Soles & Spokes

The Pedestrian and Bicycle Plan for Chicago Area Transportation

TASK 2 REPORT:

Existing Conditions & Regional Trends

Prepared by

Chicago Area Transportation Study

Plan Development Division

With Assistance from the EK Team

Edwards and Kelcey
Chicagoland Bicycle Federation
League of Illinois Bicyclists
T.Y. Lin International
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Accepted by the Soles and Spokes Plan Steering Group

October, 2004

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Executive Summary and Introduction

This report is the product of an extensive data collection and analysis effort undertaken by the Chicago Area Transportation Study to support *Soles and Spokes, the Pedestrian and Bicycle Plan for Chicago Area Transportation.* Using the information compiled here, public involvement, and additional information compiled as part of the Task 3: Best Practices Report, *Soles and Spokes* will establish regional pedestrian and bicycle transportation strategic policy guidance. This plan development effort is being undertaken by CATS with the assistance of a steering group and consultant team. Implementing government agencies, advocacy groups, and interested professionals are contributing to the plan development process.

The information here will support policy development and serve as a baseline to measure future progress in plan implementation. Hence, the report relies heavily on tabular and graphical data analysis. Much of the data is derived from data series that are at least periodically collected, so progress can be monitored in the future for a substantial proportion of the data presented here.

Here are the key findings of the report:

Public Health and Safety:

- Goals of increased physical activity, reduced air pollution, and improved safety support implementing policies to facilitate and promote pedestrian and bicycle travel.
- Children and low-income people are disproportionately affected as casualties of motor vehicle crashes with bicyclists and walkers.
- Considering exposure to risk, rural counties in the region have the greatest safety challenges for bicyclists and pedestrians.
- Controlling exposure to fast-moving vehicles is a key strategy for improving safety.
- Safety and health data provides evidence supporting improved pedestrian and bicycling safety and encouraging non-motorized travel.

Who's walking and bicycling?

- There has been a long-term reduction in walking trips to work.
- Limited data points to a rapid increase in work trips by bicycle.
- There are large numbers of non-motorized trips in northeastern Illinois, particularly in Chicago. Most of these are home-based and not work related, or are trips to and from transit services.
- Transit, walking, and bicycling are mutually supportive modes of transportation.
- The trend toward increasing vehicles per household in northeastern Illinois appears to have abated.

How Walkable and Bikeable Is Our Region?

- There is a trend toward additional compact development, particularly in Cook County.
- Population and employment projections point toward increasing mixed use development.
- Short blocks conducive to walking are concentrated in Chicago and Cook County.
- Traditional neighborhood development and transit-oriented development are among the trends supporting increased walking and bicycling.
- Most people in northeastern Illinois are within walking distance of scheduled transit service.
- Pedestrian and bicycle level of service data showed widely varying conditions for walkers and bicyclists.

- High sidewalk coverage exists, particularly in Chicago, the inner ring of suburbs, and newly developed communities. However, many communities have low sidewalk coverage.
- Most people in northeastern Illinois live in communities with bicycle facilities, but access to such facilities varies by sub-region and municipality.
- Inventories of bicycle facilities show a growing network of such facilities.
- Transit and walking journey to work trips are associated with high sidewalk coverages.
- Case studies show that physical barriers to non-motorized travel (e.g., rivers, roads, and railroads) have varying impacts on connectivity.
- People with disabilities have lower rates of pedestrian and transit use than other people in the same location. However, people with disabilities are concentrated in Chicago and Cook County, where pedestrian facilities and transit services are available. Thus, regionally, people with disabilities tend to have higher pedestrian and transit use than other people.
- An expected number of municipalities indicated they had prepared an ADA Transition Plan.
- Snow and ice control on sidewalks remains a serious concern.

Funding

- Substantial resources are being invested in the regional pedestrian and bicycle infrastructure.
- Still, resources available are not sufficient to meet needs, so competition for resources is fierce.
- Sidewalks are built routinely as part of many highway projects, though not all, even in developed areas.
- Routine sidewalk construction appears to be much more closely related to the policy environment than the funding match rate.
- To include bicycle and pedestrian accommodations in highway improvements can be expensive, so building such accommodations may require that resources be set aside for pedestrian and bicycle facilities in the programming of highway improvements.

Programs and Policies

- Support for bicycling and walking varies widely among governmental jurisdictions.
- A number of programs and policies promote pedestrian and bicycle travel. Many of these focus on safety and children.
- Each transit agency has taken steps to facilitate walking and bicycling access to transit systems, such as sidewalks, bicycle parking, and in some cases, wide-spread on-board access for bicycles.

A review of existing conditions and regional trends has thus shown a number of strengths for non-motorized travel in northeastern Illinois, but a number of shortcomings as well. Future *Soles and Spokes* reports and plan development activities will provide the tools for the region to maintain its strengths and address identified shortcomings.

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Public Health and Safety

In addition to furthering transportation goals, walking and bicycling assist in advancing multiple public health and safety goals. The following section focuses on three areas of public health that are related to travel by foot and bicycle: physical activity, air quality, and injuries. Policies, goals, and strategies for these three areas are at different states of development. The following reflects those differences, both in the data available and the information showing where we are in accomplishing objectives. The overview ties these divergent strands together to put forth a public health and safety framework supporting the development of an action plan to promote and facilitate walking and bicycling for transportation in northeastern Illinois.

Public Health and Safety Overview

Walking and bicycling will help reduce the threats posed by physical inactivity and travel-induced air pollution. However, there are many walking and bicycling injuries, though many of these are not caused by walkers and bicyclists, but by motorists. To give perspective, it's useful to compare the years of life lost by causes of death, that is, the extent of premature death.[1] Analyses of years of life lost justify accident prevention measures.

For Illinois in 2001, heart disease caused 61,568 years of life lost.[2] Bicycle and pedestrian accidents, for comparison, caused approximately 4,734 years of life lost in Illinois in 2001, or less than 8% of that from heart disease.[3] Many health advocates would argue that reducing premature deaths from heart disease should receive increased attention, since it presents a dramatically higher threat than walking or bicycling. We will show below that we have been going in the opposite direction on this issue, and have been losing ground in controlling obesity and promoting physical activity. Public policy may need to be rebalanced to promote physical activity, including bicycling and walking, and reverse physical activity and obesity trends.

So we should encourage people to travel by foot or bicycle to improve their health. Would this necessarily have a bad impact on safety statistics? Consider this excerpt from Malcolm Gladwell's article "Wrong Turn:"

> Every two miles, the average driver makes four hundred observations, forty decisions, and one mistake. Once every five hundred miles, one of those mistakes leads to a near collision , and once every sixty - one thousand miles one of those mistakes leads to a crash. *When people drive*, in other words, mistakes are endemic and accidents inevitable….[4] [emphasis added]

[1] Years of life is calculated as the sum of the differences between age 65 and the age of death, for those deaths at age 64 or less.

[2] Illinois Department of Public Health. IPLAN data system report of Cause-Specific Years of Potential Life Lost, ICD-10. http://app.idph.state.il.us

[3] Illinois Department of Transportation. "Illinois Crash Data 1997-2001." Used 2001 crash totals for pedestrians and pedalcyclists by age to calculate the total years life lost (pp. 6-7). For all motor vehicle accidents (including motor vehicle occupants, IPLAN gives 36,679 years of life lost, still less than heart disease.

[4] Malcolm Gladwell, "Wrong Turn: How the Fight to Make America's Highways Safer Went Off Course." *The New Yorker*. June 11, 2001, p. 50. Staff asked Mr. Gladwell for the primary source of the data, but he was unable to provide it at this late date.

Accidents are inevitable *when people drive*. So if more trips were made by foot or bicycle, the largest causative factor in pedestrian and bicycle deaths -- automobile travel -- would be reduced. Automotive deaths could also fall. Indeed, some countries with very high levels of pedestrian and bicycle activity and good infrastructure and other policies to support it (e.g. most of northwestern Europe) also have lower traffic death rates overall. Many of these countries with high rates of bicycling and walking even have pedestrian and bicycle death rates per capita lower than the United States. See Table 1. Table 1 shows that lower traffic fatality rates are achievable with high levels of bicycle and pedestrian travel. There is some indication that the countries of northwestern Europe have achieved safety, physical activity, and transportation benefits simultaneously by application of sufficient funds for the improvement of the transportation system combined with transportation priorities somewhat different than the priorities prevalent in the United States.[5]

Table 1
Bicycle and Pedestrian Mode Share and Traffic Fatalities, 2002
See notes.

Nation	Bicycle + Pedestrian Trips as a Percent of All Passenger Trips[6]	Year 2002 Bicycle + Pedestrian Fatalities per 100,000 Population[7]	Year 2002 Total Traffic Fatalities per 100,000 Population[8]
United States	7%	1.9	14.9
Australia	20%	1.4	8.8
Norway	27%	0.9	6.9
United Kingdom	30%	1.6	6.1
Switzerland	32%	1.7	9.4
Germany	40%	1.8	8.3
Netherlands	48%	1.6	6.1

The relationships among health, transportation, and diet variables is very complicated and needs further study that is beyond the scope of this plan. For example, some of the nations above have higher cardiovascular death rates than the United States, perhaps because of diet and smoking rates. For example, the Netherlands, Denmark, and Sweden have obesity rates that are only a third of the United States, while Germany has rates that are half of the United States, but perhaps because of smoking rates higher than the United States, Germany has higher cardiovascular

[5] John Pucher and Lewis Dijkstra, "Promoting Safe Walking and Cycling to Improve Public Health: Lessons from the Netherlands and Germany." *American Journal of Public Health.* 93:9, September, 2003. See especially pp. 1512-1515.

[6] Calculated from Andreas Schafer. "Regularities in Travel Demand: An International Perspective." *Journal of Transportation Statistics.* Vol. 3, no. 3. Bureau of Transportation Statistics. USDOT. Used latest survey from among reports, Table A-2.

[7] Calculated from: Organization for Economic Co-operation and Development, International Road and Traffic Accident Database, July, 2004 (fatality estimates). (OECD adjusts estimates for varying lengths of time deaths different countries apply in attributing deaths to collisions). Population reflects January 2002 Estimates. http://www.bast.de/htdocs/fachthemen/irtad/english/englisch.html

[8] Ibid.

mortality than the United States.[9,10,11] Japan has a low auto mode share with high rate of non-motorized transportation, a low traffic death rate, and low cardiovascular death rates (again, diet may be influential here). The result is that Japan tops the world in years of healthy life expectancy.[12] Less developed countries with high bicycle and pedestrian mode shares have high traffic fatality rates because of their infamous lack of infrastructure to accommodate bicycles, pedestrians, and motorized traffic, but have frequently have a low cardiovascular death rate that may also be because of a healthy diet.

More research regarding the relationships between transportation, public health, and safety is expected. Indeed, several studies were released while the draft of this report was being reviewed.[13] We can expect more information to refine policy. The above seems sufficient to show that it is possible to promote walking and bicycling for public health and transportation goals while improving overall traffic safety.

Having this broad overview, we set out below the details of the public health and safety context for bicycling and walking in northeastern Illinois.

[9] Pucher and Dijkstra, op cit., p 1514. Despite some higher cardiovascular disease rates, note that these four countries have longer life spans than the United States (motor vehicle crashes contributing) and per capita health care expenditures only one-half those of the United States.

[10] World Health Organisation. *Tobacco Atlas.* "Part 6, World Tables, Table A, The Demographics of Tobacco." 2004. http://www.who.int/tobacco/en/atlas40.pdf. Adult smoking rates are Germany: 35%, Denmark: 30.5%, Netherlands: 33.0%, Sweden: 19.0%, USA: 23.6%.

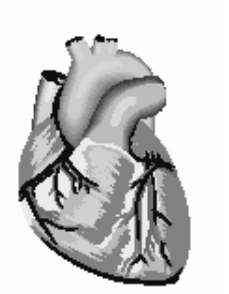
[11] Global Cardiovascular Infobase. WHO Collaborating Center on Surveillance of Cardiovascular Diseases. http://www.cvdinfobase.ca/GCVI/default.htm. Except for Germany, the countries Pucher mentions have lower CVD rates than the U.S for both males and females.

[12] Additional data is available upon request. Strong correlations were present when the United States and Japan (extreme and opposite values in almost all of the data) were included in univariate analyses, but weakened or disappeared when these countries were omitted, so other variables may be lurking that would need to be analyzed in a multi-variate analysis that is beyond the scope of this study. Among the problems to be overcome would be developing a uniform data set for travel behavior among countries (most analyses now published contain data for only a few countries, or don't have bicycle and pedestrian travel data).

[13] In addition to Pucher and Dijkstra, op cit., see:

- Ewing, Schieber, and Zegeer, "Urban Sprawl as a Risk Factor in Motor Vehicle Occupant and Pedestrian Fatalities" *American Journal of Public Health.* 93: 9 (September, 2003) 1541- 1545.
- Saelens, Sallas, Black and Chen, "Neighborhood-Based Differences in Physical Activity: An Environment Scale Evaluation," *American Journal of Public Health.* 93: 9 (September, 2003) 1552-1558.
- Lucy, "Mortality Risk Associated with Leaving Home: Recognizing the Relevance of the Built Environment," *American Journal of Public Health.* 93: 9 (September, 2003) 1564-1569.
- World Health Organization. *World Report on Road Traffic Injury Prevention.* Geneva, Switzerland: WHO. 2004. Available at http://www.who.int/world-health-day/2004/infomaterials/world_report/en/

Public Health Policy Context: Physical Activity.



Recent initiatives at the state and national levels address health issues such as physical activity and obesity. Walking and bicycling are key strategies for reducing the risk of heart attacks, strokes, diabetes, cancer and other chronic diseases associated with inactivity. The U.S. Department of Health and Human Services has adopted *Healthy People 2010* as its blueprint of goals and objectives for improving the health of Americans. *Healthy People 2010* includes objectives that are related to bicycling and walking. Table 2 shows that these health objectives are substantially higher than the current baseline information:[14]

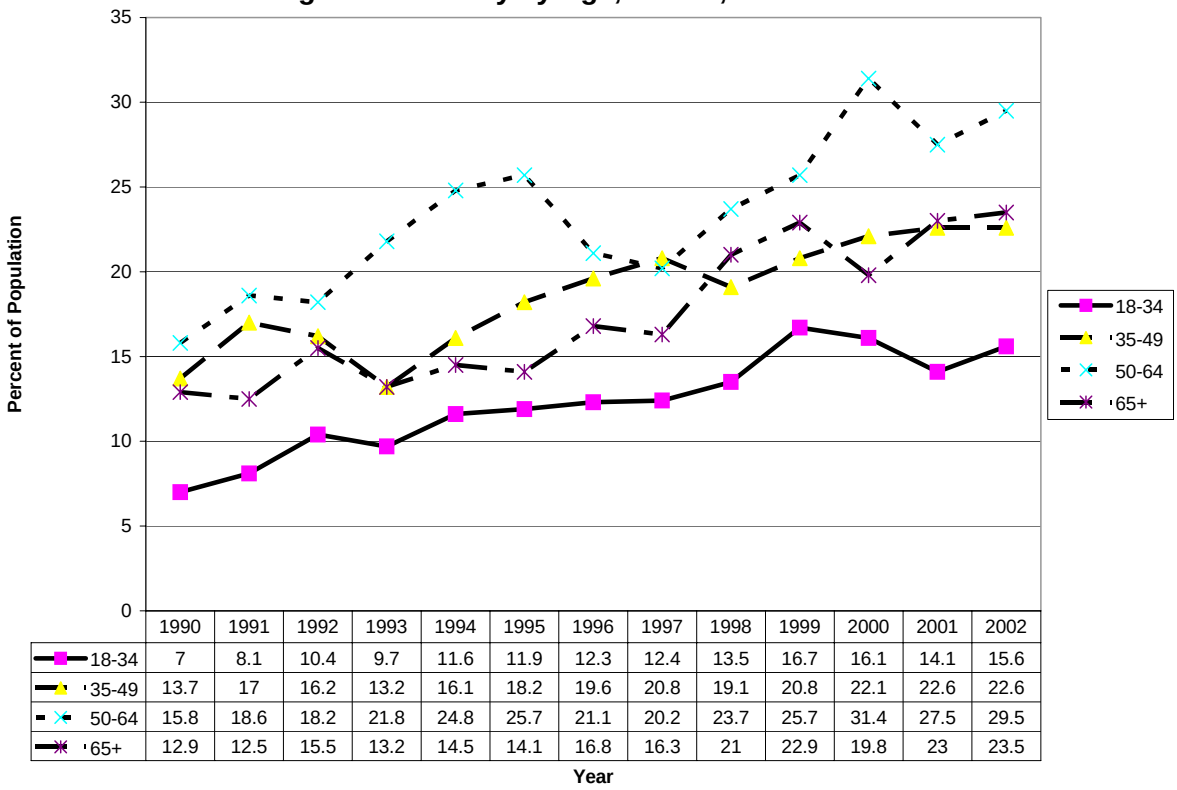
Table 2
Healthy People 2010 Objectives Related to Walking and Bicycling

Objective	Population	Percentage of Total US Population	
		Baseline	2010 Objective
Trips of ≤ 1 mile made by walking	Adults	17% (1995)	Increase to 25%
Trips to school of ≤ 1 mile made by walking	Children and adolescents	31% (1995)	Increase to 50%
Trips of ≤ 5 miles made by bicycling	Adults	0.6% (1995)	Increase to 2%
Trips to school of ≤ 2 miles made by bicycling	Children and adolescents	2.4% (1995)	Increase to 5.0%

Another of the *Healthy People 2010* objectives is to reduce the prevalence of obesity among adults to less than 15%. However, the trend is in the opposite direction. Increasing numbers of people are overweight or obese because of physical inactivity or poor diets. In 2001, twenty states have obesity prevalence rates of 15-19 percent; 29 states (among them Illinois) have rates of 20-24 percent. Figure 1 shows the trend of increasing obesity in Illinois. The data indicate that the proportion of residents who are obese went up by at least 60% for all adult age groups from 1990 to 2002. The proportion of young adults who are obese doubled in the same period.

