will stay the same. This totals approximately 94 parking spaces that may be utilized on Eastlake with the implementation of a one-way street diagonal and parallel parking layout.

2) Howard Street

Based on the requirements needed for two-way street diagonal parking on both sides, both the west and east sides of Howard Street (Howard) are too narrow to accommodate the parking layout. The street width must be 52 feet wide to fit diagonal parking on both sides of the street with a depth of 17 feet. Even with cutting down the parkway landscape area to 2.10 feet wide like it is on North Eastlake Terrace (north of North Rogers Avenue), Howard’s street width will only be approximately 47.06 feet wide west of North Sheridan Road and 43.26 on the east side of North Sheridan Road. Please refer to Appendix (F) to view the current street dimensions for Howard. However, sometimes the city of Chicago does make exceptions to their street and landscape requirements, so diagonal parking may still be feasible.

Yet, two-way street diagonal and parallel parking on both sides is possible west and east of North Sheridan Road. If the parkway landscape area on Howard is reduced a couple of feet (no less than 2.10 feet), then the required street width will be fulfilled on the west side of North Sheridan Road. If the parkway landscape area is reduced to 2.10 feet on Howard on the east side of North Sheridan, then the street width fulfills the minimum dimension requirements.

If diagonal or diagonal and parallel parking is possible on Howard, we propose that either parking layout start at Howard and North Greenview Avenue and continue east of North Sheridan Road to the lake. There are some obstructions on Howard that may be a hindrance to two-way street diagonal parking on both sides and two-way diagonal and parallel parking on both sides, such as light poles, ground electric boxes, mature trees in concrete planters, fire hydrants, and most, importantly, parking meters However, parking meters have been removed and reinstalled in several cities that changed the parking layout from parallel to diagonal (City of Fresno, 2008). However, the cost of diagonal parking would increase to accommodate this change. Also, east of North Sheridan Road, on Howard, there are mature trees that may have to be removed to make room for diagonal parking to the lakefront.

In addition, we took a count of the number of parallel parking spaces on Howard, counting empty spaces, but ignoring restricted parking areas like fire hydrants. There were approximately 15 spaces on each side of the road west of North Sheridan Road, totaling 30 spaces. There were approximately 20 spaces on the north side and 22 spaces on the south side of the Howard, east of North Sheridan Road, totaling 42 spaces. Diagonal parking can potentially increase parking capacity by 25%. Therefore, parking west of North Sheridan Road will increase to almost 38 parking spaces. Parking east of North Sheridan Road will increase to almost 53 parking spaces.

One problem that may affect potential diagonal parking on Howard is the Chicago Transportation Authority (CTA) #147 bus that runs down Howard and turns onto North Sheridan Road. The city of Chicago may reject the diagonal parking layout because it poses the same risks mentioned in the literature review in section two.

3) West Sherwin Avenue

Based on the requirements needed for two-way street diagonal parking on both sides of West Sherwin Avenue (Sherwin), the street is wide enough to accommodate the parking layout. The street width requirement for this parking layout is 52 feet and Sherwin west of North Sheridan Road is 56.89 feet wide with a parkway landscape area of 2.10 feet. Since these measurements are almost 5 feet wider than what is required, the parkway landscape area can be wider than 2.10 feet, if needed. Sherwin east of North Sheridan Road is 56.47 feet wide with a parkway landscape area of 2.10 feet wide. Since these measurements are almost 4.5 feet wider than what is required, the parkway landscape area can be wider than 2.10 feet, if needed. Please refer to Appendix (G) to view the current street dimensions for Sherwin. We propose that the two-way street diagonal parking on both sides extend west of North Sheridan Road to Touhy Park and east of North Sheridan Road to the lakefront. Since Sherwin is such a wide street, it is one of the best streets identified for a diagonal parking layout.

Also, we took a count of the number of parallel parking spaces on Sherwin, counting empty spaces, but ignoring restricted parking areas like fire hydrants. There were approximately 71 spaces on the left side of Sherwin west of North Sheridan Road and 85 spaces on the right side of Sherwin west of North Sheridan Road, totaling 156 spaces. There were approximately 16 spaces on the left side of Sherwin east of North Sheridan Road and 19 spaces on the right side of Sherwin east of North Sheridan Road, totaling 35 spaces. Diagonal parking can potentially increase parking capacity by 25%. Therefore, parking west of North Sheridan Road will increase to approximately 195 parking spaces. Parking east of North Sheridan Road will increase to almost 44 parking spaces.

4) West Touhy Avenue

Based on the requirements needed for two-way diagonal parking on both sides of West Touhy Avenue (Touhy), the street is wide enough to accommodate the parking layout. The street width requirement for this parking layout is 52 feet and Touhy west of North Sheridan Road is 55.43 feet wide with a parkway landscape area of 2.10 feet. Since these measurements are almost 3.5 feet wider than what is required, the parkway landscape area can be wider than 2.10 feet if needed. Please refer to Appendix (H) to view the current street dimensions for Touhy. The parking area east of North Sheridan Road is a public parking lot with a perpendicular parking layout that is used for the Leone Beach Park (c/o Loyola Park). Since this parking area is used as parking for the park and for residents living nearby, the parking layout will remain the same. We propose that the two-way street diagonal parking on both sides extend to North Ashland Avenue.

Also, we took a count of the number of parallel parking spaces on Touhy, counting empty spaces, but ignoring restricted parking areas like fire hydrants. There were approximately 55 spaces on the north side and 63 spaces on the south side, totaling 118 spaces. Diagonal parking can potentially increase parking capacity by 25%. Therefore, parking on the north side of Touhy will increase to almost 69 parking spaces. Parking on the south side of Touhy will increase to almost 79 parking spaces.

Pros and Cons of Diagonal Parking

There are several benefits and consequences to implementing diagonal parking in commercial and residential districts. It is important to understand how this parking layout can potentially impact residents / businesses and decide if it is actually the best option for what you are trying to achieve. Below are some of the pros and cons to diagonal parking; they should be reviewed and evaluated before moving forward with changing the parking layout on North Sheridan Road.

Pros

- Increases parking capacity by 25%, which results in a more efficient use of space
- It would eliminate the parked cars from North Sheridan Road, making room for a buffered bicycle lane
- Diagonal parking would be located on the side streets, which is still near residents' homes
- Parking would still remain permit and meter-free
- Diagonal parking is proven to help with traffic calming
- The diagonal and parallel parking layout is already implemented on North Eastlake Terrace (north of North Rogers Avenue) and it is functional and ascetically pleasant
- Cars are more likely to see pedestrians when they cross the street between cars
- Pull-in or reserve parking can be implemented to increase driver's visibility, unlike with

parallel parking

- Residents will not have to worry about the parking restriction on North Sheridan Road if they can park diagonally on side streets
    - Currently, one side of North Sheridan Road has restricted parking from 7:00 a.m. to 9:00 a.m. Monday through Friday. The other side of North Sheridan Road has restricted parking from 4:00 p.m. to 6:00 p.m. Monday through Friday.

Cons

- Diagonal parking can decrease the drivers' ability to see bicyclists and pedestrians when they are backing out of the parking space
- It can be difficult for multiple cars to back out of diagonal parking spaces at the same time due to street space
- A significant portion of parkway landscape area will have to be removed to make room for diagonal parking, which may also result in the loss of mature trees and parkway planters
- Buses and emergency vehicles may have difficulty traveling down streets with diagonal parking due to street width and standing cars
- Traffic may significantly slow to a stop as cars back out of diagonal parking spaces
- Diagonal parking may not work as well in residential areas as it does in business districts
- Implementing diagonal parking will cost a significant amount of money, approximately $3,000 per space, which includes the replacement of the parking meter (Source: City of Fresno Parking Manual)

Bicycle Lanes Options on North Sheridan Road

The table below shows the stress level of cyclists when riding on roadways with varying speeds, traffic volume, quantity of trucks, curb lanes, and hindrances, like intersections and commercial driveways. This is a good tool to measure the level of stress that cyclists, in a neighborhood, may feel when riding on certain roads. Using this table, we were able to find what we believe are the best bicycle lane options for the level of stress a cyclist may experience due to street and traffic conditions. In addition, it is important to note that other factors should be involved when measuring the stress level of cyclists, like the existence of bicycle lanes or paths, the overall weather condition of the environment, amount and format of parking on the road, and the average number of cyclists. Based on this chart, we believe that the stress rating for cyclists riding on the one mile stretch of North Sheridan Road, between West Touhy Avenue and the curve on North Sheridan Road by Juneway Terrace Park, to be between a rating of 1 and 2.

Stress Rating	**Speed**	**Volume**	**Trucks**	**Curb Lane**	**Hindrances**
	Posted speed limit (km/hr)	Vehicles/hr per traffic lane	Percentage of truck traffic	Curb lane width (m)	Commercial driveways and intersections per km
1	<40	<50	<2%	>4.6	<6
2	50	51-150	4%	4.3	13
3	60	151-250	6%	4.0	19
4	65	251-350	8%	3.7	25
5	>75	351-450	>10%	<3.3	>31

Source: Litman et al. (2000)

Buffered Bicycle Lane Requirements in Chicago

Rogers Park would like buffered, protected bicycle lanes in an effort to keep traffic from entering the bicycle lane. Below are the requirements for a buffered bicycle lane in an urban community based on information from the National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide. Please refer to Appendix (I) to view the NACTO visual rendering of a buffered bicycle lane:

- 5 foot minimum width for the bicycle lane
- 2 foot minimum width for buffer lane
- 6-8 inch wide solid white line located between the traffic lane and the bicycle lane indicating the beginning of the buffer lane
- 2 inch solid lines should be used inside the buffer area to indicate that crossing is discouraged
- The bicycle lane line should not cover drains on the curb, so there needs to be enough clearance
- On intersections approaches where there is no dedicated right turn lane, bike boxes should be placed before each intersection to help reduce bicycle and vehicle accidents. Please refer to Appendix (J) to view a bike box.
- The buffer markings should become dashed lines, with no paint, when passing through wide intersections. On more narrow intersections, the green paint will remain.
- Reflective, flexible poles are the standard for protected lanes (this optional feature would make the bicycle lane protected)
- Proper bicycle lane signage for cyclists, vehicles, and pedestrian awareness