[14] Cited in Centers for Disease Control and Prevention, "Increasing Physical Activity: a Report on Recommendations of the Task Force on Community Preventive Services." *Morbidity and Mortality Weekly Report* 2001; 50 (No. RR-18): 2.

Figure 1. Obesity by Age, Illinois, 1990-2002



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
18-34	7	8.1	10.4	9.7	11.6	11.9	12.3	12.4	13.5	16.7	16.1	14.1	15.6
35-49	13.7	17	16.2	13.2	16.1	18.2	19.6	20.8	19.1	20.8	22.1	22.6	22.6
50-64	15.8	18.6	18.2	21.8	24.8	25.7	21.1	20.2	23.7	25.7	31.4	27.5	29.5
65+	12.9	12.5	15.5	13.2	14.5	14.1	16.8	16.3	21	22.9	19.8	23	23.5

Year

Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System. Http://apps.nccd.cdc.gov. Data represent percent of respondents 18 and older who report their body mass index (BMI) is 30.0 or more. BMI is defined as weight in kilograms divided by height in meters squared (w/h**2). Denominator includes all survey respondents except those with missing, don't know, or refused answers. Data is based on a sample.

Among youth in Illinois, physical inactivity is a major problem. In the city of Chicago, 30.5% of students did not participate in sufficient "vigorous" or "moderate" physical activity during a sample week; 11.7% of Chicago students did not participate in any physical activity meeting vigorous or moderate benchmarks. Statewide (excluding Chicago), 22.0% of high school students did not participate in sufficient vigorous or moderate physical activity; 4.6% participated in no vigorous or moderate physical activity.[15]

As noted above, inactivity and obesity are associated with many diseases. Currently, the relationship between inactivity and cardiovascular disease is getting special attention because of the development of a state cardiovascular health plan. Driving this interest is the high costs of

[15] Youth Risk Behavior Surveillance - United States, 2001. *Morbidity and Mortality Weekly Report.* June 28, 2002 / 51 (SS04); 1-64 Table 41. *Insufficient* physical activity is defined as not having participated in vigorous physical activity for >= 20 minutes on >= 3 of the 7 preceding days preceding the survey and had not participated in moderate physical activity for >= 30 minutes on 5 of the 7 days preceding the survey. *No* physical activity means not having participated in either vigorous physical activity for >= 20 minutes or moderate physical activity for >= 30 minutes on any of the 7 days preceding the survey. Weaknesses of YRBS data include that it is self-reported, unweighted, and therefore perhaps unrepresentative. Chicago and Illinois rates of reported inactivity are lower than most states and other large cities, the trend in the state is for substantial increases in youth inactivity, perhaps because of a combination of changing travel habits and frequent recent exemptions to the P.E. requirements. Further study is needed to determine the accuracy of the self-reported information, and the source of differences between Chicago and the remainder of the state and among states.

cardiovascular disease in Illinois. Annual Illinois hospital costs of $4 billion, including Medicaid payments of $240 million, strain the resources of Illinois businesses and taxpayers.[16][17]

The Centers for Disease Control and Prevention forecasts that the burden of cardiovascular disease - both deaths and survivors requiring care - will increase markedly from 2010 to 2030. Cardiovascular disease is already the leading cause of death in Illinois. The CDC forecast suggests "instead of increasing quality and years of healthy life, we may lose ground."[18]

To address both physical inactivity and obesity and the diseases they cause, the CDC has developed a myriad of programs including Active Community Environments (ACEs), KidsWalk-to-School and State-based Nutrition and Physical Activity Programs. All these initiatives recognize the health benefits of improved walking and bicycling environments and address both inactivity and obesity by promoting walking and bicycling as exercise. ACEs specifically promotes walking, bicycling, and the development of accessible recreation facilities. KidsWalk-to-School not only encourages children to walk and bicycle to and from school, but also encourages regular physical activity for children, improved pedestrian safety, and healthy and walkable community environments.

The national government has also taken some recent steps regarding physical activity. In June, 2002, President Bush issued Executive Order 13266, which ordered a number of departments, including the U.S. Department of Transportation, to review policies to promote physical activities, among other goals. President Bush also kicked off *HealthierUS*, which is designed to "empower Americans with the knowledge, motivation, and skills they need to make healthy choices," improved government policies and services, and effective and efficient federal collaboration with others. Secretary of Health and Human Services Tommy Thompson since established "Steps to a *HealthierUS,"* to advance the President's initiative.[19] "Steps to a *HealthierUS"* adopts 5 strategies to increase physical activity from *A Guide to Community Preventive Services.* These strategies have been shown to be effective and are consistent with other documents:[20]

- *Community-wide campaigns.* Large-scale, highly visible, multi-component campaigns with messages promoted to large audiences through diverse media, including television, radio, newspapers, movie theaters, billboards, and mailings.
- *Individually targeted programs.* Programs tailored to a person's readiness for change or specific interests; these programs help people incorporate physical activity into their daily routines by teaching them behavioral skills such as setting goals, building social support, rewarding themselves for small achievements, solving problems, and avoiding relapse.

[16] Illinois Cardiovascular Disease Prevention Task Force. *The Burden of Cardiovascular Disease and Obesity in the State of Illinois.* A Report to the Governor of Illinois and the Illinois General Assembly as Required by S.J. R. 37. June 30, 2000.

[17] Increased costs and suffering will also follow from higher rates of other diseases caused by higher obesity. For example, cancer is another chronic disease, sometimes fatal, that is very expensive to treat. Recent evidence provided by Calle et al in "Overweight, Obesity, in a Prospectively Studied Cohort of U.S. Adults" (*New England Journal of Medicine* 2003 348: 1625 - 38 [April 24, 2003]) shows significantly higher risks of death from many types of cancers for overweight and obese people.

[18] Centers for Disease Control and Prevention. *A Public Health Action Plan to Prevent Heart Disease and Stroke.* April 15, 2003.

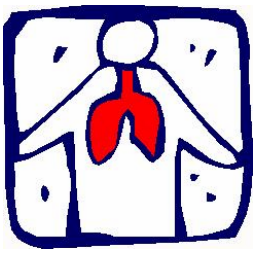
[19] U.S Department of Health and Human Services. *Healthy People 2010 Quarterly Report.* December, 2002.

[20] U.S. Department of Health and Human Services. *Steps to a* HealthierUS: *A Program and Policy Perspective - Prevention Strategies that Work.* 2003.

- *School-based physical education (PE)…*
- *Interventions that provide social support for physical activity in community settings…*[Such as walking groups].
- *Interventions to provide people greater access to places for physical activity.* Examples include building walking or biking trails and making exercise facilities available in community centers or workplaces.

Thus, walking and biking provide support to a wide variety of national public health policy goals. In Illinois, there are also many programs and initiatives that address health, wellness and physical fitness. The legislature also created the *Governor's Council on Health and Physical Fitness*. The mission of the Council is to encourage Illinois citizens to participate more actively in health and fitness activities that will help them to live healthier, happier and more productive lives. *Illinois Health and Wellness Initiative (IHWI)* is a funding support mechanism that helps implement physical activity programs and other *Healthy People 2010* objectives through local health departments.[21]

Public Health Policy Context: Air Quality.



Bicycling and walking support and enhance regional, state and national initiatives and programs to improve air quality. Bicycling and walking reduce harmful motor vehicle emissions and improve air quality. Bicycling and walking have no tailpipe emissions, no evaporative emissions, and no emissions from gasoline pumping or oil refining. Nationally, walking and bicycling support the air quality goals of the Clean Air Act (CAA) and the Transportation Equity Act for the 21st Century (TEA-21).

Air quality standards are based on human health effects of pollutants. Once health standards (National Ambient Air Quality Standards) are established, states must monitor pollutant levels to determine where the standards are not being attained. States must adopt plans (State Implementation Plans, or SIPs) to attain the standards in non-attainment areas. Integral in these plans are both an inventory of the sources of the pollutant as well as future emissions budgets consistent with regulatory requirements to attain the standard. SIPs may also include Transportation Control Measures (TCMs) which are strategies that:

1. are specifically identified and committed to in State Implementation Plans (SIPs); and
2. are either listed in Section 108 of the Clean Air Act or will reduce transportation-related emissions by reducing vehicle use or improving traffic flow. [22]

Transportation plans and programs must conform to approved SIPs through a process referred to in transportation planning as "conformity." Thus, plans and programs must reflect SIP mobile source budgets and TCMs.

[21] Other Illinois programs that have goals and objectives that are supported by improvements to bicycling and walking environments include *Illinois Strategic Direction 2002* and *Illinois Tomorrow*. In the area of public health, *Illinois Strategic Direction 2002* seeks to provide "a community of services that enhance health and well being" while *Illinois Tomorrow* seeks to "encourage the creation, expansion, and restoration of livable communities in Illinois."

[22] See http://www.fhwa.dot.gov/environment/tcm.htm.

Northeastern Illinois is designated as a non-attainment area for ozone.[23] Ozone is a product of a chemical reaction between volatile organic compounds (VOC's) and nitrogen oxides, with sunlight and heat acting as a catalyst. 40% of VOC emissions come from transportation sources.[24] Control of transportation sources of VOC's has been important in reducing ozone levels. Much of the most effective control has been at the technology level (e.g., combustion that completely burns fuels). However, reducing vehicle use or improving traffic flow has helped move toward attaining air quality standards, while simultaneously reducing congestion.[25,26]

Figure 2 shows Illinois' exceedances of the 1-hour ozone standards since 1988 and VOC emissions budgets through 2007, when the ozone standard is to be attained.[27] Figure 2 shows that the air quality is improving. Since 1987, the number of days our region exceeded the 1-hour ozone standard has decreased from a high of 25 days in 1988 to five days or less since 1996.

Air quality is still a health concern. A new 8-hour standard is taking effect based on more recent information regarding the impacts of ozone on health. In 2001, there were 14 exceedance days for the 8-hour ozone standard.[28] In addition, while this report was being compiled, stricter standards were put into place for fine particulate matter; the Chicago area fails to attain these new standards. So while air quality has improved, some additional improvement is necessary for the air in northeastern Illinois to be healthy for everyone to breathe every day.

[23] According to the U.S. Environmental Protection Agency, here are the health effects of ozone pollution:

- Ozone can irritate lung airways and cause inflammation much like a sunburn. Other symptoms include wheezing, coughing, pain when taking a deep breath, and breathing difficulties during exercise or outdoor activities. People with respiratory problems are most vulnerable, but even healthy people that are active outdoors can be affected when ozone levels are high.
- Repeated exposure to ozone pollution for several months may cause permanent lung damage. Anyone who spends time outdoors in the summer is at risk, particularly children and other people who are active outdoors.
- Even at very low levels, ground-level ozone triggers a variety of health problems including aggravated asthma, reduced lung capacity, and increased susceptibility to respiratory illnesses like pneumonia and bronchitis.

Source: (http://www.epa.gov/air/urbanair/ozone/hlth.html)

[24] U.S. DOT, Federal Highway Administration. *A Summary: Transportation Programs and Provision of the Clean Air Act Amendments of 1990.* 1992

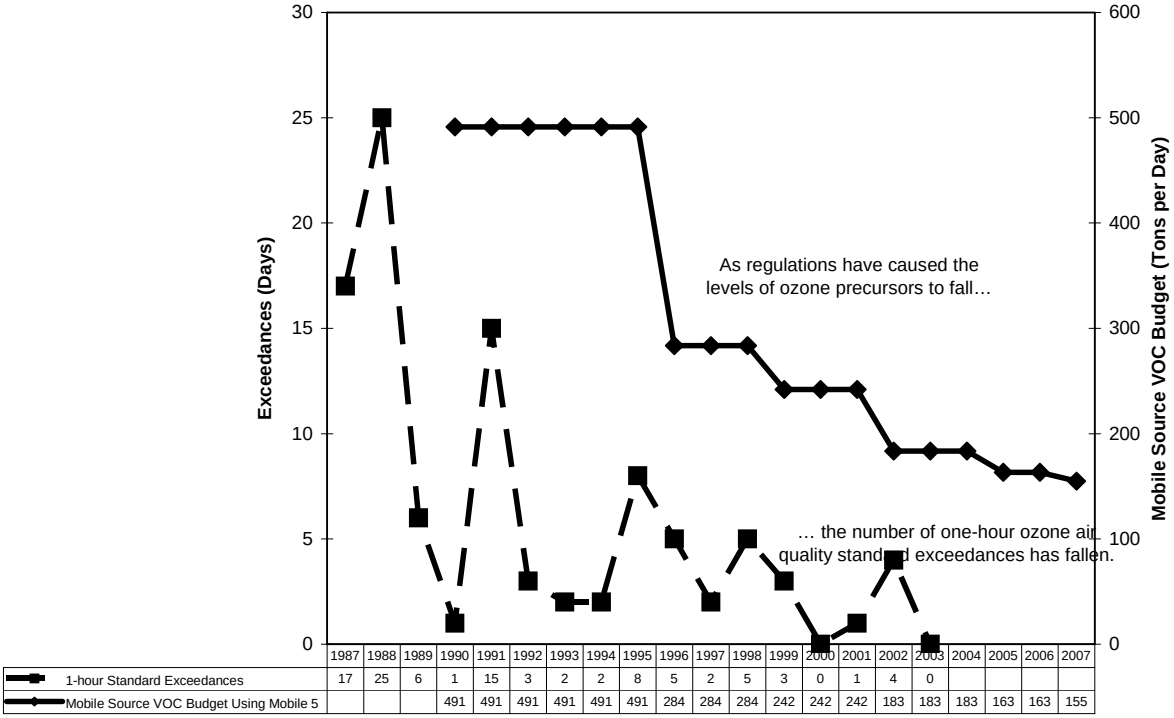
[25] Transportation Research Board of the National Academies. *The Congestion Mitigation and Air Quality Improvement Program: Assessing 10 Years of Experience.* Special Report 264. 2002. Pp. 158-159.

[26] Particulate matter, broadly, is perhaps more harmful than ozone. Particulates are often associated with individual sources, particularly diesel engines. Improved technologies, regulation enforcement, and exposure control are generally thought to be the primary means of particulate health impact controls. However, walking and bicycling (away from particulate matter sources) can be an alternative to exposure to particulate emissions. For example, diesel fume build-up in school buses can be a health threat (David R. Brown Sc.D., John Wargo Ph.D., "Children's Exposure to Diesel School Bus Emissions" Voices for Clean Air Research Symposium Presentation. June 3, 2003. - or see http://www.ehhi.org) Walking or bicycling can be a healthy alternative to such exposure.

[27] Sources: CATS, *FY 2002-2006 Transportation Improvement Program for Northeastern Illinois Conformity Analysis Supplement,* March, 2002, pp 3, 5; CATS, *FY 1998-2002 Transportation Improvement Program Conformity Analysis Documentation,* November 1997 p. 57. CATS, *FY 1998-2002 Transportation Improvement Program Conformity Analysis Supplement,* April 1998, Overview. CATS, *FY 2001-2006 Transportation Improvement Program Conformity Analysis Documentation,* October, 2000 p. 100. US EPA, *The Ozone Report: Measuring Progress through 2003* (April 2004). *http://www.epa.gov/air/data/monvals.html?st~IL~Illinois.*

[28] The state of Illinois has recommended that the non-attainment area for the ozone 8-hour standard remain the same as for the 1-hour standard.

Figure 2. Air Quality Trends, Chicago Ozone Non-attainment Area, Ground-level Ozone, 1987 - 2007



	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1-hour Standard Exceedances	17	25	6	1	15	3	2	2	8	5	2	5	3	0	1	4	0				
Mobile Source VOC Budget Using Mobile 5				491	491	491	491	491	491	284	284	284	242	242	242	183	183	183	163	163	155

Walking and bicycling make a contribution to air quality improvement as part of adopted laws and regulations. Walking and bicycling, as zero-emissions modes, are listed in the Clean Air Act as potential TCMs.[29] 37 bicycle and pedestrian projects have been included in successive SIP's as TCM's from 1995 through 1999.[30] 36 bike and pedestrian projects in the CATS TIP database could be considered for the next TCM submittal.[31] TCM's as a whole are expected to contribute 4 tons per day toward the VOC budget, although bike projects are a small part of this total.[32]

[29] Section 108 of the Clean Air Act lists the following potential TCMs, among others:

- (ix) programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place;
- (x) programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas;
- (xiv) programs and ordinances to facilitate non-automobile travel, provision and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts of a locality, including programs and ordinances applicable to new shopping centers, special events, and other centers of vehicle activity;
- (xv) programs for new construction and major reconstructions of paths, tracks or areas solely for the use by pedestrian or other non-motorized means of transportation when economically feasible and in the public interest….

[30] However, several TCMs had to be withdrawn because of implementation delays. See: CATS. *FY 2001-2006 Transportation Improvement Program for Northeastern Illinois.* Appendix C. Table 3. Also see the section on funding in this report.

[31] TCM code = "Accepted" and work type = "E-BIKE" or "E-PED."

[32] Illinois Environmental Protection Agency Bureau of Air. A Revision to the State Implementation Plan for the Chicago Ozone Nonattainment Area: Motor Vehicle Emissions Budgets Using Mobile6. March, 2003, p. 8.

Funding for projects that help the region attain air quality standards is available through the Congestion Mitigation and Air Quality Improvement (CMAQ) program. In fact, the common formula is "CMAQ funds TCM's." By law, TCM's have CMAQ funding priority. In northeastern Illinois, the CATS CMAQ Project Selection Committee has stipulated that CMAQ projects be included as TCM's in the SIP at the appropriate time for the project. CMAQ project sponsors must agree to this inclusion when they apply for CMAQ funds.[33]

Another fund source with a policy link to air quality is the Locally Programmed Surface Transportation (STP-L) Program. The STP-L/air quality link is not established legislatively, but is maintained as part of the program development process in several CATS regional councils. TCM's are eligible for STP-L funds in all councils. Table 3 shows which councils provide some funding parameters for TCM projects in programming STP-L funds. It will be shown later that these funding parameters are highly correlated with funding levels for bicycle and pedestrian improvements in the councils.

TABLE 3
Suburban Council STP-L Funding Parameters Regarding TCM Projects

Suburban Council	Does Council Have TCM Priority?	Description of TCM Priority
North Shore	No	N.A.
Northwest	Yes	Specific Allocation (20%)
North Central	Yes	Specific Allocation (15%)
Central	No	N.A.
Southwest	No	N.A.
South	Yes	Determined Annually
DuPage	Yes	Specific Allocation (30%) and Lower Local Match Rate
Kane	Yes	Lower Local Match Rate
Lake	Yes	Additional Project Ranking Points for TCM Projects
McHenry	No	N.A.
Will	No	N.A.

The bottom line is that since the CMAQ and STP-L Programs fund a large portion of bicycle and pedestrian improvements in northeastern Illinois, the policy link between such improvements and improving air quality to meet public health objectives is very strong.

[33] See http://www.catsmpo.com/progs/CMAQ FY 2004 Project Submittal Information Booklet.doc and http://www.catsmpo.com/progs/CMAQ FY 2004 TCM Committal Agreement.doc

Public Health Policy Context: Injury Prevention

Safety is a key element of national and regional policy. Of roadway improvements in general, Title 23 of the U.S Code[34] directs that safety on the roads other than the interstate system be given increased emphasis.

Section 109 of Title 23 specifically protects non-motorized trip safety in the federal aid highway process:

(m) PROTECTION OF NONMOTORIZED TRANSPORTATION TRAFFIC.—The Secretary shall not approve any project or take any regulatory action under this title that will result in the severance of an existing major route or have significant adverse impact on the safety for non-motorized transportation traffic and light motorcycles, unless such project or regulatory action provides for a reasonable alternate route or such a route exists.

To facilitate these improvements, Section 134 of Title 23 requires:

(1) IN GENERAL.—The metropolitan transportation planning process for a metropolitan area under this section shall provide for consideration of projects and strategies that will— …
(B) increase the safety and security of the transportation system for motorized and nonmotorized users….

In support of this, CATS is expected to adopt the objective of developing "a transportation system that provides safe and secure movement for all travelers."[35] The Federal Highway Administration and Federal Transit Administration, in their certification review of the metropolitan transportation planning process in northeastern Illinois, recommended that "CATS give emphasis to issues related to safety in the plan, including the development of specific pedestrian goals and objectives."[36] Compliance certification for this recommendation is scheduled for 2005.

Pedestrian and bicycle safety is a public health concern. Table 4 shows the number of injuries and fatalities in 2000 in northeastern Illinois by county. Table 4 demonstrates that pedestrian and bicyclist injuries and fatalities affect thousands of residents of northeastern Illinois each year. The table also shows that most pedestrian and bicyclist injuries and fatalities are in Cook County. In addition, more injuries and deaths occur among pedestrians than bicyclists.

[34] Title 23, United States Code, "reflecting amendments made through the end of the 105th Congress. Excerpted from House Transportation and Infrastructure Committee Print 106-5 (May 1999) *Compilation of Selected Surface Transportation Laws.*

[35] CATS. *2030 Regional Transportation Plan for Northeastern Illinois. Draft.* August, 2003 p. 31.

[36] Federal Highway Administration and Federal Transit Administration. *2002 Certification Review of the Metropolitan Transportation Planning Process for the Northeastern Illinois Transportation Planning Area.* P. 23.

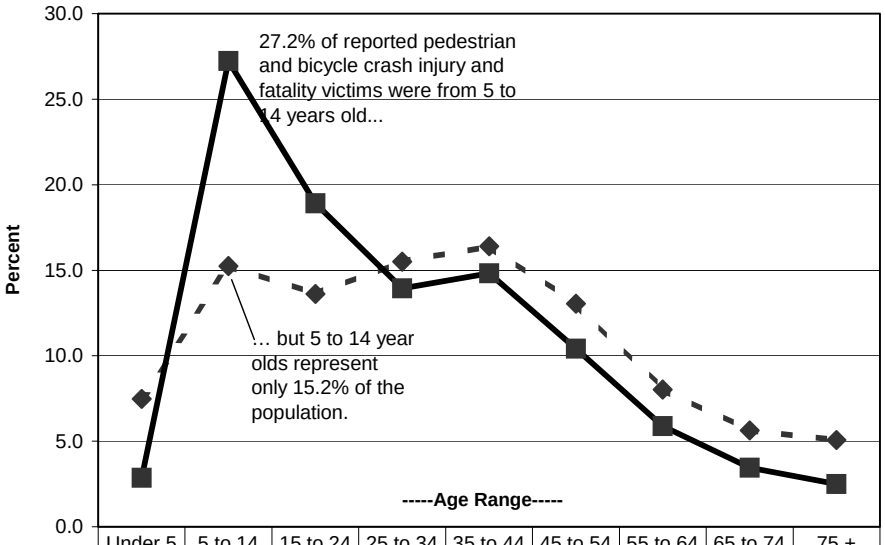
TABLE 4
Non-occupant Injury and Fatality Crashes by County, Northeastern Illinois, 2000

County	Pedestrian Injury Crashes	Pedestrian Fatality Crashes	Pedalcyclist Injury Crashes	Pedalcyclist Fatality Crashes	Total
Cook	5,109	116	1,956	9	7,190
DuPage	158	3	169	0	330
Kane	105	3	83	1	192
Lake	131	4	97	0	232
McHenry	44	3	42	2	91
Will	110	3	86	1	200
Total	5,657	132	2,433	13	8,238

Source: Illinois Department of Public Health EMS Reporting System, 2003. See http://app.idph.state.il.us/emsrpt/index.htm. Numbers reflect crashes, not victims. Some low numbers resolved using simultaneous equations involving multiple queries.

Figure 3 shows that children suffer from a disproportionately high percentage of crashes with pedestrian or bicyclist injuries.

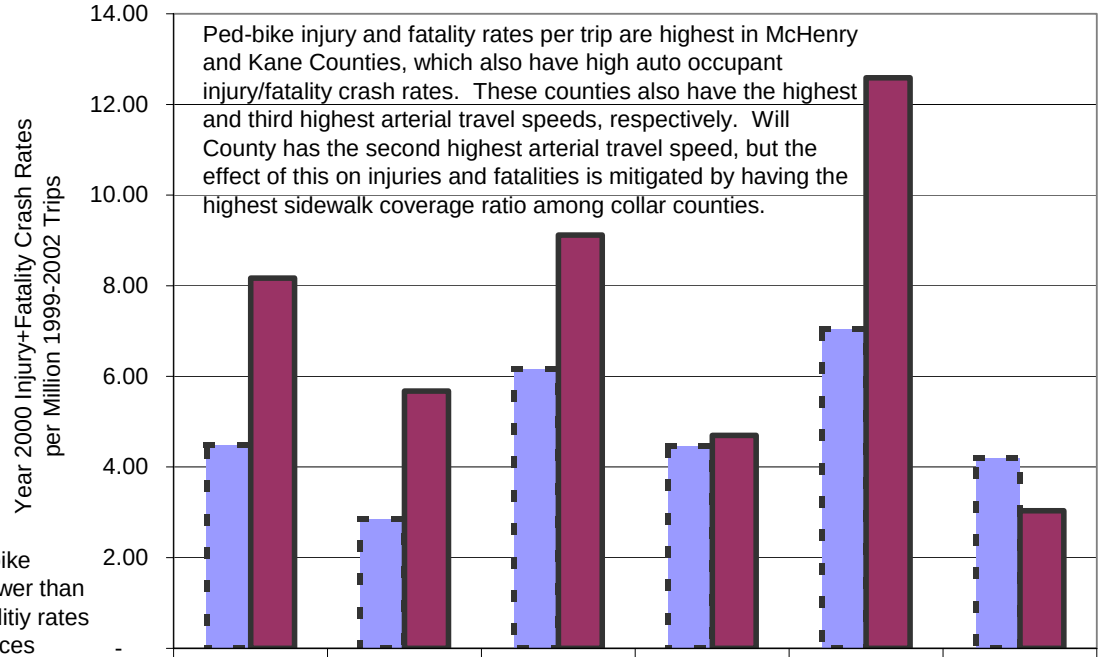
Figure 3
Distributions of Population and Reported Bicyclist or Pedestrian Injuries and Fatality Crashes, Northeastern Illinois, 2000, by Age



	Under 5	5 to 14	15 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65 to 74	75 +
Percent of Population in Age Range	7.5	15.2	13.6	15.5	16.4	13.0	8.0	5.6	5.1
Percent of Reported Bicyclist and Pedestrian Accidents with Injuries and Fatalities in Age Range	2.9	27.2	18.9	13.9	14.8	10.4	5.9	3.5	2.5

Source: IDPH EMS Reporting System and US Census
Analyzed and Produced by the Chicago Area Transportation Study, April 2003

Figure 4
Reported Injury and Fatality Crash Rates per Million Trips, Northeastern Illinois, 1999-2002



On a per-trip basis, ped-bike injury+fatality rates are lower than auto occupant injury+fatalitiy rates because of shorter distances travelled for ped-bike trips.

	Cook	DuPage	Kane	Lake	McHenry	Will
Reported Bicyclist and Pedestrian Injury and Fatality Collisions per Million Non-Motorized Trips	4.49	2.86	6.17	4.46	7.05	4.20
Reported Collisions with Occupant Injuries and Fatalities per Million Auto/Truck Trips	8.17	5.67	9.12	4.70	12.59	3.04

County

Data Sources: Chicago Area Transportation Study, Illinois Department of Public Health EMS Reporting System

Geographical disparities exist in the riskiness of bicycle and pedestrian travel. As noted above, Table 4 shows that there are geographic disparities in the number of bicyclist and pedestrian injury crashes. However, when adjusted for population and that population's exposure to risk, the relative risk may not be proportional to the results shown in Table 4. Figure 4 shows that on a per-trip basis, walking and bicycling are riskiest in McHenry and Kane Counties. These counties also have high arterial travel speeds and low municipal sidewalk coverage rates.[37]

The relation of speed and pedestrian accommodations to injuries and fatalities is supported by other data. To give a general view of the relationship, it is necessary to look at national studies, then revisit northeastern Illinois data to see where we fit and the issues that are raised. Tables 4A and 4B show two views of the relationship between speed and the risk of death or serious injury in a car-pedestrian collision. First, in a widely quoted study by Pasanen (Table 5A), impact speeds were related to injury and death. In this study and others like it, impact speeds of 40 miles per hour are estimated to result in an 80% pedestrian fatality rate. Using the same data

[37] Estimated 24-hour arterial travel speeds from the travel demand models for the 2002 network are as follows, from Table 5-7 of the FY 2002-2006 TIP Conformity Analysis Supplement (March 2002),: Cook: 33.5, DuPage: 40.0, Kane: 45.1, Lake: 41.4, McHenry: 49.3, Will: 46.5. Estimated municipal sidewalk coverages weighted by population are: Cook: 91%, DuPage: 80%, Kane: 78%, Lake: 60%, McHenry: 73%, Will: 84%.

disaggregated by age, Davis showed injury and fatality rates for the aged are much higher than for the young. For example, at an impact speed of 40 mph, the fatality rate for children is estimated to be 25%, while the fatality rate for adults over the age of 60 is 97% (See Table 4A).

TABLE 5A
Relationship of Impact Speed to Risk of Death and Injury in Car-Pedestrian Crashes

Impact Speed (mph)	Pasanen (1992) Probability of Fatality	Ages 0 to 14, Davis (2001)		Ages 60+, Davis (2001)	
		Probability of Fatality	Probability of Serious Injury	Probability of Fatality	Probability of Serious Injury
20	5%	1%	30%	4%	74%
30	40%	5%	71%	54%	45%
40	80%	25%	71%	97%	3%
50	~100%	70%	30%	~100%	0%

Sources: Davis, Gary A. "Relating Severity of Pedestrian Injury to Impact Speed in Vehicle-Pedestrian Crashes." *Transportation Research Record 1773.* Transportation Research Boars, 2001. Pasanen, E. *Driving Speeds and Pedestrian Safety; a mathematical model*. Technical Report No. REPT-77, and Nordisk Kabel- og Traadfabriker, Copenhagen, Denmark, 41 pp., 1992. Referenced in W.A. Leaf and D.F. Preusser *Literature Review on Vehicle Travel Speeds and Pedestrian Injuries* National Highway Traffic Safety Administration, October 1999. Notes: Davis column figures compiled by CATS staff using Davis logit model parameters. Adult figures, not shown here, are closer to rates for children than the elderly but show significantly higher fatality probabilities at the higher speed ranges. These estimates are available upon request. The widely referenced UK Department of Transport *Traffic Advisory Leaflet 7/93* (TAU, 1993) has results similar to Pasanen (referenced in Leaf and Preusser, 1999).

A second method is to compare pre-crash travel speed (before any braking or evasive actions) to pedestrian fatalities and injuries. Using this method, an analysis of General Estimates System data (Table 5B) showed that vehicles traveling at more than 45 miles per hour prior to the crash circumstances had pedestrian fatality rates of 35%, with an additional 38% of pedestrians suffering incapacitating injuries.

TABLE 5B
Relationship of Travel Speed to Risk of Death and Injury in Car-Pedestrian Crashes

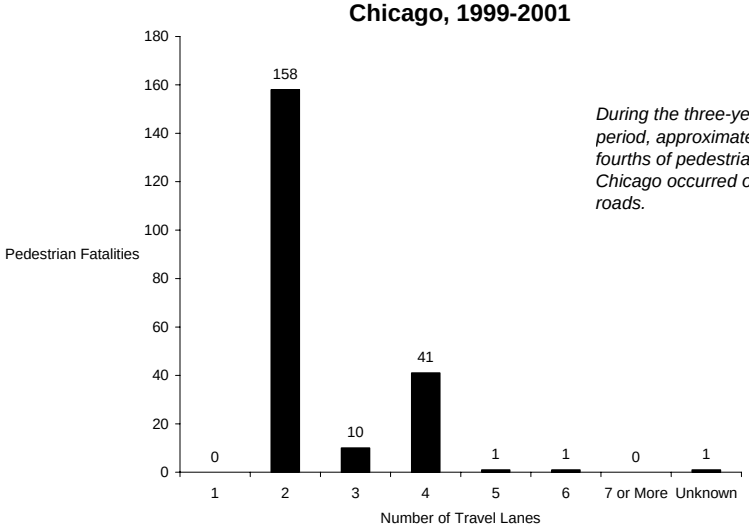
Pre-Crash Vehicle Travel Speed	GES, Fatal Injury	GES, Incapacitating Injury	GES, Non-Incapacitating Injury	GES, Minor or No Injury
<=20	1.0%	32.5%	36.2%	30.3%
21-25	2.9%	40.9%	34.5%	21.7%
26-30	2.8%	47.1%	27.3%	22.8%
31-35	4.9%	47.3%	29.2%	18.6%
36-45	16.2%	44.9%	18.1%	20.7%
46+	35.2%	38.2%	18.2%	8.4%

Source: General Estimates System, ftp://www.nhtsa.dot.gov/ges/ Data analyzed in W.A. Leaf and D.F. Preusser *Literature Review on Vehicle Travel Speeds and Pedestrian Injuries* National Highway Traffic Safety Administration, October 1999.

Figure 4 and Tables 5A and 5B show that high vehicle speeds are an important factor in pedestrian deaths and injuries. *Soles and Spokes* investigated whether fatalities in particular were related to high-speed roads in northeastern Illinois. Staff found that most non-motorist fatalities in northeastern Illinois occur on two-lane roads, instead of multi-lane arterial streets. Multi-lane roads account for a larger share of suburban pedestrian fatalities, however (see Figures 5A, 5B, 5C, and 5D). We also found that a large majority of Chicago non-motorist fatalities occur where speed limits are 30 or 35 miles per hour, while a large proportion of suburban fatalities occur on streets where the speed is 40 miles per hour or higher (compare

Figures 5E, 5F, 5G, and 5H). These figures show that the characteristics of non-motorist crashes in Chicago are clearly different than in the suburbs.

Figure 5A
Pedestrian Fatalities by Number of Travel Lanes.
Chicago, 1999-2001

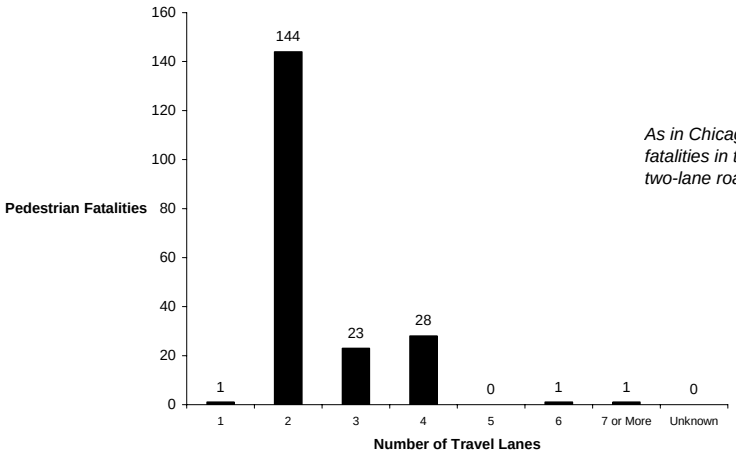


During the three-year study period, approximately three-fourths of pedestrian deaths in Chicago occurred on two-lane roads.