Therefore, the total minimum width needed for buffered bicycle lanes is 7.5 feet. Based on our measurement of the parallel parking spaces on North Sheridan Road, the parking stall width is approximately 7.5 feet wide from the curb front to the edge of the parking stall nearest to the traffic lane. Therefore, the parallel parking lane can accommodate a buffered bicycle lane. We propose that reflective, flexible poles approximately 3 feet high be used every few feet to help shield cyclists from incoming traffic. We understand that Rogers Park would prefer planters to be used in the buffered area of the bicycle lane. However, due to concerns of safety for the cyclists, reflexive, flexible poles should be used instead to soften any potential falls of cyclists in the bicycle lane. We propose two bicycle lane options for the mile stretch between West Touhy Avenue and the curve in the road on North Sheridan Avenue by Juneway Terrace Park.

Bicycle Lane Option One: Removal of Parallel Parking

The first option is for the two traffic lanes on each side of North Sheridan Road to remain the same; however, the parallel parking will be moved to a diagonal and/or diagonal and parallel layout on one of the four side streets. In place of the parallel parking on either side of North Sheridan Road, there will be one-way buffered bicycle lanes. Keeping two lanes of traffic will still allow for sufficient traffic flow on North Sheridan Road and moving parallel parking to diagonal parking on four side streets allows sufficient amount of space for a 5 foot (minimum) buffered bicycle lane. To view a rendering of the first bicycle lane option, please refer to Appendix (K).

Bicycle Lane Option Two: Lane Reduction

The second bicycle lane option will replicate the mile of bicycle lanes on Kinzie Street. There is one lane of traffic on each side of North Sheridan Road, with one lane of parallel parking on each side of the road, along with buffered one-way bicycle lane on each side of North Sheridan Road. There is a chance that the Illinois Department of Transportation (IDOT) and CDOT will not allow diagonal parking on the side streets of North Sheridan Road. Therefore, as a way to continue to calm traffic on North Sheridan Road, two lanes of traffic on each side of the street can be reduced to one lane of traffic each side. There will still be a 7 to 8 foot parallel parking lane and a 5 foot (minimum) buffered bicycle lane. To view pictures from the Kinzie bicycle lane project, please refer to Appendix (L).

A plan proposed to use by the RPBA was to reduce the traffic lanes on North Sheridan Road near the Juneway Terrace Park to one lane each way. With the second bicycle lane option, the traffic lanes will already be reduced to one lane of traffic in each direction. As a result, the buffered bicycle lane can continue north of Sheridan Road past Juneway Terrace Park. Also, as stated previously in the literature review, bicycle lanes can have a calming effect on traffic.

Therefore, the traffic going around this curve on North Sheridan Road will most likely slow down significantly. Please refer to Appendix (M) to view street measurements for North Sheridan Road by Juneway Terrace Park.

Bicycle Lane Accessories

There are several "accessories" that must be implemented for each bicycle lane option:

- Bicycle lanes will painted in a deep green color with bicycle symbols painted on the lane at approximately every 10 feet

- The buffer line will become dashed to indicate that it is a crossing for cyclists when passing though wide intersections and, therefore, cyclists and vehicles must yield to each other and pedestrians. On more narrow intersections, the green paint will remain. This will allow drivers to see the bicycle lane clearly and preventing them from stopping on the bicycle lane when pulling up to an intersection. Also, this will also keep the construction and maintenance costs down since the bicycle lane will not able to be raised or of a different texture.

- Proper signage indicating for bicyclists and vehicles to yield at intersections and crosswalks must be implemented to ensure safety standards. Also, signage indicating that a bicycle lane is running along side traffic should be implemented. Please refer to Appendix (N) to view signage options for bicycle and traffic lanes.

- Reflective poles should be implemented along the buffer line to keep bicyclists within the bicycle lane and traffic out of the bicycle lane. Also, these reflexive poles help with visibility at night.

Potential Bicycle Lane Issues

There are a couple issues that arise from the potential implementation of bicycle lanes on North Sheridan Road. They focus on how bus traffic will be managed in conjunction with bicycle lanes and how will pedestrian traffic at crosswalks be handled. First, we do not recommend moving shelters into the bicycle lane or removing any bus stops along North Sheridan Road. The location of the bus shelters comply with the city of Chicago's street design guidelines and moving the bus shelters may cause issues with compliance. Also, the removal of bus shelters is not recommended due to potential community pushback. Second, we do not recommend moving any of the bus stop locations, again, due to the potential reduction in convenience for residents.

We recommend that bus traffic be managed the same way it is handled now in other parts of Chicago that use bicycle lanes. The bus should pull into the traffic and bicycle lanes when loading and unloading passengers since the bus will most likely need the extra width space. Buses should yield to bicyclists and bicyclists should, in turn, yield to buses. Buses require 85 feet of length at all bus stops. Therefore, approximately 85 feet of bicycle lane will have to be used when buses approach bus stops along North Sheridan Road. Currently, bicyclists move into the traffic lane to go around the bus on its left side (opposite side of where pedestrians get on and off the bus). That can still be an option or bicyclists can yield to buses that are temporarily loading and unloading in the bicycle lane. We do not recommend that the bicycle lane go around bus stops near the traffic lane or near the sidewalk area due to lack of space and the expense of constructions costs.