Source: National Highway Traffic Safety Administration, Fatal Accident Reporting System, Web-Based Encyclopedia

Produced by Chicago Area Transportation Study, May, 2002

Figure 5B
Pedestrian Fatalities by Number of Travel Lanes.
Collar Counties + Suburban Cook County, 1999-2001

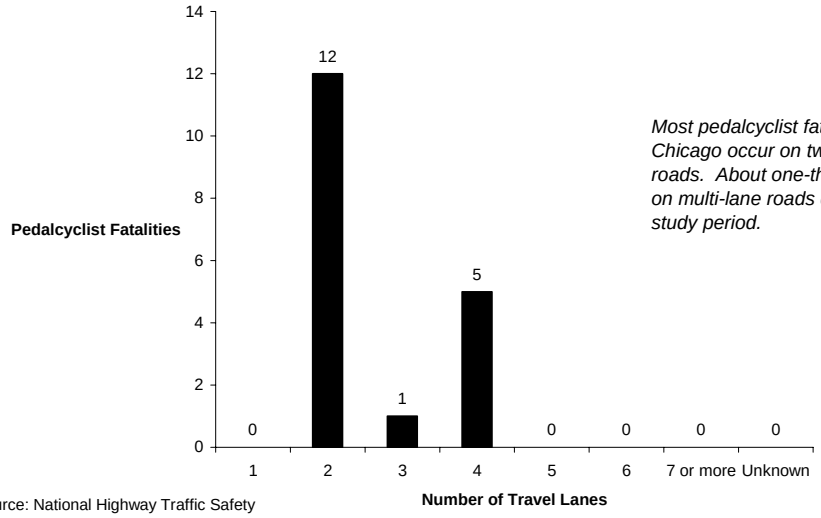


As in Chicago, most pedestrian fatalities in the suburbs occur on two-lane roads.

Source: National Highway Traffic Safety Administration, Fatal Accident Reporting System, Web-Based Encyclopedia

Produced by Chicago Area Transportation Study, May, 2002

Figure 5C
Pedalcyclist Fatalities by Number of Travel Lanes.
Chicago, 1999-2001

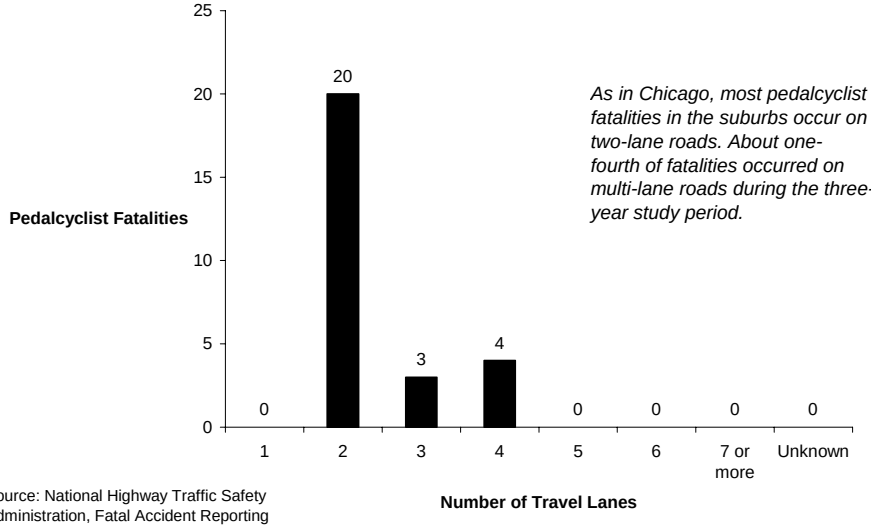


Most pedalcyclist fatalities in the Chicago occur on two-lane roads. About one-third occurred on multi-lane roads during the study period.

Source: National Highway Traffic Safety Administration, Fatal Accident Reporting System, Web-Based Encyclopedia

Produced by Chicago Area Transportation Study, May, 2002

Figure 5D
Pedalcyclist Fatalities by Number of Travel Lanes.
Collar Counties + Suburban Cook County, 1999-2001

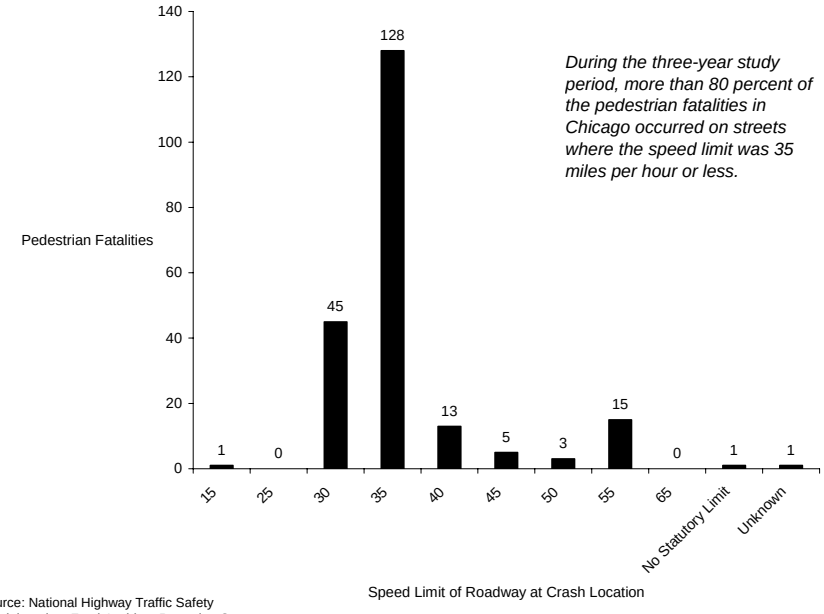


As in Chicago, most pedalcyclist fatalities in the suburbs occur on two-lane roads. About one-fourth of fatalities occurred on multi-lane roads during the three-year study period.

Source: National Highway Traffic Safety Administration, Fatal Accident Reporting System, Web-Based Encyclopedia

Produced by Chicago Area Transportation Study, May, 2002

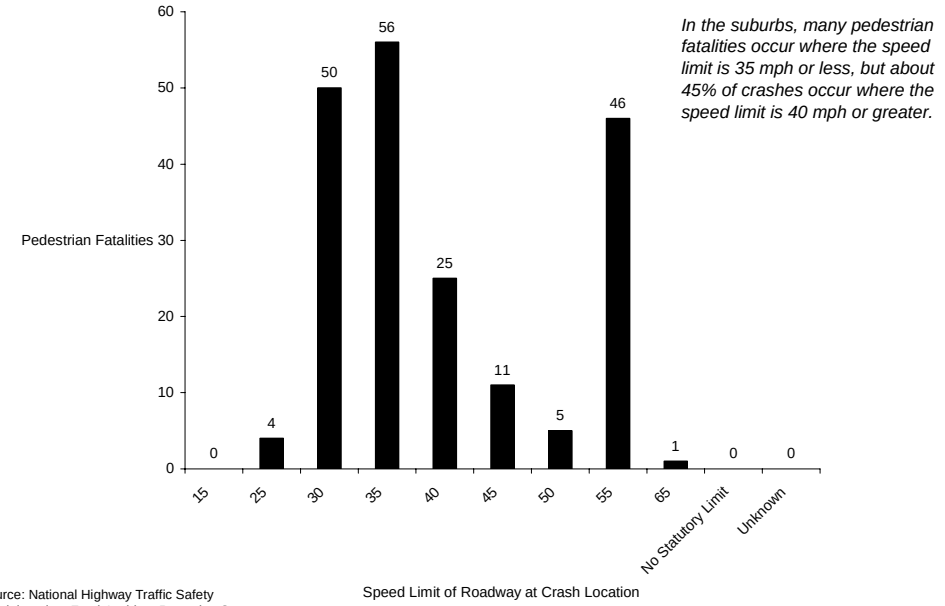
Figure 5E
Pedestrian Fatalities by Roadway Speed Limit.
Chicago, 1999-2001



Source: National Highway Traffic Safety Administration, Fatal Accident Reporting System, Web-Based Encyclopedia

Produced by Chicago Area Transportation Study, May, 2002

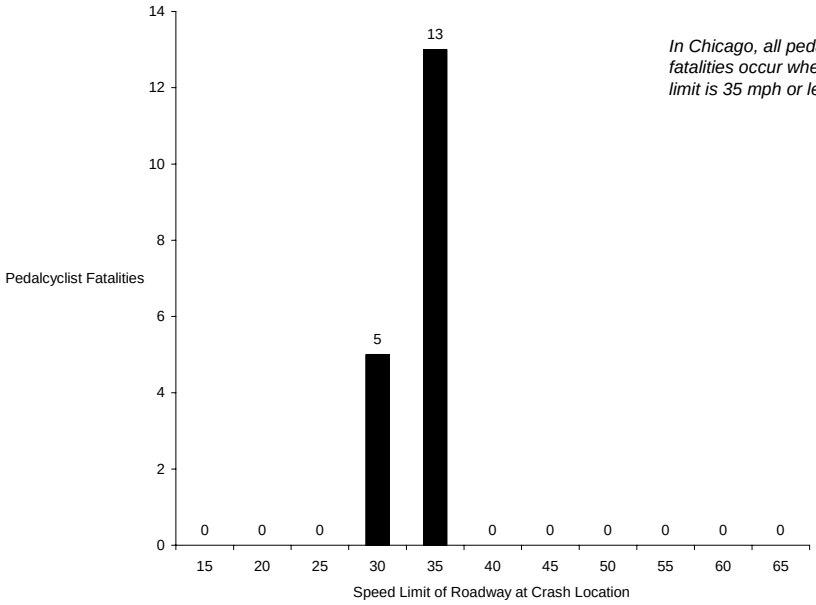
Figure 5F
Pedestrian Fatalities by Roadway Speed Limit.
Suburban Cook + Collar Counties, 1999-2001



Source: National Highway Traffic Safety Administration, Fatal Accident Reporting System, Web-Based Encyclopedia

Produced by Chicago Area Transportation Study, May, 2002

Figure 5G
Pedalcyclist Fatalities by Roadway Speed Limit.
Chicago, 1999-2001

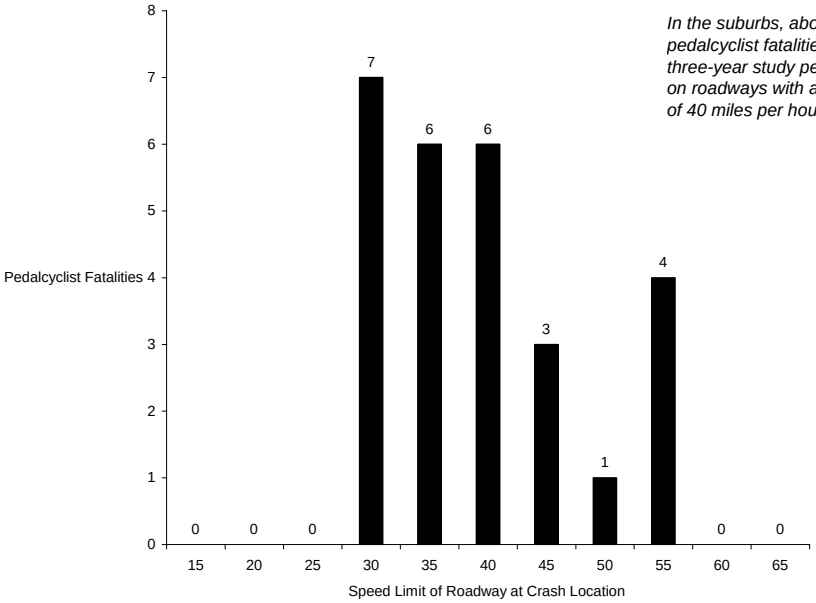


In Chicago, all pedalcyclist fatalities occur where the speed limit is 35 mph or less.

Source: National Highway Traffic Safety Administration, Fatal Accident Reporting System, Web-Based Encyclopedia

Produced by Chicago Area Transportation Study, May, 2002

Figure 5H
Pedalcyclist Fatalities by Roadway Speed Limit.
Suburban Cook + Collar Counties, 1999-2001



In the suburbs, about half of the pedalcyclist fatalities during the three-year study period occurred on roadways with a speed limit of 40 miles per hour or above.

Source: National Highway Traffic Safety Administration, Fatal Accident Reporting System, Web-Based Encyclopedia

Produced by Chicago Area Transportation Study, May, 2002

So control of exposure of pedestrians to vehicles traveling at high speeds may be critical in reducing the risk of deaths and injuries. Control can be exercised through engineering, education, and enforcement. For example, exposure control may be maintained by the provision of sidewalks, refuges, safer crossings, and even grade-separated crossings, particularly on high-speed roads with a high functional class. However, based on the large number of fatalities on moderate-speed roads, speed limit enforcement and other traffic law enforcement appear to be very important - if people were obeying the low speed limits often indicated, Table 4b indicates that the fatalities would be unlikely. The relationship between speed and non-motorist safety also indicates that traffic calming may be an important strategy for improving pedestrian safety.[38]

The preceding figures show differences between the City of Chicago and suburbs. Figure 6 shows child and adolescent pedestrian and bicycle injury trauma center overnight hospitalization rates by Chicago community area. The hospitalization rates vary by a factor of more than seven, from 17 per hundred thousand children in the Ashburn community to 129 in the West Garfield Park community. Differences in hospitalization rates are strongly correlated with socio-economic measures. For example, high hospitalization rates are strongly correlated with low incomes, high minority population shares, low vehicle availability, and crime.[39]

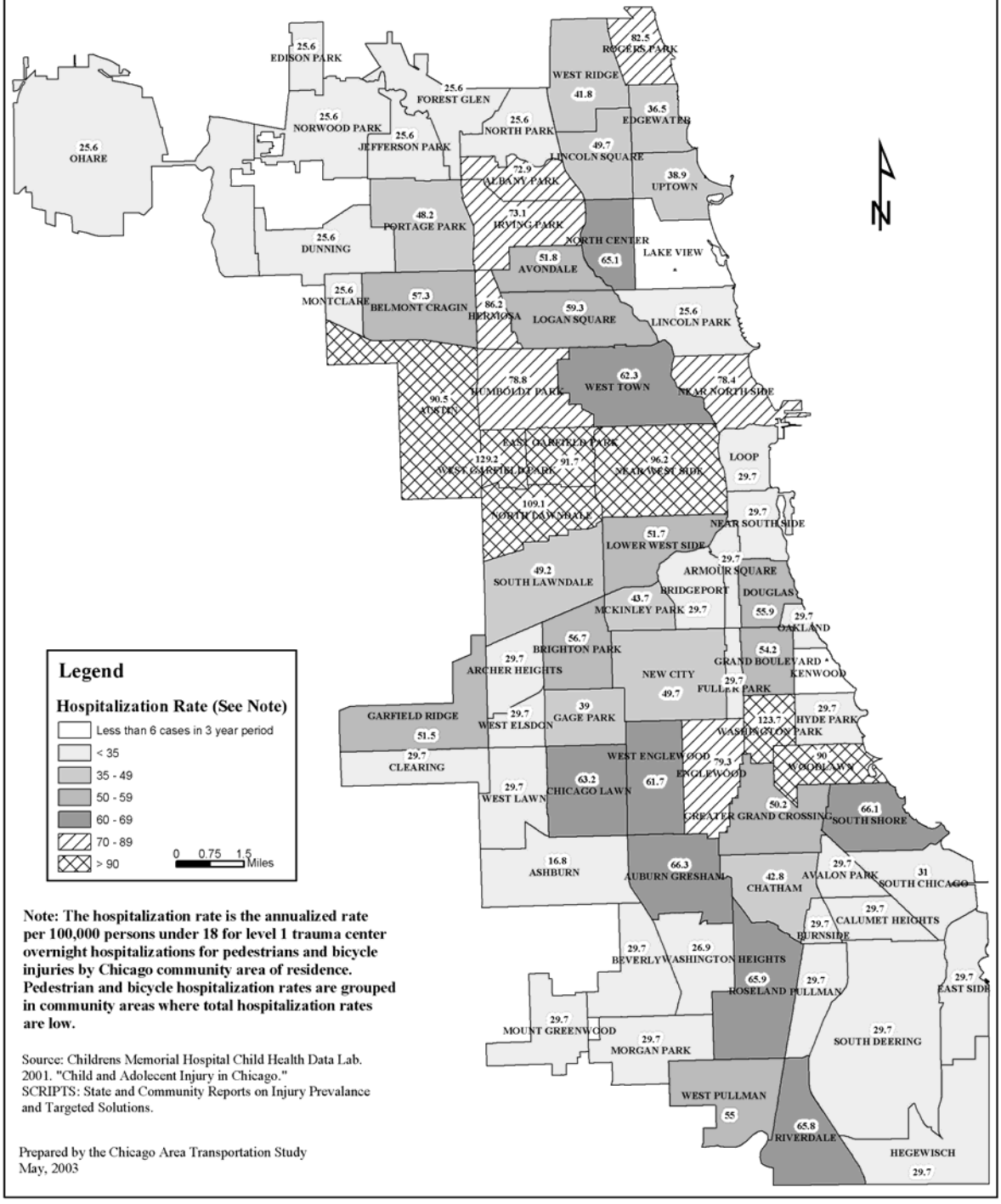
The strong correlation of hospitalizations with low vehicle ownership may indicate a high level of exposure to traffic for pedestrians, increasing the chances of injuries. However, the correlation with crime may bear further investigation. Careless or aggressive behavior is a roadway safety concern. None of these correlations indicate cause, but show that pedestrian and bicycle safety is an issue that disproportionately affects poor and minority populations that face other difficulties. The data in Figure 6 suggest that poor communities may need particular focus in any pedestrian and bicycle safety education, driver education, traffic calming, and traffic enforcement efforts.

So far, we have seen fatalities broken out by bicycle and pedestrian activities. This information indicates that there are many more pedestrian deaths than bicyclist deaths in northeastern Illinois. The remainder of the information we have seen shows bike and pedestrian injuries aggregated. Table 6 shows pedestrian and bicycle injury trauma center overnight hospitalization rates for children by district in Northeastern Illinois. Table 6 also shows that child and youth hospitalization rates for pedestrian injuries range from 8.6 in Lake County to 49.1 in Chicago, while the rates for bicycle injuries range from 8.3 in Chicago to 21.3 in McHenry County. Table 5 also shows that in the collar counties, hospitalization rates for bicycle-related injuries per population are higher than for pedestrian injury rates, while pedestrian rates are much higher than bicycle rates in the Cook County.

[38] Many pedestrian fatalities occur on roads where speed limits should make crash fatalities unlikely, especially in Chicago. While four-lane roads may be thought of as the most dangerous for cyclists and pedestrians to cross, there are actually more fatalities on two-lane roads. Therefore, further study should consider how so many fatalities can occur when crossing distances are shorter and speed limits are lower, and evaluate programs and ideas to reduce such fatalities.

[39] With n=73, the correlation of the community area's hospitalization rate in Figure 6 with median household income is -.47 (t=4.53); with % not white, .41 (t=3.80); with % of the population with no vehicle available, .53 (t=5.21); and with the index crime rate , .39 (t=3.53). Additional study is necessary to draw definitive conclusions regarding the importance of each variable; perhaps using another larger dataset. However, it's worth noting that the area with the lowest crash hospitalization rate for children, Ashburn, is a community area where whites make up a minority of the population, but where incomes are high and crime is low. Loop, O'Hare, Lakeview and Kenwood are not included in the analysis because of missing data or because of high index crimes related to employment center status.

Figure 6
Pedestrian and Bicycle
Hospitalization Rates for Children & Adolescents
by Chicago Community Area, 1994 - 1996



Note: The hospitalization rate is the annualized rate per 100,000 persons under 18 for level 1 trauma center overnight hospitalizations for pedestrians and bicycle injuries by Chicago community area of residence. Pedestrian and bicycle hospitalization rates are grouped in community areas where total hospitalization rates are low.

Source: Childrens Memorial Hospital Child Health Data Lab. 2001. "Child and Adolecent Injury in Chicago." SCRIPTS: State and Community Reports on Injury Prevalance and Targeted Solutions.

Prepared by the Chicago Area Transportation Study
May, 2003

Table 6
Hospitalization Rates for Children and Adolescents
by District and Pedestrian or Bicycle Travel
Northeastern Illinois, 1994-1996

District	Pedestrian Injury - Child and Youth Hospitalization Rate	Bicycle Injury - Child and Youth Hospitalization Rate
City of Chicago	49.1	8.3
Suburban Cook	18.7	14.4
DuPage	13.1	17.4
Kane	14.3	14.9
Lake	8.6	13.5
McHenry	10.4	21.3
Will	13.0	18.1

Note: Data shows annualized rates of pedestrian and bicycle injury hospitalization for persons under age 20 per 100,000 population under age 20.
Source: . Cartland J, Meleedy-Rey P, Christoffel KK. 2001. *Child and Adolescent Injury in Illinois.* Child Health Data Lab, Children's Memorial Hospital. SCRIPTS: State and Community Reports on Injury Prevalence and Targeted Solutions. Pages 33, 36, 52, 53, 55, 57, 62.

Note that the information in Table 6 shows the epidemiological perspective, with a rate per hundred thousand people. The level of risk and exposure to the risk determine these epidemiological rates. A more typical transportation planning perspective, taking exposure and risk into account, is in Figure 4, above. In addition, more information on exposure (usage) and risk (in the form of level of service information) is included later in this report.

Here, it may be useful to present information regarding some risk behaviors on the part of motorists, bicyclists, and pedestrians that contribute to traumatic injuries and fatalities. The information should be used to point to further research, since it is general and not of high quality.[40]

Alcohol involvement: In the 6-county area, approximately 17 (10%) of 165 ped and bike fatal crashes in 2001 had alcohol involvement reported by the police on the part of the victim. 2 of

[40] It is extremely important that the information here and other FARS data be used with care. Problems with the information include:

1. Information quality is often poor. For example, a large portion of Chicago's fatalities are reported to be on local roads and streets, when in fact, upon analyzing the individual cases, they are shown to be on arterials.

2. "Person-related factors" are assigned to each case, regardless of whether the related factor was the cause of the crash: so "blame" is assigned to pedestrians and bicyclists in each and every case even when they were not at fault. Therefore, the information should point to further case-specific research, but shouldn't be used to set policy.

3. Missing information is widespread and can be interpreted in a variety of ways. Here, staff interpreted missing alcohol tests as an indication of no alcohol involvement on the part of drivers or pedestrians; if there were suspicion of alcohol involvement, it would be in the report. Others have taken the same information, disregarded the lack of reports, and reported a much higher alcohol involvement rate, based on the assumption that the missing information has the same rate of alcohol involvement as the reported information.

4. Among the pedestrian fatalities reported are people entering and exiting their vehicles while parking and occupational injuries, such as construction workers struck by motor vehicles in construction zones. Hence, some of the pedestrian death reports are not strictly related to foot travel. In Illinois, there were 36 work zone fatalities in 2001 (many of which may have been occupational pedestrians) compared to 185 total pedestrian deaths statewide in 2001.

the 17 with alcohol involvement were bicycle crashes. Approximately 16 crashes (10%) had drivers with reported alcohol involvement.[41]

Hit and Run: In the City of Chicago, 33 (35%) of 94 ped and bike fatalities in 2001 were hit and run. In the remainder of the region, 19 (22%) of 87 were hit and run.[42]

Bicycle Helmet Use among Adolescents: In Chicago, 92.6% of high school students surveyed who rode a bicycle in a 12-month period ending in 2001 never or rarely wore a bicycle helmet Statewide in Illinois excluding Chicago, the figure was 93.2%.[43]

Intersection vs. Non-Intersection. 99 of 165 fatal bike and ped crashes in the six-county area in 2000 occurred away from intersections in locations where crosswalks were not available.[44]

Route Signing: Approximately 44 of 140 fatal pedestrian crashes in 2001 in the six-county area were on federal and state routes; and 96 were on municipal roads and streets. Of approximately 18 fatal bicycle crashes, 7 were on a federal or state route, 1 was on a county route, and 10 were on municipal roads and streets.

Person Related Factors: Among fatal ped and bike crashes in the six-county area, frequently cited factors contributing to fatal collisions include:

- motorists not seeing pedestrians;
- darting, running or stumbling into the road;
- improper crossing of the roadway or intersection.[45]

Public Health Policy Context: A Conclusion

The public health perspective on the bicycle and pedestrian activity seems to argue for increased promotion of bicycle and pedestrian travel as mode choices. However, when doing so, the data

[41] Fatality Analysis Reporting System Web Based Encyclopedia (FARS), Create a Query: Year 2001, State IL, Counties 31, 43,89,97,111,197; Person Types 5,6,7,8 (victims) Person Type 1 (drivers); Count Number of Crashes by Police-Reported Alcohol Involvement by Person Type. For both of these rates, there are large portions with no information reported by the police. Note that there can be multiple victims and multiple drivers in fatal bike and ped crashes. Also note that numbers need are estimates, based on joining a crash database with a database of persons.

[42] Ibid., Year 2001Counties 31, 43,89,97,111,197, City 1670; Person Types 5,6,7,8. Count Number of Persons by Hit and Run

[43] Grunbaum et al, 2002. "Youth Risk Behavior Surveillance --- United States, 2001. *Morbidity and Mortality Weekly Report Surveillance Summaries.* June 28, 2002 (51 (SS04) 1-64). Table 3. See also http://apps.nccd.cdc.gov/yrbss/index.asp. The confidence interval for the Chicago data is 90.2 to 95.0%. Statewide data is unweighted.

[44] FARS, op.cit., Year 2000 Counties 31, 43,89,97,111,197.Count Number of Crashes by Non-Motorist Forms by Non-Motorist Location.

[45] Ibid., Year 2000 State IL, Counties 31, 43,89,97,111,197.Count Number of Crashes by Person-Related Factors. The next most common factor is "walking/riding with or against traffic, playing, working, sitting, lying, standing, etc., in roadway" which could be a legitimate walking, crossing, or riding activity; all bike and ped crashes have a "person-related factor" assigned, so that option may be a catch-all. In addition, NHTSA also categorizes the person-related visibility factor as "not visible." Since few people are in fact invisible, the information is better related as motorists not seeing pedestrians. Improving the chances of seeing a pedestrian may include vehicle illumination, street lighting, and reflective clothing to be worn by pedestrians and bicyclists.

seem to argue that a combination education, enforcement, and engineering be in place to improve safety. Such efforts should include not only non-motorist facilities and programs, but also efforts to design facilities and implement programs to assure that motorized traffic operates in a manner that is safe for non-motorized travelers. The combination of all of these activities to increase bicycle and pedestrian mode share could reduce traffic deaths, reduce illness from mobile source emissions, and improve cardiovascular health and other aspects of health affected by physical activity.

This section set out the data explaining why walking and bicycling are important. The next several sections lay out the level and character of pedestrian and bicycle activity in northeastern Illinois.

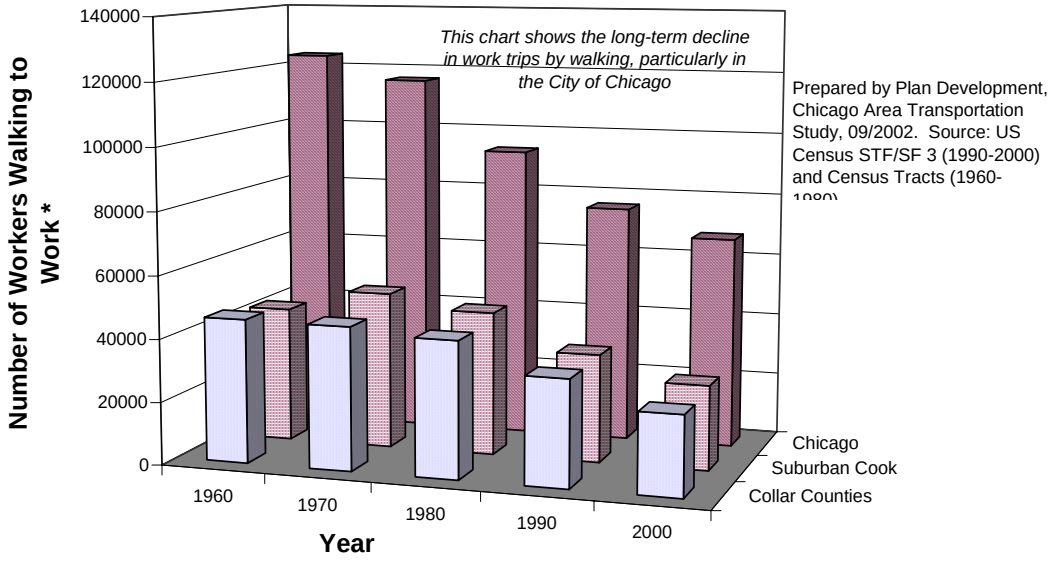
Who is Walking and Bicycling in Northeastern Illinois?

Who bicycles and walks depends on the characteristics of the trip purpose, location, and demographic characteristics.

Work Trips Trends

Figure 7 shows walking trips to work in northeastern Illinois from 1960 to 2000, as collected as part of U.S. Census Bureau decennial census activities. The chart shows declines in walking for commutes region-wide. However, the trend began to abate in the 1990's.

Figure 7. Work Trips by Walking, Northeastern Illinois Census Data



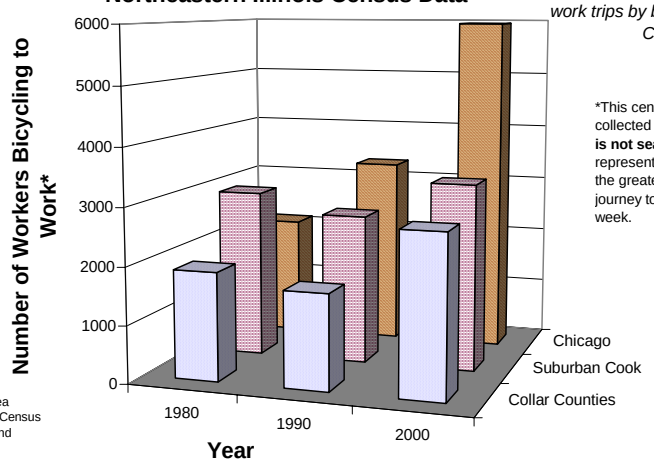
	1960	1970	1980	1990	2000
Collar Counties	45842	45533	43330	33839	25365
Suburban Cook	43182	50118	45846	34459	26898
Chicago	124046	116361	93590	76041	67556

*This census data is based on a sample collected for the last week of March and **is not seasonally adjusted**. The data represents those who walked to work for the greatest part of the distance for their journey to work on most days of the week.

Many more people walk than bicycle in northeastern Illinois, including access to transit trips. However, recent policy initiatives to promote and facilitate bicycling may help explain an upswing in bicycling as a commuter mode choice. The upswing is particularly evident in the City of Chicago, where pro-bike policy has been particularly strong. Figure 8 shows bicycle journey to work trends (note that the data is for the last week in March).

Transit service relies on the walking environment to attract customers. Most transit trips involve walking or bicycling on one or both ends of the transit line-haul trip. A large portion of walking in northeastern Illinois involves walking to or from transit services. Transit use has shown long-term decline in Cook County, where transit use has historically been highest. This trend abated in the 1990's. Figure 9 shows transit journey to work trends in northeastern Illinois.

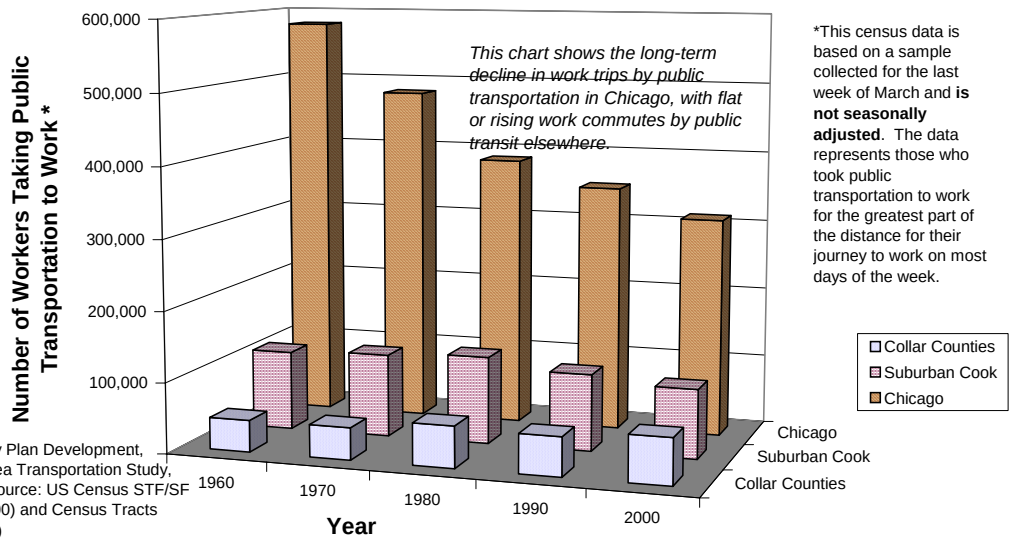
Figure 8. Work Trips by Bicycle, Northeastern Illinois Census Data



Prepared by Plan Development, Chicago Area Transportation Study, 09/2002. Source: US Census STF/SF 3 (1990-2000) and General Social and Economic Characteristics for Illinois, 1980.

	1980	1990	2000
Collar Counties	1881	1654	2784
Suburban Cook	2944	2616	3265
Chicago	2114	3307	5956

Figure 9. Work Trips by Public Transportation, Northeastern Illinois, 1960-2000

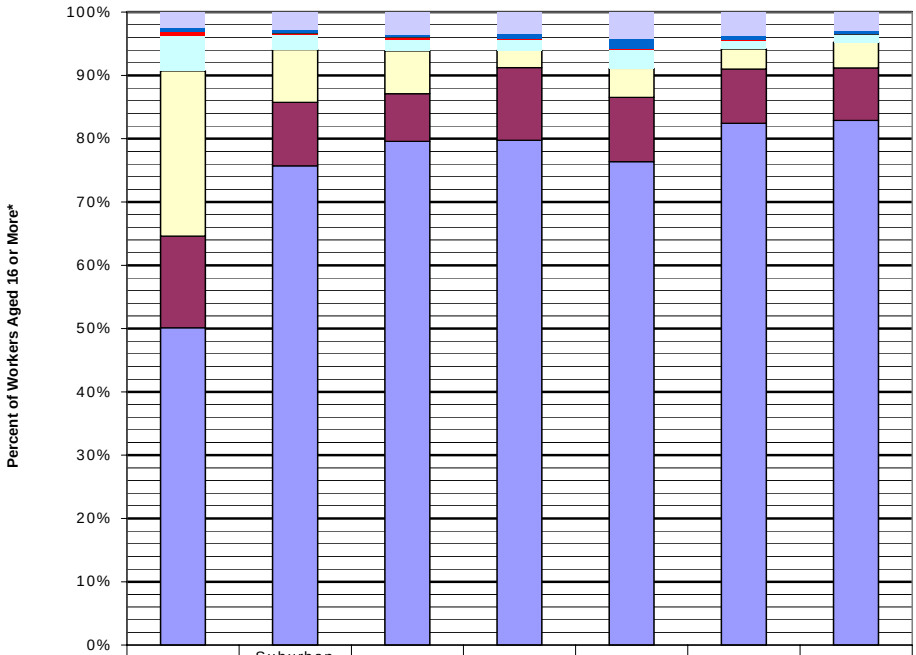


Prepared by Plan Development, Chicago Area Transportation Study, 09/2002. Source: US Census STF/SF 3 (1990-2000) and Census Tracts (1960-1980)

	1960	1970	1980	1990	2000
Collar Counties	44,886	45,532	58,877	55,249	65,453
Suburban Cook	112,380	117,472	123,817	108,888	98,143
Chicago	580,418	481,106	385,792	351,059	310,924

As a result of these long-term trends, driving alone in an automobile is the dominant mode of transportation to work in northeastern Illinois. Such travel accounts for 50% of work trips in Chicago, 75% of work trips in suburban Cook County, and 75-85% of work trips in the collar counties. See Figure 10.