In option two, there is one lane for parallel parking. We recommend that, in this instance, the bus pulls into the parallel parking and bicycle lanes since the bus will most likely need the extra width space. Again, bicyclists should either yield to bus traffic or go around the bus by moving into the traffic lane on the left side of the bus. There is not a significant amount of bus traffic on North Sheridan Road; therefore, there is not a high chance that many cyclists will be inconvenienced due to bus traffic.

As bicyclists approach crosswalks on North Sheridan Road, they should follow the rules of the road just like vehicles do, yielding to crossing pedestrians. It is important to implement the proper signage so cyclists are reminded to yield or stop as pedestrians cross North Sheridan Road or any side streets. Again, when the bicycle lane crosses intersections, the lines should become dashed to remind vehicles, bicyclists and pedestrians that it is a still a bicycle lane crossing, but can be crossed over by through traffic.

V. Cost Analysis

Below is an estimated cost table for the various components that will have to go into implementing bicycle lanes on a one mile stretch on North Sheridan Road. Not all costs could be identified because they diff from city-to-city or state-to-state. Even though not all of the costs could be identified, it is important to understand how they impact the community.

Item	Cost	Schedule
Diagonal parking layout	$3,000 per parking space*	One-time fee
Buffered bicycle lanes	$300,000 for one mile**	Maintenance may have to be done every couple of years
Bicycle signage	$150 to 200 per sign***	One-time fee
Construction and labor	Differs from city-to-city	One-time fee
Maintenance of bicycle lanes	Differs from city-to-city	Maintenance may have to be done every couple of years
Marketing for community support	$500 or more (depends on the type of campaign)	One-time fee
Cost matching	Depends on how much Rogers Park can put into this project	One-time fee

* This cost includes the replacing the parking meters. Since Rogers Park has very few parking meters, the cost for diagonal parking will be less money than what is listed above. Source: City of Fresno Parking Manual – http://www.fresno.gov/NR/rdonlyres/4E8DAB11-5117-4358-8945-C891EA1E3F7E/0/parking3.pdf

** This cost was just for the paint and reflective poles. Signage, construction, maintenance, and labor costs were not included in this figure. Source: Active Transportation Alliance (ATA)

***Source: The Metropolitan Transportation Commission of San Francisco

VI. Future Actions

There are important next steps in the process of getting a bicycle lane implemented on North Sheridan Road and moving parallel parking to the side streets.

- Review the findings in this report and determine which sections will be used when presenting findings to local government and the alderman
- Garner backing from the alderman for this project and discuss any issues and/or concerns
- Determine what the alderman defines as community support
- An authorized survey of community residents and leaders may have to be conducted to gauge community support
- Ask CDOT to make a site visit and evaluate whether the proposed side streets are viable for diagonal parking before formally presenting to the community
- Ask the ATA to assist with gathering community support / marketing campaign and perhaps be a liaison between Rogers Park and the city of Chicago
- Work with the ATA on the creation of visualizations
- Hold a series of community meetings to discuss the project and concerns / issues

- Work with CDOT to determine what is needed to complete a project of this magnitude and discuss funding options

- Meet with IDOT to present the plan and seek approval for implementation

VII. References

American Association of State Highway and Transportation Officials. AASHTO Guide for the development of bicycle facilities, 1999. www.transportation.org (accessed June 28, 2011).

Balsas, Carlos. 2003. Sustainable Transportation Planning on College Campuses. Transport Policy. 10:35-39.

Beckman, Jarad D. and Goulias Katherine G. 2008. Immigration, Residential Location, Car Ownership, and Commuting Behavior: A Multivariate Latent Class Analysis From California. Transportation. 35:655-671.

Buehler, Ralph and Pucher, John. 2008. Making Cycling Irresistible: Lessons from The Netherlands, Denmark, and Germany. Transport Reviews. Volume 28. No. 4. 495-528.

Buehler, Ralph, and Pucher, John. 2006. Why Canadians Cycle More than Americans: A Comparative Analysis of Bicycling Trends and Policies. Transport Policy. Volume 13. 265-279.

Buehler, Thomas, Handy, Susan, & Xing, Yang. 2010. Factors Associated with Bicycle Ownership and Use: A Study of 6 Small U.S. Cities. Submitted to the Committee on Bicycle Transportation.

City of Chicago Street and Site Plan Design Standards [2007] http://www.cityofchicago.org/content/dam/city/depts/cdot/StreetandSitePlanDesignStandards407.pdf (accessed May, June, and July 2011)

City of Fresno Parking Manual: Part I http://www.fresno.gov/NR/rdonlyres/4E8DAB11-5117-4358-8945-C891EA1E3F7E/0/parking3.pdf (accessed May, June, and July 2011)

de Nazelle, Audrey et. al "Improving health through policies that promote active travel: A review of evidence to support integrated health impact assessment," *Environmental International 37* [2011]: 766-777.

Downtown Prineville: Street Improvement Project [1997]: 1-77.

Friedman, Steve. 2011. #1 Bike City: Minneapolis. Bicycling http://www.bicycling.com/news/featured-stories/1-bike-city-minneapolis (accessed May, June and July 2011)

Haughney, Christine.2011. Women, Uneasy, Still Lag as Cyclists in New York City. The New York Times. July 3.

Foster, Charlie E., Jenna R. Panter, and Nicholas J. Wareham "Assessing the impact of road traffic on cycling for leisure and cycling to work," *International Journal of Behavioral Nutrition and Physical Activity 8, no. 61* [2011]: 1-5.

Gotschi, Thomas "Costs and Benefits of Bicycling Investments in Portland, Oregon," *Journal of Physical Activity and Health 8(Suppl 1)* [2011]: S49-58.

Jaskiewicz, Frank “Pedestrian Level of Service Based on Trip Quality,” *TRB Circular E-C019: Urban Street Symposium* [2011]: G-1/1 – G-1/14.

Judge, Ainsley Henry "Designing More Inclusive Streets: the Bicycle, Gender, and Infrastructure" (2011). Honors Projects. Paper 29. http://digitalcommons.macalester.edu/geography_honors/29 (accessed on May, June, and July 2011)

Illinois Department of Transportation Chapter thirty-One: Cross Section Elements [2006] http://www.dot.state.il.us/blr/manuals/Chapter%2031.pdf (accessed on May, June, and July 2011)

Kersys, Arturas “Sustainable Urban Transport System Development Reducing Traffic Congestion Costs,” *Engineering Economics 22(I)* [2011]: 5-13.

King, Michael R. “Calming New York City Intersections,” *TRB Circular E-C019: Urban Street Symposium* [2011]: 1-3/1 = I-3/15.

Kliewer, Christopher, Kelly Kokorunda, Laura Mendenhal, and Iris Wilson “Biking in Manhattan: Connecting Campus to Downtown,” *Port Authority of New York and New Jersey* [2009]: 1-41.

Krizek J. Kevin. 2006. “Two Approaches to Valuing Some of Bicycle Facilities Presumed Benefits.” *Journal of American Planning* 72, no. 3: 309-320.

Kulash, Walter “The Third Motor Age,” *Places* [1996]: 1-5.

Litman, Todd, Robin Blair, Bill Demopoulos, Nils Eddy, Anne Fritzel, Danelle Laidlaw, Heath Maddox, and Katerine Forster “Pedestrian and Bicycle Planning Guide to Best Practices,” [2000]: 1-28. 1

Minneapolis Bicycle Master Plan [2011] http://www.ci.minneapolis.mn.us/bicycles/FullBikePlan-condensed.pdf (accessed July 1, 2011).

National Association of City Transportation Officials. 2011. Urban Bikeway Design Guide, 2010. http://nacto.org/cities-for-cycling/design-guide (accessed June 29, 2011).

Pezler, Peter. 2010. Bicycling as a Way of Life: A Comparative Case Study of Bicycle Culture in Portland, OR and Amsterdam. 7th Cycling and Society Symposium. September.

Pucher, J., R. Buehler, D. Merom, and A. Bauman “Walking and Cycling in the United States, 2011-2009: Evidence from the National Household Travel Survey,” *National Transportation Data Requirements and Programs vol.101* [2009]: 1-18.

Pucher, John and Lewis Dijkstra “Making Walking and Cycling Safer: Lessons from Europe,” Department of Urban Planning Rutgers University – Bloustein School [2000]: 1-33.

Pucher, John, and Ralph Buehler. 2008. "Making Cycling Irresistible: Lessons from The Netherlands, Denmark and Germany." *Transport Reviews* 28, no. 4: 495-528.

Pucher, John, Komanoff, Charles, and Schimek, Paul. 1999. "Bicycling renaissance in North America? Recent trends and alternative policies to promote bicycling." *Transportation Research Part A: Policy and Practice* 33: 625-654.

Pucher, John, Dill, Jennifer, and Handy, Susan. 2010. "Infrastructure, programs, and policies to increase cycling: An international review." *Preventative Medicine* 50: S106-S125.

Pucher, John, Komanoff, Charles & Schimek, Paul. 1999. Bicycling Renaissance in North America? Recent Trends and Alternative Policies to Promote Bicycling. Transportation Research. Part A. 625-654.

Portland Bicycle Master Plan [2010] ftp://ftp02.portlandoregon.gov/PBOT/Bicycle_Plan_for_2030/Plan_Documents/Individual_Sections/PBP_Cover-Title-TOC-Foreword.pdf (accessed July 1, 2011).

Retting, Richard A., Susan A. Ferguson, Anne T. McCartt "A Review of Evidence-Based Traffic Engineering Measures Designed to Reduce Pedestrian-Motor Vehicle Crashes," *American Journal of Public Health 93, no. 9* [2003]: 1456-1463.