Figure 10. Comparison of Mode of Journey to Work, Northeastern Illinois, 2000



	Chicago	Suburban Cook	DuPage	Kane	Lake	McHenry	Will
Worked at Home	28,165	32,652	16,599	6,536	13,294	5,056	7,035
Other Means	8,806	6,940	2,126	1,476	4,995	741	1,363
Motorcycle	412	231	207	97	95	37	70
Bicycle	5,956	3,265	1402	400	461	250	271
Walked	67,556	26,898	8,476	3,136	9,332	1,694	2,727
Public Transportation	310,924	98,143	31,612	5,242	14,572	4,195	9,832
Carpooled	172,722	118,214	35,391	22,144	32,306	11,426	20,075
Drove Alone	597,598	892,679	373,560	153,831	242,387	109,858	200,514

Prepared by Plan Development, Chicago Area Transportation Study, 09/2002. Source: US Census SF 3 (2000)

*This census data is based on a sample collected for the last week of March and **is not seasonally adjusted.** The data represents percentages of workers by the mode they used for the greatest distance of their journey to work on most days of the week.

A Broader View: A Summary of Non-Motorized Trips by Relation to Transit and Trip Purpose

Work trips account for only a portion of travel in northeastern Illinois. Table 7 shows estimates of non-motorized trips per day by trip purpose and relationship to transit. The table demonstrates that (1) walking and bicycling are concentrated in Cook County, (2) walking and bicycling for transportation are now strongly related to transit trips, and (3) work trips account for a small share of non-motorized transportation in northeastern Illinois.

The estimates in Table 7 show some other important trends:

- Excluding transit-related walking and bicycling trips, work trips account for 34% of non-motorized trips in the collar counties, but only 14% in Cook County. This may be because the variety of destinations accessible by foot and bicycle is wider in Cook County than in the collar counties.
- For work trips, the relationship between non-motorized trips and transit is greatest in Cook County. In Cook County, among home-based work trips, 88% of non-motorized trips are transit-related. In the collar counties, this figure falls to 73%.
- Conversely, for home based other (non-work) trips, non-motorized trips are most strongly related to transit in the collar counties. Thus, for home-based non-work trips, 57% of Cook

County home-based non-work non-motorized trips are related to transit. In the collar counties, 79% of such trips are related to transit.

- Walking and bicycling are important parts of trip chaining. 1,186,612 non-motorized daily trips are non-home based. Most of these are in Cook County.

Table 7
Summary of Daily Non-Motorized Trips by Trip Purpose and Relation to Transit
Northeastern Illinois, 1999-2005 Estimates, Tuesday - Thursday[46]

Type of Trip	2005 Non-motorized	2005 Transit Access	1999 Transit Egress	Total
Cook County				
Home-based Work	181,396	597,197	703,971	1,482,564
Home-based Other	920,517	406,226	796,867	2,123,610
Non-home-based	241,364	532,658	272,145	1,046,167
Subtotal	1,343,277	1,536,081	1,772,983	4,652,341
Collar Counties				
Home-based Work	49,722	84,508	50,763	184,922
Home-based Other	55,365	51,416	159,755	266,536
Non-home-based	39,992	52,933	47,519	140,445
Subtotal	145,079	188,857	258,036	591,972
Total (Cook + Collar)	**1,488,356**	**1,724,938**	**2,031,019**	**5,244,313**

Prepared by Chicago Area Transportation Study, August, 2003. Data reflects Tuesday-Thursday daily trips.

Staff reviewed recently released National Household Travel Survey (NHTS) data for that part of the Chicago area that is within Illinois.[47] The data sample is limited, but is useful as an intermediate data point given the lack of a statistically satisfactory local survey. Table 8 shows a comparison of the summary levels for trips from the NHTS and the travel model data.

Table 8
Comparison of Non-Motorized Trip Estimates
from the NHTS and CATS Travel Demand Models by Trip Purpose

Type of Trip	2005 Travel Model	2001 NHTS
Home-based Work	231,118	61,238
Home-based Other	975,882	929,962
Non-home-based	281,357	360,250
Total	1,488,356	1,351,450

Prepared by Chicago Area Transportation Study, September, 2003. Data reflects average Tuesday-Thursday daily trips in the travel model, and average 7-day daily trips for the NHTS (using NHTS annualized trip factors divided by 365). NHTS data includes independent youth travel; travel model data does not.

Table 8 shows an NHTS 7-day average of about 1.35 million bicycle and pedestrian trips per day. This is somewhat less than the numbers of non-motorized trips reported above, but is not

[46] Source: Chicago Area Transportation Study. 2020 and 2030 RTP Conformity Analyses, unpublished data. Figures exclude independent travel by those less than 14 years of age. Figures exclude automobile access or egress trips (e.g., walking to a downtown parking garage from work).

[47] Bureau of Transportation Statistics, US Department of Transportation. 2003. [Center for Transportation Analysis, Oak Ridge National Laboratory]. Analysis by CATS. Raw data is posted at http://nhts.ornl.gov/2001/html_files/download_directory.shtml. Data is only indicative because of small sample.

inconsistent given the different data collection methods, and much smaller Chicago area sample for the national dataset. However, problems with the NHTS data subsets are indicated. First, Chicago area transit trips were significantly under-sampled in the national survey, so they were not analyzed for the purposes of this report. Second, the NHTS home-based work data is consistent with neither CATS travel demand models nor US census data.[48] These faults notwithstanding, the national household travel survey data allows for description of general travel trends. In particular, the data shows that, among non-work trips, trips to and from recreation are very important, and that walking and bicycling account for a significant fraction of such trips in the Chicago area. The data also shows that non-work trip-making is becoming increasingly important for all transportation modes, especially when weekend trips are surveyed. In addition, more trips are part of trip chains. About 30% of all trips are non-home based. Some of these trips are by foot or by bike. See Appendix A for details for non-motorized and all trips.

The rest of this section will examine the characteristics of these trips, to discern the population characteristics associated with walking and bicycling in northeastern Illinois.

Walking and Bicycling Activity in the Chicago Central Area

The intense development of the Chicago Central Area has been driven by its rail transit system. The rail transit system provides good links to a large part of the region, irrespective of traffic congestion. The intense development and relative attractiveness of transit for downtown trips results in high transit demand. This transit activity in turn generates large numbers of non-motorized trips in Chicago's Central Area.

Features of the Central Area making it ideal for trips on foot are discussed in the next chapter. Here, we will discuss the volumes of walkers and bicyclists and their trip characteristics.

Most non-motorized trips in the Central Area are, like those region-wide, by foot. Most block faces in the Loop area have weekday pedestrian counts in the 5,000 to 20,000 range.[49],[50] Block face pedestrian counts ranging to more than 25,000 per block face lead to the four Metra rail terminals. Block face counts are also over 20,000 in central locations on State Street, with CTA's Red Line subway stations and retail anchors generating large amounts of foot traffic.

North Michigan Avenue also has very high pedestrian counts. Weekday block face counts are above 10,000 from Oak Street south over the Chicago River; the majority of block face counts are over 20,000. Unlike the remainder of the Central Area, weekend counts on North Michigan Avenue are higher than weekday counts. Weekend counts are frequently over 30,000 on each block face, and are above 40,000 in the heart of the district. Special 1999 holiday pedestrian counts exceeded 70,000.[51]

[48] Recalling the bicycle and walking work commute data in Figures 7 and 8 total 131,824 workers. This number, when doubled to account for the return trips, yields more than 260,000 per day. This is consistent with the travel model data (accounting for part-time workers, etc.), but is dramatically higher than the NHTS.

[49] Source: Chicago Department of Transportation, unpublished data, collected July and August 1999. Data is for a ten-hour period from 7:45 a.m. to 5:45 p.m. Weather is not reported. Excludes "Taste of Chicago."

[50] The area bounded by Canal Street, the Main Branch of the Chicago River, Michigan Avenue, and Congress Pkwy.

[51] Source: Chicago Department of Transportation, unpublished data. Collected July, August, and December, 1999. Saturday counts were collected from 9:00 a.m. to 6:00 p.m. Weekday counts were from 7:45 a.m. to 5:45 p.m.

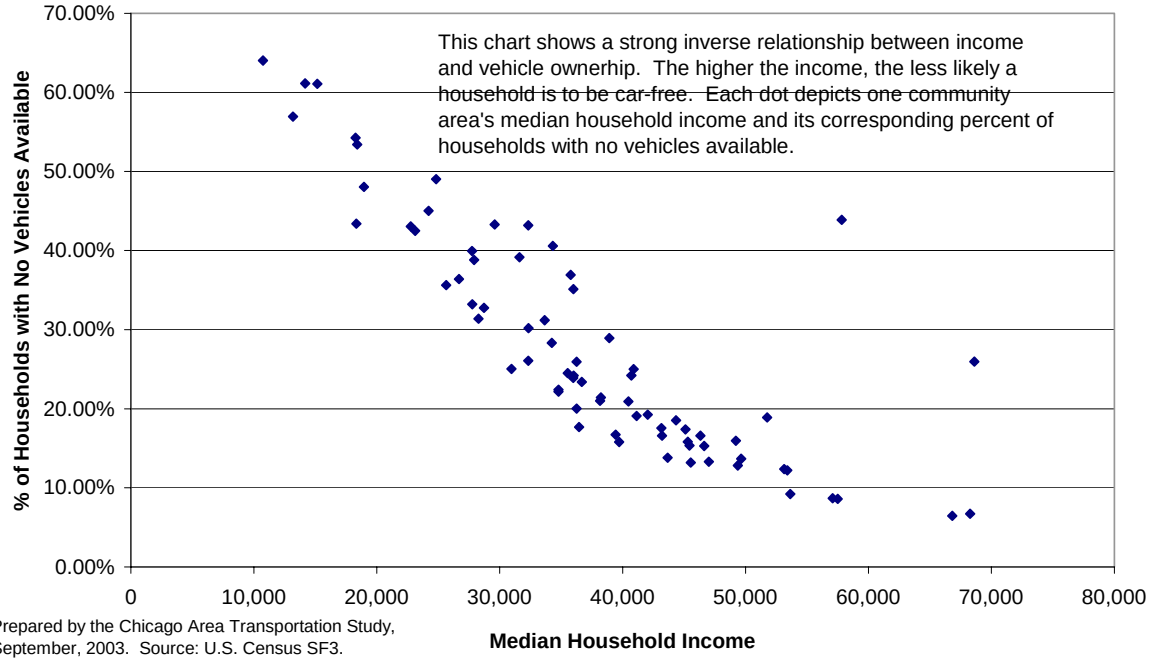
Pedestrian counts were also conducted in 1999 on selected blocks in the Streeterville and River North areas. These counts ranged from several hundred per block face to more than 10,000; most counts were between 1,000 and 5,000.[52] Maps showing full 1999 pedestrian counts are included in this document as Appendix B.

Bicycling in the Central Area is becoming increasingly common. Over 300 people are estimated to earn their living bicycling throughout the Central Area as bicycle messengers, working for 40-45 messenger companies.[53] Commuting downtown is also popular, as large numbers of households live within bicycling distance of downtown. One popular way to access downtown Chicago is via the Lakefront Path. On a weekday in 1990, counts of more than 2,000 bicyclists were using the trail from 10:00 a.m. to 6:00 p.m. in the segment from Belmont Avenue south to Grant Park (Belmont Avenue is 5 miles from the heart of the Loop via the Lakefront Path). The highest count was 3,400 between North Avenue and Michigan Avenue. Counts trailed off significantly north of Addison Street. Less than 200 bicyclists were the trail during the weekday count period at count locations between Addison and Hollywood (a further 3 miles).[54]

Walking and Bicycling Activity in Chicago Neighborhoods

Walking and bicycling are widespread in Chicago neighborhoods. This is probably directly related to the walking and bicycling accessibility of various activities to Chicago residents. It also relates indirectly to income. Many Chicago residents do not own automobiles. Such residents rely on walking, bicycling and access to public transportation for personal mobility. Figure 11 shows the relationship between vehicle ownership and income.

Figure 11. Vehicles Available by Income, 74 Chicago Community Areas, 2000



[52] Source: Chicago Department of Transportation, unpublished data. Collected July, August, and December, 1999.

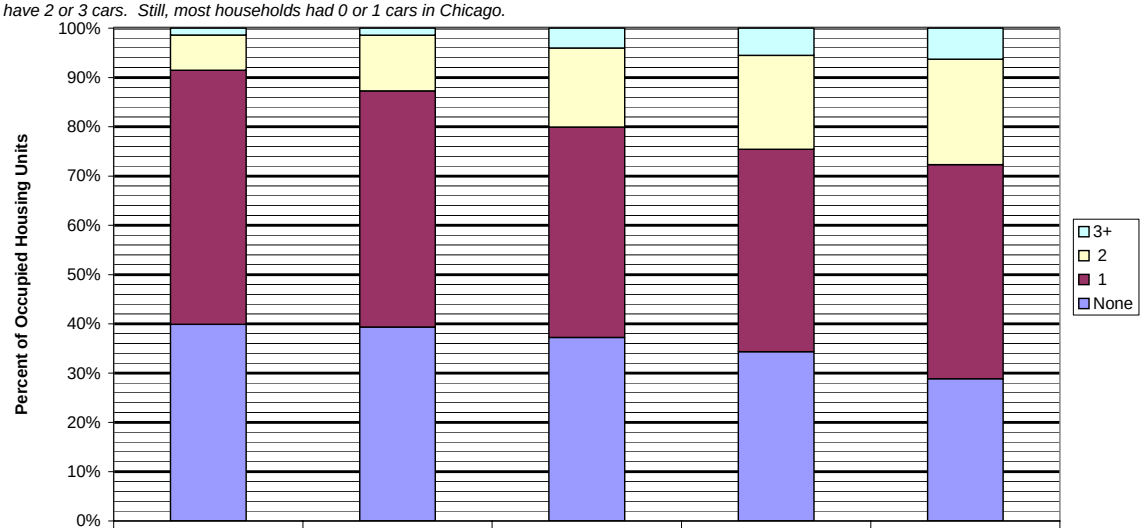
[53] Source: International Federation of Bike Messenger Associations. www.bikemessenger.org/travel/chicago.html.

[54] City of Chicago Department of Transportation. Title/date? Figure 14, p. 85.

Partly because of rising incomes, the percent of Chicago households with zero or one car has been trending down. In Chicago, this trend has been recently accelerating. However, many households still did not own cars in 2000. See Figure 12.

Figure 12. Percent of Occupied Housing Units by Number of Vehicles Available, Chicago, 1960-2000

In Chicago, the trend is that fewer households have 0 or 1 car, while more households have 2 or 3 cars. Still, most households had 0 or 1 cars in Chicago.



	1960	1970	1980	1990	2000
3+	16,053	15,962	44,104	56,703	66,863
2	82,574	128,367	175,529	195,276	227,045
1	596,935	545,102	466,706	421,070	461,677
None	461,831	447,207	407,068	352,125	306,336

Prepared by Plan Development, Chicago Area Transportation Study, 09/2002. Source: US Census SF/STF 3 (1990-2000) Census Tracts (1960-1980). Data is based on a sample.

Survey data indicates that besides walking and bicycling because they don't have cars, Chicago residents walk and bicycle because they can and want to. Most Chicago residents report that they live within walking distance of many activities and services. Table 9 shows that most residents live within walking distance of a variety of activities, but these numbers vary by socioeconomic data and location. Accessible amenities and high-income households appear to be attracted to each other.

Further, the right-most column of Table 9 shows that three-fourths of Chicago residents prefer to live within walking distance of shopping amenities. Again, there is some variation among groups. Overall, however, Chicago is attractive to people who wish to live in walkable communities. Together, the data on walkable amenities and attraction of people seeking walkable amenities helps explain the high non-auto trip shares in Chicago.

A large number of Chicago trips are within walking distance. Table 10 shows that about 31% of all trips tabulated in Chicago in the CATS household travel survey were less than a mile in length. Table 10 also shows that even more trips within Chicago were within bicycling distance. Almost 60% of trips were less than 3 miles in length. Three miles is a distance many people seem to be willing to bicycle (at a speed of 10 miles per hour, such a trip takes less than 20 minutes).

Table 9
Walking Distance Accessibility
Percent of Survey Respondents Indicating They Are within Walking Distance
Chicago, 1997 - 2001

Population Group	Park	Restaurant	Train or "L" Station	Movie Theatre	Shopping Area	*Prefer Living within Walking Distance of Shops*
Chicago	89	87	65	29	70	*75*
Lower Third Income Quantile	88	86	56	22	68	*76*
Middle Third Income Quantile	89	87	71	30	70	*74*
Upper Third Income Quantile	94	87	74	42	71	*72*
White	93	92	72	42	76	*76*
Black	85	79	62	15	57	*71*
Latino	87	90	54	25	78	*84*
North Side	96	95	86	58	79	*87*
Northwest Side	90	89	62	34	77	*68*
West Side	80	88	52	9	64	*82*
Southwest Side	94*	90	39	18	67	*56*
South Side	88	76	65	16	64	*69*

Prepared by Chicago Area Transportation Study, August, 2003. Source: Taylor, D. Garth, *2001 Metro Survey Report*, Chicago, IL: Metro Chicago Information Center, 2001. MCIC Tables #1, 3, 5. * Indicates that caution is advised because of small sample (50-100 responses). For discussions of methodology, sampling, etc., see the appendices to the source documentation.