Rivara, Frederick, Ricahrd W. Sattin "Preventing Bicycle related injuries: next-steps," *Journal of Injury Prevention 17* [2011]: 215.

Roney, Matthew J. 2008. Bicycles Pedaling Into the Spotlight. Earth Policy Institute. May.

Salingaros, Niko A. "Compact City Replaces Sprawl," *Crossover: Architecture, Urbanism, Technology* [2006]: 100-115.

Seattle Bicycle Master Plan 2010. http://www.seattle.gov/transportation/docs/bmp/final/BikeMasterPlanCOMPLETE.pdf (accessed July 1, 2011).

Smart, Michael. 2010. US Immigrants and Bicycling: Two-Wheeled in Autopia. Transport Policy. 17. 153-159.

Smith, Robin Urban. 2011. Traffic Calming. Moving Beyond the Automobile. April 5.

U.S. Department of Transportation, 2006. Federal Highway Administration Course on Bicycle and Pedestrian Transportation.

Washington DC Bicycle Master Plan 2010. http://www.dc.gov/DC/DDOT/ (accessed July 1, 2011).

Yang, Lin, Shannon Sahlqvist, Alison McMinn, Simon J. Griffin, and David Ogilvie "Interventions to promote cycling: systematic review," *BMJ Journals 341:c5293* [2011]: 1-10.

Zegeer, Charles V., Max Bushell "Pedestrian Crash Trends and Potential Countermeasures from Around the World," University of North Carolina Highway Safety Research Center [2010]: 1-18.

Zegeer, Charles V. and Michael Cynecki "FHWA Study Tour for Pedestrian and Bicyclist Safety in England, Germany, and The Netherlands" FHWA International Technology Scanning Program Study Tour Summary Report [1994]: 1-99.

Zhang, Xin "Improving the Pedestrian Experience in SoHo, NYC," College of Environmental Science and Forestry [2007]: 1-95.

VIII. Appendix

Appendix (A): Streetscape Definitions: Chicago Department of Transportation *Street and Site Plan Design Standards*

- Aisle width = measurement from end of diagonal parking to side of parallel parking. This measurement will be part of the entire street width.

- Back of curb = The edge of the curb contiguous to the planted parkway area, the carriage walk, or the sidewalk.

- Carriage walk = Narrow walk (usually 1’-0” to 2’-6”) parallel to and attached to the back of curb, typically provided to allow a paved surface for passengers to use while entering or leaving parked vehicles.

- Courtesy Walk = Narrow walk (usually 2’-6” or 3’-0”) crossing the planted part of the parkway, connecting the curb to the sidewalk.

- Curb cut = is a solid (usually concrete) ramp graded down from the top surface of a sidewalk to the surface of an adjoining street. It is designed for pedestrian uses and commonly found in urban areas where pedestrian activity is expected

- Parkway landscape area = An area between the sidewalk and the back of street curb (or carriage walk) used for landscaping.

- Parkway planter = A large planter cut-out in a sidewalk, usually edged with a concrete curb and/or metal fence located in the parkway landscape area

- Sidewalk = That portion of the parkway that is paved and used for pedestrian movement.

- Stall linear dimension = from back of curb corner to back of curb corner for each parking stall

- Street = a thoroughfare especially in a city, town, or village that is wider than an alley or lane and that usually includes sidewalks[2]

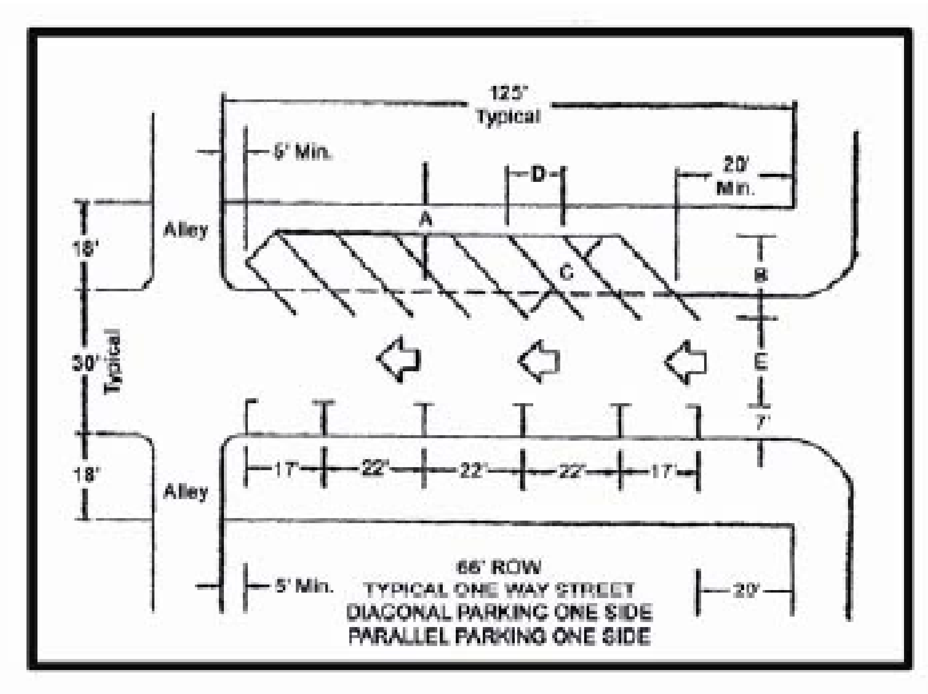
[2] The definition of streets was taken from the Merriam-Webster online dictionary - http://www.merriam-webster.com/dictionary/street

(B): Typical Parking Standards Table

(C): Minimum Local/Residential Street Cross-Section Width Standards

Appendix (D): Diagonal Parking Layouts: Chicago Department of Transportation *Street and Site Plan Design Standards*

<u>Layout One: One-way street diagonal parking on one side & parallel parking on the other side</u>



Area	Width Requirements
One-way street (entirety)	26 to 30 feet* / 40 – 41 feet (diagonal parking)
Curb	0.5 feet
Carriage walk	0 – 2.5 feet
Parkway landscape area	4 feet
Sidewalk	6 feet (minimum)*

* Allows for one lane of through traffic and enough space for a vehicle to bypass a stopped vehicle, if needed.

** 5 foot sidewalks may be allowable in some low-density residential zones (RS)

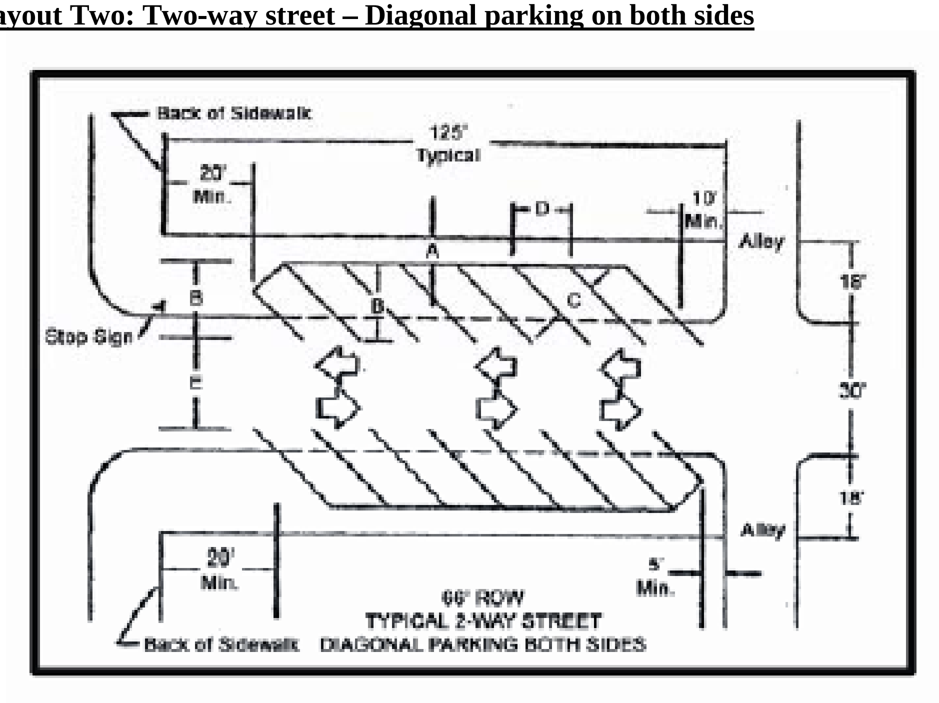
Diagonal Parking Area	Width Requirements
Parking depth	17 feet
Parking stall width	9 feet
Stall linear dimension	12.7 feet
Aisle width	16 feet (minimum)

Parallel Parking Area	Width Requirements
Parking depth	16 – 18 feet (for end spaces) 20 – 22 feet (for interior spaces)
Parking stall width	7 – 8 feet
Stall linear dimension	N/A
Aisle width	16 feet (minimum)

Type of Parking	Number of Parking Spaces
Diagonal	7
Parallel***	4 to 5
Total number of spaces =	11 to 12

*** 4 parallel spaces if on an approach to stop sign; 5 parallel spaces if on an approach to alley

<u>Layout Two: Two-way street – Diagonal parking on both sides</u>



Area	Width Requirements
One-way street (entirety)	32 – 34 feet*
Curb	0.5 feet
Carriage walk	0 – 2.5 feet
Parkway landscape area	4 feet
Sidewalk	6 feet (minimum)**

* However, diagram in Appendix (D) states that a two-way diagonal parking street can be 30 feet wide.