Table 10
Trip Lengths, Chicago, 1988-1991

Trip Length	City of Chicago
< 3 miles	59%
< 2 miles	48%
< 1 mile	31%

Source: Compiled from Transportation Facts summaries of CATS Household Travel Survey

Table 11 shows that bicycling is even more sensitive to socioeconomic variables than walking. Whites and higher income groups are more likely to own bicycles. However, they are less likely to use them for commuting or errands than people in lower income groups and minorities. Again, among low income groups, residents may bicycle because they have to. The large number of people from low income and minority groups without a bicycle indicates that a strategy of targeted promotions for bicycle ownership might encourage higher rates of bicycle use among these populations.

Table 11
Summary of Bicycle Ownership, Commuting, and Use for Errands
Chicago, 1997 - 2001

Population Group	Percent of Survey Respondents Who Have a Bicycle	Among those Who Have A Bicycle:				Among Work Commuters, Ride Bike to Work in Good Weather (%)
		Never Use Bike for Errands (%)	Use Bike for Errands 1-3 Times per Month (%)	Use Bike for Errands 4-10 Times per Month (%)	Use Bike for Errands Over 10 Times per Month (%)	
Chicago	42	69	14	12	6	13
Lower Third Income Group	26	63	19	14	5	19*
Middle Third Income Group	50	69	12	11	8	12
Upper Third Income Group	66	73	14	9	3	11*
White	54	66	15	13	5	11
Black	27	82	9	6	2	8
Latino	37	62*	12*	12*	14*	25*
North Side	48	59	20	16	5	15*
Northwest Side	47	79*	11*	6*	4*	11*
West Side	28	52*	14*	21*	13*	**
Southwest Side	56	74*	10*	9*	7*	**
South Side	37	77	11	7	7	9*

Prepared by Chicago Area Transportation Study, August, 2003. Source: Taylor, D. Garth, *2001 Metro Survey Report*, Chicago, IL: Metro Chicago Information Center, 2001. MCIC Tables #1, 3, 5. * Indicates that caution is advised because of small sample (50-100 responses). ** Indicates less than 50 responses. For discussions of methodology, sampling, etc., see the appendices to the source documentation.

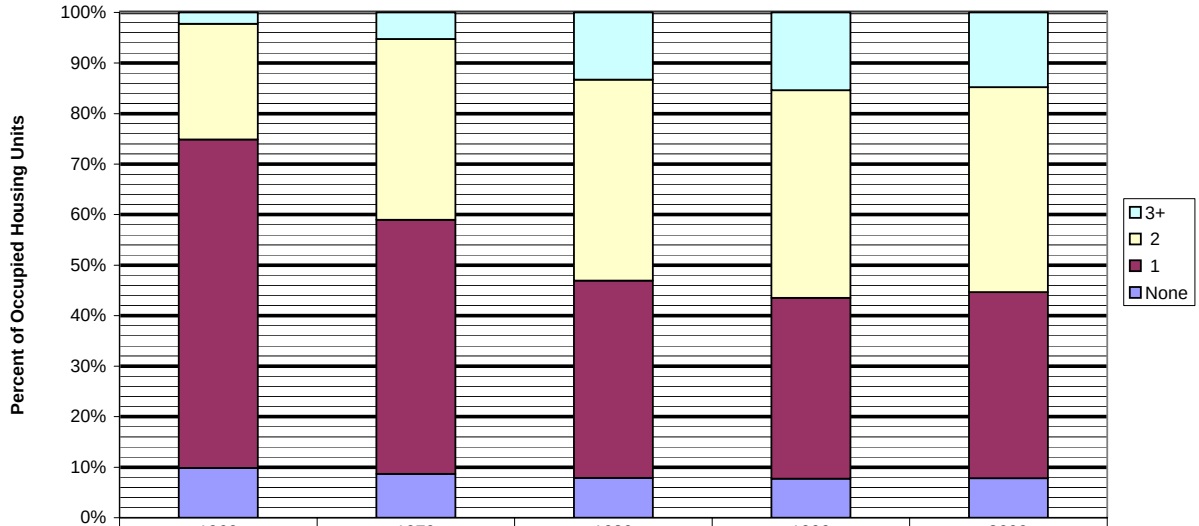
Walking and Bicycling Activity in Suburban Locations

Suburban areas vary widely. Many communities have high residential densities, vibrant commercial districts and accessible schools and parks. Some communities do not. Many communities in northeastern Illinois remain rural. These differences are often intentional.

Figures 13 and 14 show that automobile availability has grown in the suburbs during the last 40 years. A comparison with Figure 12 will show that auto availability rates are higher in the suburbs than in the City of Chicago. However, unlike Chicago, suburban vehicle availability growth has abated.

Figure 13. Percent of Occupied Housing Units by Number of Vehicles Available, Suburban Cook County 1960-2000

About 44% of households in suburban Cook County have 0 or 1 vehicles available. The trend toward more vehicles per household abated in the 1990's:

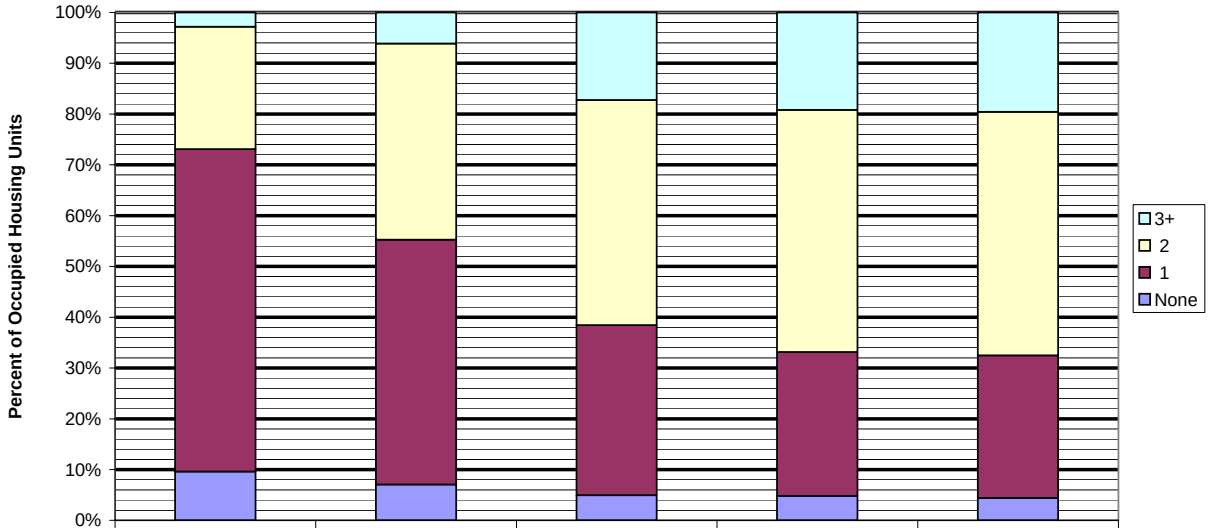


	1960	1970	1980	1990	2000
3+	9,843	32,918	104,438	131,159	134,687
2	101,429	224,853	312,643	351,309	370,298
1	288,008	315,827	306,792	305,543	335,820
None	43,622	54,722	61,837	66,303	71,455

Prepared by Plan Development, Chicago Area Transportation Study, 09/2002. Source: US Census SF/STF 3 (1990-2000) Census Tracts (1960-1980). Data is based on a sample.

Figure 14. Percent of Occupied Housing Units by Number of Vehicles Available, Collar Counties, Illinois 1960-2000

Two-thirds of collar county households have 2 or more vehicles. The trend toward more vehicles abated in



	1960	1970	1980	1990	2000
3+	8,280	25,469	104,841	140,624	182,508
2	71,648	161,241	269,277	349,713	447,129
1	188,865	201,203	203,266	207,686	261,517
None	28,553	29,440	30,221	35,290	41,572

Prepared by Plan Development, Chicago Area Transportation Study, 09/2002. Source: US Census SF/STF 3 (1990-2000) Census Tracts (1960-1980). Data is based on a sample.

Figures 13 and 14 show that the large majority of suburban households have access to a car, and indeed have two or more cars. Now we will examine whether walking and bicycling are choices. Using the same analysis procedures as for Chicago above, Table 12 shows a summary of how well suburban socio-economic groups and communities can access activities by foot. Table 12 demonstrates that most members of most suburban groups and areas can walk to a park and a restaurant. However, unlike the city, most cannot walk to a train station.

Most interestingly, while a majority lives within walking distance of a shopping area, most suburbanites prefer not to. This is unlike their city counterparts, where large majorities live

Table 12
Walking Distance Accessibility
Percent of Survey Respondents Indicating They Are within Walking Distance
Suburban Northeastern Illinois, 1997 - 2001

Population Group	Park	Restaurant	Train or "L" Station	Movie Theatre	Shopping Area	*Prefer Living within Walking Distance of Shops*
Suburbs	84	68	38	23	54	*44*
Lower Third Income Group	83	68	38	26	56	*49*
Middle Third Income Group	83	68	37	23	56	*43*
Upper Third Income Group	86	66	37	22	51	*40*
White	85	67	37	23	54	*43*
Black	84	72	38	22	41	*48*
Latino	81	75	45	28	67	*47*
North Cook County Suburbs	94	80	48	34	72	*61*
Northwest Cook County Suburbs	83	82	32	29	70	*43*
West Cook County Suburbs	93	83	59	22	58	*59*
Southwest Cook County Suburbs	88	71	40	21	57	*39*
South Cook County Suburbs	88*	68*	27*	23*	46*	*42**
DuPage County	88	71	44	27	52	*45*
Kane County	79	61	22	27	52	*38*
Lake County	79	53	34	17	44	*36*
McHenry County	79	38*	25*	11*	31*	*28**
Will County	75	49	15	11	40	*29*

Prepared by Chicago Area Transportation Study, August, 2003. Source: Taylor, D. Garth, *2001 Metro Survey Report*, Chicago, IL: Metro Chicago Information Center, 2001. MCIC Tables #1, 3, 5. * Indicates that caution is advised because of small sample (50-100 responses). For discussions of methodology, sampling, etc., see the appendices to the source documentation.

within walking distance of shops and even higher numbers would like to. It is noteworthy that there is quite a bit of variation in these numbers and differences among populations. In general, Cook County suburbs have higher walking accessibility than collar county suburbs. Cook County suburbs also have higher proportions of people wanting shopping accessibility by foot, particularly in the north and west suburbs, where majorities have such preferences. The north and west suburbs also have the highest accessibility to rail stations by foot. Among the suburbs, DuPage, Kane, and Lake Counties have higher walking accessibility than McHenry and Will Counties. Most McHenry and Will residents do not seek walkability: less than 30 percent of survey respondents from those counties preferred living within walking distance of a shopping area.

We have seen dramatic differences in walking accessibility in the suburbs. Unlike the City of Chicago, however, differences are not as prevalent among socioeconomic groups, except accessibility to shopping areas by foot, where there are large differences among racial and ethnic groups. Additionally, unlike in the City of Chicago, majorities of all socio-economic groups tabulated do not prefer to live within walking distance of shopping areas.

In the suburbs, according to data compiled from 1991 to 1993 during the CATS household travel survey, about 20% of all trips were less than one mile, considered by many a walkable distance. About half of all trips were less than 3 miles, a distance that is generally considered bikable. See Table 13.

Table 13
Trip Lengths, Suburban Northeastern Illinois, 1989-1991

Trip Length	Suburbs
< 3 miles	51%
< 2 miles	40%
< 1 mile	20%

Source: Compiled from Transportation Facts summaries of CATS Household Travel Survey. Note: Includes all trips regardless of mode.

Bicycle ownership and use varies among suburban groups. Table 14 show that lower income groups are less likely to own a bicycle, but are more likely to use it for commuting and errands than wealthier groups. However, black suburbanites are unlikely to own a bicycle, and those that do are unlikely to use it for errands. About half of Latino suburbanites own bicycles, and almost 30% of those use their bicycles for errands.

Table 14 also shows that bicycle ownership and bicycle use varies by area. Suburban bicycle ownership varies from a low of 54% in the western suburbs of Cook County to a high of 73% in Kane County. However, the west Cook County suburbs, along with DuPage, have the highest levels of bicycle commuting among those with a bicycle. West and north suburban Cook County bicycle owners are also the most likely to use their bikes for errands.

Table 14
Summary of Bicycle Ownership, Commuting, and Use for Errands
Suburban Northeastern Illinois, 1997 - 2001

Population Group	Percent of Survey Respondents Who Have a Bicycle	Among those Who Have A Bicycle:				Among Work Commuters, Ride Bike to Work in Good Weather (%)
		Never Use Bike for Errands (%)	Use Bike for Errands 1-3 Times per Month (%)	Use Bike for Errands 4-10 Times per Month (%)	Use Bike for Errands Over 10 Times per Month (%)	
Suburbs	60	81	10	5	4	9
Lower Third Income Group	43	73	12	6	8	15
Middle Third Income Group	61	84	8	5	3	11
Upper Third Income Group	73	79	12	5	3	7
White	63	81	10	4	4	9
Black	41	86	3	7	4	**
Latino	51	72	14	5	8	**
North Cook County Suburbs	57	70	18	5	8	11*
Northwest Cook County Suburbs	60	88	7	2	3	5*
West Cook County Suburbs	54	70*	10*	8*	11*	16*
Southwest Cook County Suburbs	61	83	12	1	4	11*
South Cook County Suburbs	48*	**	**	**	**	**
DuPage County	61	82	12	4	4	16
Kane County	73	84	6	4	4	9*
Lake County	64	80	10	9	1	5*
McHenry County	65*	**	**	**	**	**
Will County	59	88	7	5	1	6*

Prepared by Chicago Area Transportation Study, August, 2003. Source: Taylor, D. Garth, *2001 Metro Survey Report*, Chicago, IL: Metro Chicago Information Center, 2001. MCIC Tables #1, 3, 5. * Indicates that caution is advised because of small sample (50-100 responses). ** Indicates less than 50 responses. For discussions of methodology, sampling, etc., see the appendices to the source documentation.

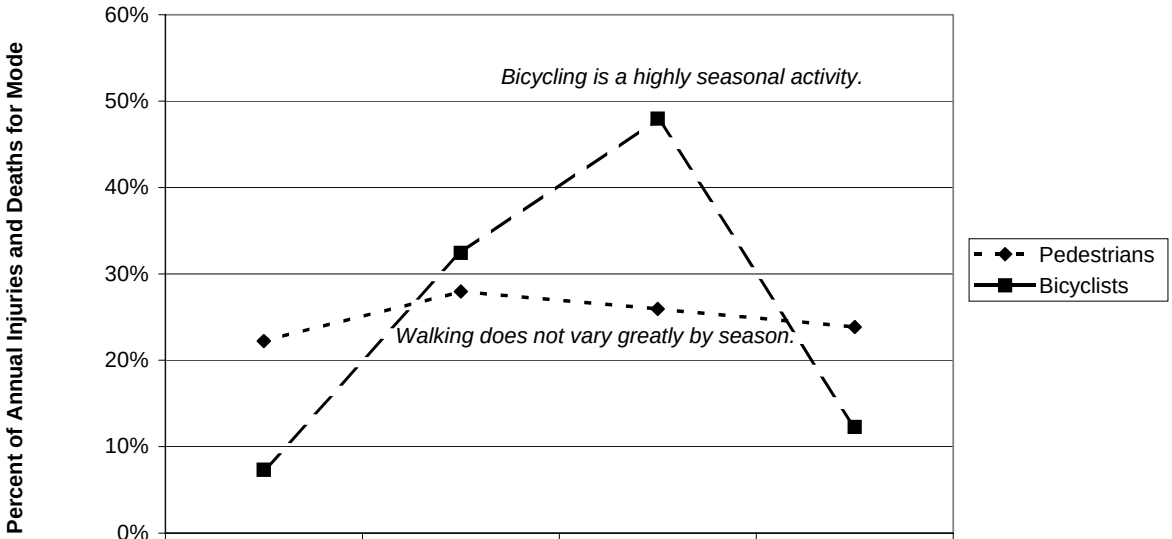
Some suburban bicycling and walking is also associated with regional trails. Trail counts conducted in 1995 in support of CMAQ programming activity indicated that showed widely varying use. Several locations showed counts in excess of 500 users over a 6-hour period. Among the important findings of the 1995 survey was other evidence showing that while walking and bicycling as recreation were important in accounting for trail use, bicycle and foot trips to recreation were even more important. Substantial numbers of trips not related to recreation were also tabulated.[55]

Other Factors Affecting Walkers and Bicyclists in Northeastern Illinois

Seasonality

Overall seasonality information for bicycling and walking is available by looking at injury and fatality data. Such data shows that bicycling is highly seasonal in northeastern Illinois. The data indicates that about 80% of bicycling occurs from April through September. Walking, on the other hand, does not appear to vary greatly by season. This information is shown in Figure 15.

Figure 15. Seasonality of Bicycling and Walking in Northeastern Illinois. Indicated by Seasonality of Injuries and Fatalities.