** 5 foot sidewalks may be allowable in some low-density residential zones (RS)

Diagonal Parking Area	Width Requirements
Parking depth	17 feet
Parking stall width	9 feet
Stall linear dimension	12.7 feet
Aisle width	18 feet (minimum)

Type of Parking	Number of Parking Spaces
Diagonal	14
Parallel	0
Total number of spaces =	14

Appendix (E): North Eastlake Terrace Street Dimensions

West side (potential diagonal parking)

Landscape Area	**Width Measurements (rounded up)**
One-way street (entirety)	29.38 feet
Curb	0.75 feet
Carriage walk	1.42 feet
Parkway landscape area	9 feet
Sidewalk	6 feet

East side, near park (potential parallel parking)

Landscape Area	**Width Measurements (rounded up)**
One-way street (entirety)	N/A
Curb	0.75 feet
Carriage walk	1.54 feet
Parkway landscape area	5.46 feet
Sidewalk	5.96 feet

To get a better idea of how the street dimensions will change with the proposed diagonal and parallel parking layout on Eastlake, below are the street measurements of North Eastlake Terrace (north of North Rogers Avenue):

West side (diagonal parking)

Landscape Area	**Width Measurements (rounded up)**
One-way street (entirety)	40.34 feet
Curb	0.75 feet
Carriage walk	0 feet
Parkway landscape area	2.10 feet
Sidewalk	5.20 feet

East side, near park (parallel parking)

Landscape Area	**Width Measurements (rounded up)**
One-way street (entirety)	N/A
Curb	0.75 feet
Carriage walk	0 feet
Parkway landscape area	2.10 feet
Sidewalk	5.20 feet

Appendix (F): Howard Street Dimensions

West of North Sheridan Road: Traffic flows towards North Sheridan Road

Landscape Area	Width Measurements (rounded up)
One-way street (entirety)	37.92 feet
Curb	0.67 feet
Carriage walk	1.33 feet
Parkway landscape area	6.42 feet
Sidewalk	6.79 feet

West of North Sheridan Road: Traffic flows away from North Sheridan Road

Landscape Area	Width Measurements (rounded up)
One-way street (entirety)	N/A
Curb	0.67 feet
Carriage walk	0 feet
Parkway landscape area	6.92 feet
Sidewalk	5.75 feet

East of North Sheridan Road: Traffic flows towards North Sheridan Road

Landscape Area	Width Measurements (rounded up)
One-way street (entirety)	30.5 feet
Curb	0.58 feet
Carriage walk	0.67 feet
Parkway landscape area	10.04 feet
Sidewalk	7 feet

East of North Sheridan Road: Traffic flows away from North Sheridan (to lake)

Landscape Area	**Width Measurements (rounded up)**
One-way street (entirety)	N/A
Curb	0.58 feet
Carriage walk	1.54 feet
Parkway landscape area	8.54 feet
Sidewalk	6.04 feet

Appendix (G): West Sherwin Avenue Dimensions

West of North Sheridan Road: Traffic flows towards North Sheridan Road

Landscape Area	**Width Measurements (rounded up)**
One-way street (entirety)	40.17 feet
Curb	0.58 feet
Carriage walk	1.5 feet
Parkway landscape area	10.38 feet
Sidewalk	5.17 feet

West of North Sheridan Road: Traffic flows away from North Sheridan Road

Landscape Area	**Width Measurements (rounded up)**
One-way street (entirety)	N/A
Curb	0.58 feet
Carriage walk	1.54 feet
Parkway landscape area	10.54 feet
Sidewalk	5.33 feet

East of North Sheridan Road: Traffic flows towards North Sheridan Road

Landscape Area	**Width Measurements (rounded up)**
One-way street (entirety)	40.17 feet
Curb	0.58 feet
Carriage walk	1.38 feet
Parkway landscape area	9.75 feet
Sidewalk	5.96 feet

East of North Sheridan Road: Traffic flows away from North Sheridan (to lake)

Landscape Area	Width Measurements (rounded up)
One-way street (entirety)	N/A
Curb	0.63 feet
Carriage walk	0.88 feet
Parkway landscape area	10.75 feet
Sidewalk	5.29 feet

Appendix (H): West Touhy Avenue Dimensions

West of North Sheridan Road: Traffic flows towards North Sheridan Road

Landscape Area	**Width Measurements (rounded up)**
One-way street (entirety)	42.17 feet
Curb	0.58 feet
Carriage walk	1.33 feet
Parkway landscape area	8.67 feet
Sidewalk	6.13 feet

West of North Sheridan Road: Traffic flows away from North Sheridan Road

Landscape Area	**Width Measurements (rounded up)**
One-way street (entirety)	N/A
Curb	0.58 feet
Carriage walk	1.5 feet
Parkway landscape area	8.79 feet
Sidewalk	6.13 feet

East of North Sheridan Road: Traffic flows towards and away from North Sheridan Road
There is no street parking east of North Sheridan Road due to the parking lot for the Leone Beach Park (c/o Loyola Park). Therefore, the parking layout in this area will not change and remain a perpendicular parking area.

Appendix (I): NACTO Buffered Bicycle Lane

Appendix (J): Bike Box

Source: http://www.neighborhoodnotes.com/news/2008/08/bike_box_design_study_in_portland_neighborhoods/

Appendix (K): Bicycle Lane Option One

Appendix (L): Bicycle Lane Option Two – Photographs from the Kinzie Bicycle Lane Project

Appendix (M): The curve on North Sheridan Road by Juneway Terrace Park

Landscape Area	**Width Measurements (rounded up)**
One side of the street (two lanes of traffic)	27.25 feet
Curb	0.5 feet
Carriage walk	2.17 feet
Parkway landscape area	N/A
Sidewalk	N/A

N. Signage