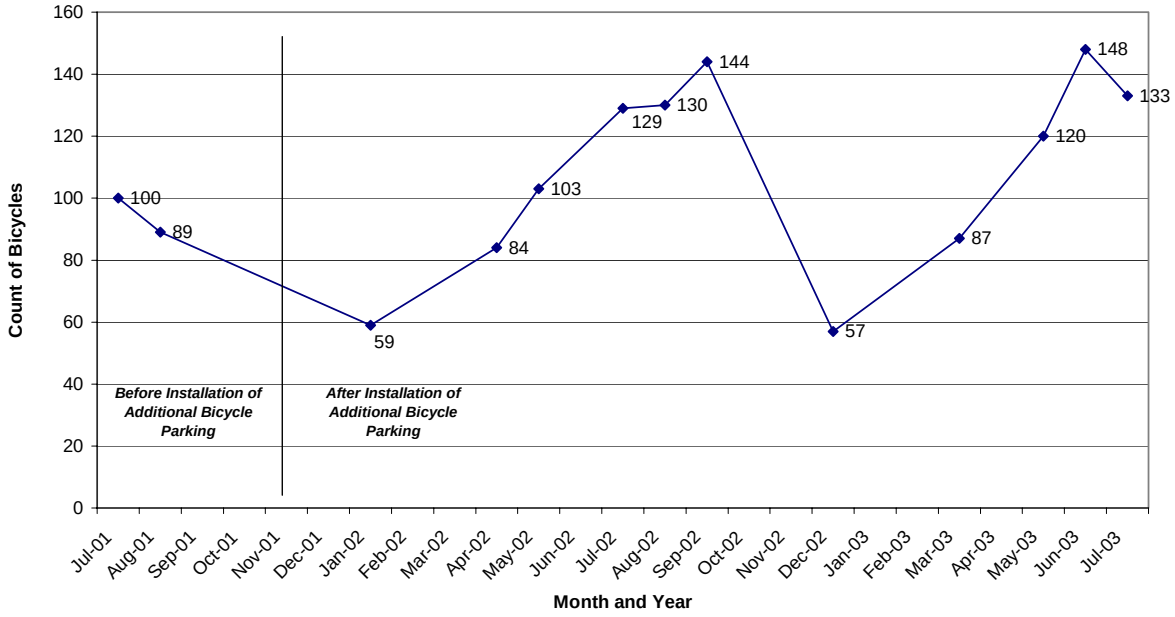
	JAN-MAR	APR-JUN	JUL-SEP	OCT-DEC
Pedestrians	22%	28%	26%	24%
Bicyclists	7%	32%	48%	12%

Prepared by the Chicago Area Transportation Study. Source: Illinois Department of Public Health. EMS Data Reporting System. Data for 2000 is depicted.

Seasonality for bicycling varies by trip purpose. CTA bike parking counts at rail stations indicate that while seasonality is still present for bicycle access to transit trips, the extent of seasonality is not as great as total bike trips. See Figure 15a.

[55] Welzenbach, Karl D. *Analysis of the 1995 Bicycle Survey of Suburban Bicycle Trails.* Chicago Area Transportation Study Working Paper 96-08. June 1996.

Figure 15a. Chicago Transit Authority Bike Counts at 20 Selected Rail Stations, Showing Seasonal Variation, July, 2001 - July 2003



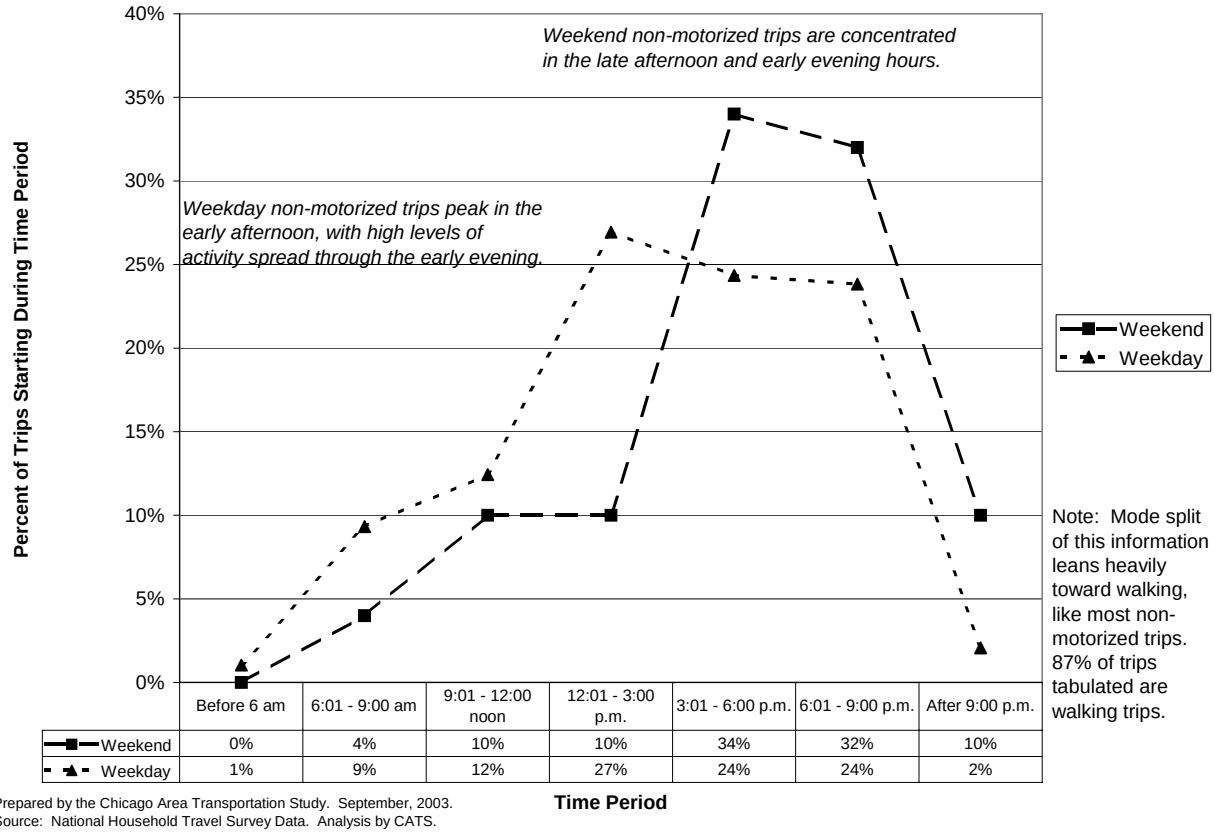
Prepared by Chicago Area Transportation Study, September, 2004. Source: Chicago Transit Authority Bike Count Database. Note: Data was collected to track the impact of Phase I of the Chicago Transit Authority's Bike to Transit Program, which provided a mix of indoor and outdoor bicycle parking at selected stations.

Both of the above charts indicate that for bicycling, encouragement of off-season bicycling may bring benefits without requiring additional resources beyond providing "how-to" information and cold-weather gear purchased by cyclists.

Travel by Time of Day

Walking and bicycling tend to be afternoon activities and early evening activities. On weekdays, about three-fourths of non-motorized trips take place between noon and 9:00 p.m. Weekend walking and bicycling is more concentrated in the latter part of the day. On weekends, about two-thirds of non-motorized trips take place between 3:00 p.m. and 9:00 p.m. Figure 16 shows this information, gathered from National Household Travel Survey data collected in the Chicago area.

Figure 16. Walking and Bicycling Trips by Time of Day and Weekend/Weekday. Chicago CMSA, Illinois Part, 2001.



	Before 6 am	6:01 - 9:00 am	9:01 - 12:00 noon	12:01 - 3:00 p.m.	3:01 - 6:00 p.m.	6:01 - 9:00 p.m.	After 9:00 p.m.
Weekend	0%	4%	10%	10%	34%	32%	10%
Weekday	1%	9%	12%	27%	24%	24%	2%

Prepared by the Chicago Area Transportation Study. September, 2003.
Source: National Household Travel Survey Data. Analysis by CATS.

The time of day information demonstrates a large portion of walking and bicycling takes place at or after dusk, when street lighting may be important in improving visibility by and of non-motorized travelers.[56]

Travel Mode by Gender

Walking and bicycling have very different gender characteristics. An analysis of NHTS data showed that women accounted for a little more than half (53%) of the walking trips tabulated for the Chicago region.[57] On the other hand, the majority of bicycling is by males. In Chicago, males have accounted for about three-fourths of cyclists counted on city streets and trails during counts over the past several years.[58] Suburban trail counts in 1995 yielded a similar ratio: almost 70% of bicyclists counted were male.[59] Very limited bicycle trip data in the NHTS also indicate that 70% of regional bicycle trips were by males.

[56] Sunset ranges from 4:20 p.m. CST in December to 8:31 p.m. CDT in June. See Source: "Sunrise/sunset" at http://www.crh.noaa.gov/lot/climate.html

[57] Bureau of Transportation Statistics, US Department of Transportation. 2003. [Center for Transportation Analysis, Oak Ridge National Laboratory]. Analysis by CATS. Raw data is posted at http://nhts.ornl.gov/2001/html_files/download_directory.shtml.

[58] Source: CATS analysis of counts by the Chicagoland Bicycle Federation for the Chicago Department of Transportation, 1996-2003.

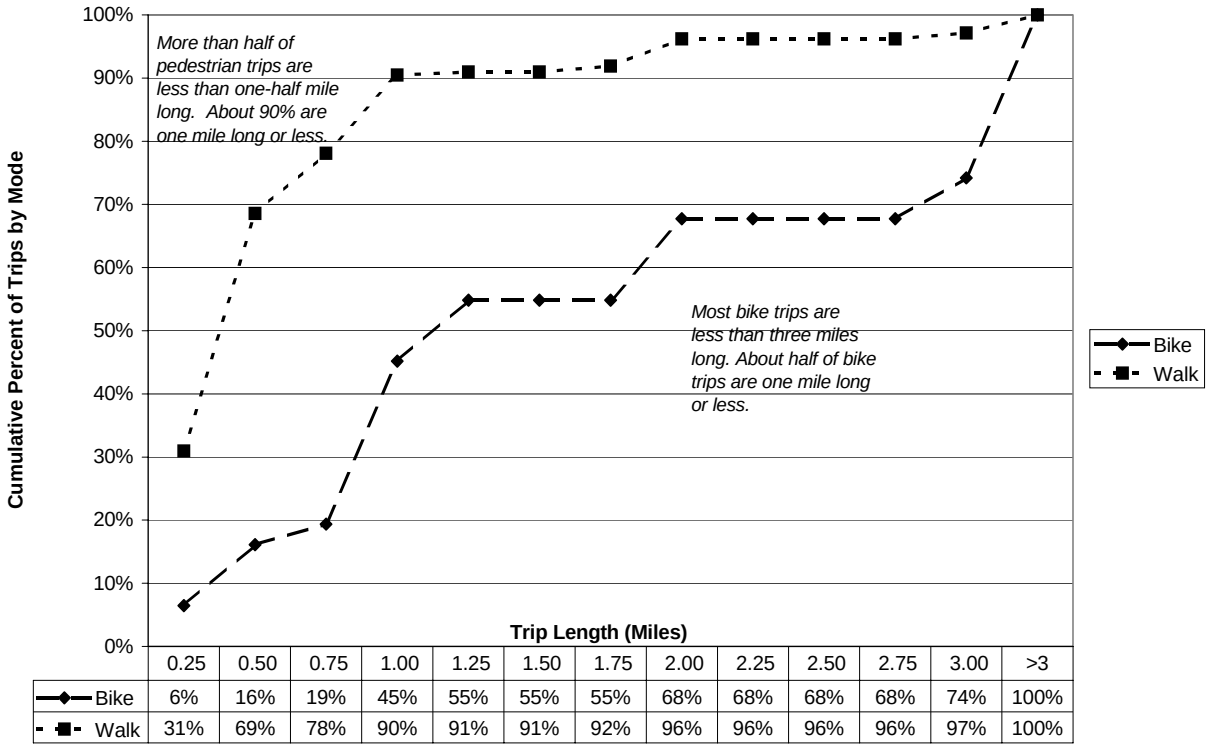
[59] Welzenbach, op.cit., p. 6.

Additional study may be necessary to ascertain why women do not participate in bicycling as much as men, and whether any steps can be made reduce barriers to participation by women.

Walking and Bicycling Trips by Trip Length

Walking and bicycling trips tend to be short. As shown by Figure 17, most walking trips are one mile long or less, and most bicycle trip are less than three miles long or less. Analysis of NHTS data shows that the median walk trip length was 0.4 miles. The median bike trip length was 1.1 miles.

Figure 17: Bike and Walk Trip Lengths Cumulative Percent Frequency Distribution: Chicago CMSA, IL Part, 2001



	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	>3
Bike	6%	16%	19%	45%	55%	55%	55%	68%	68%	68%	68%	74%	100%
Walk	31%	69%	78%	90%	91%	91%	92%	96%	96%	96%	96%	97%	100%

Prepared by the Chicago Area Transportation Study, September, 2003. Source: National Household Travel Survey. Analysis by CATS.

Note: Bicycle trip sample small. Use with caution.

Many trips in the region fall into distances that are walkable or bikable. NHTS data analysis shows that about 10% of all Chicago area trips are 0.4 miles long or less, and 31% are one mile long or less. So a large portion of trips in the region are easily within walkable distances. Fully 54% of trips in the NHTS for the Chicago area are less than 3 miles in length, so are within a bikeable distance.[60]

[60] Bureau of Transportation Statistics, US Department of Transportation. 2003. [Center for Transportation Analysis, Oak Ridge National Laboratory]. Analysis by CATS. Raw data is posted at http://nhts.ornl.gov/2001/html_files/download_directory.shtml.

Walking and Bicycling Trips by Day

An analysis of NHTS trips by day of the week showed that less than 20% of non-motorized trips occur on weekends. Sunday has higher levels of tripmaking than Saturday.[61]

Transit Access, Egress, and On-Vehicle Trips

The strong relationship between transit and non-motorized transportation was noted above, particularly with reference to the Chicago Central Area. Non-motorized access to transit is very important to the continued strength of the transit market in the developed part of the region. Rail services rely heavily on pedestrian access, bus services even more so. Table 15 shows the walking and biking share of access and egress for transit modes.

Table 15
Summary of Transit Access and Egress Shares by Transit Mode

	All Transit Modes (RTA IVIS Survey)	Bus Services (Pace and CTA)	CTA Rail	Metra Commuter Rail	
				System	CBD Only
Walk Percent Share – Access	66	100	30 (Blue Line) 26 (Orange Line)	21	31
Walk Percent Share – Egress	94	96	?	76	80
Bike Percent Share – Access	2	0	0 (Blue Line)	1	1
Bike Percent Share – Egress	0	0	?	0	0

Sources: Regional Transportation Authority. *Non-Motorized Access to Transit. Final Report.* July, 1996. [Submitted by Wilbur Smith Associates, et al]. Pages 2-4 through 2-6 and Appendix 2, p. 4. NHTS 2001 (for bus services; use with caution - small sample). Metra Origin-Destination Survey (for Metra), Fall, 2002 [data for start-of-service until noon]. Note: the rail services have additional transit shares for their access and egress trips; these access and egress trips in turn probably have large walk access shares.

Pace and CTA both have recently implemented bikes on transit services, allowing transit users to extend the length of the egress journey that may be accessible from the transit service without additional transit transfer trips. However, Pace reports that their program attracted 2,585 customers in May, 2003. The Pace program is growing in popularity, with each month in 2003 at least five-times higher than year-earlier levels.[62]

All three transit agencies and local communities work to implement suitable bicycle parking facilities at transit stations, transfer centers, and bus stops. While specifics regarding programs are covered in a later section of this report, we discuss usage of these facilities here. Bike rack usage data indicates that bicycle usage, while representing a small mode of access share, is growing fast at transit services. Metra conducted a comprehensive inventory of bicycle parking in September, 2003. The inventory indicates that there were 2,123 bicycles parked at the 224

[61] Ibid. Daily numbers are Sunday 15%, Monday 20%, Tuesday 15%, Wednesday 20%, Thursday 9%, Friday 17%, Saturday 4%.

[62] Pace, 2003. Internal document.

Metra stations in 2003.[63] Comparing the results for just the 199 stations counted mostly in August, 1998, usage rose from 1,026 in 1998 to 2,107 in 2003, an increase of more than 100%.[64] At these stations, the number of "official" usable bike parking spaces available increased 2% from 3,809 to 3,887. Utilization at good quality spaces was 48%, 45% at marginal quality spaces; 276 bicycles were parked at "unofficial spaces (trees, parking meters, etc.). 28 stations had more bicycles parked than official spaces[65].

CTA has also seen a surge in bicycle use, partly related to their efforts to install and promote bicycle parking. System-wide counts at CTA rail stations for July 2001 totaled 361 in 2001, 464 in September, 2002, 480 in July, 2003.[66] From 2001 to 2002, usage went up by 44% "where secure racks were installed accompanied by marketing," while stations without this treatment had only a 21% increase.[67]

School and Youth Transportation

As part of the City of Chicago Safe Routes to School program, students at four elementary schools were surveyed regarding their preferred travel mode to school and their actual travel mode to school.[68] The survey showed that far more students wished to bike to school than were able to (compare Figures 18 and 19). Many of these walked to school; many more were driven in an automobile.

The preference of many students for bicycling may reflect these students' view of bicycling as a "fun" way of getting around. Experience indicates that many youths find bike riding enjoyable and exciting. Many youth associate bicycling with independence and freedom. Tapping into the attraction bicycling holds for young people may reduce traffic congestion associated with schools and may also lead to healthier transportation among youth.

[63] Metra, Office of Planning and Analysis. *2003 System-Wide Bicycle-Parking Inventory Report.* August, 2004. p. 1.

[64] Ibid., p. 22. Note the following (ibid.): "Some stations along the South Chicago and Blue Island Branches on the Metra Electric Line, the Hegewisch Station on the South Shore Line, and the 95th Street (Longwood), 103rd Street (Washington Heights), and Gresham Stations on the Rock Island District Line were conducted in October 1997." See also the report's discussion regarding the methodology for the inventory regarding caveats for the comparison.

[65] At all stations, 2,557 of the official spaces were of good quality, while 1,410 spaces were of marginal quality (e.g., "schoolyard" racks to which one cannot lock the frame to the rack using a standard U-shaped bicycle lock), and 167 spaces were unusable. Ibid., p. 1.

[66] Chicago Transit Authority Bike Count Database.

[67] Chicago Transit Authority. *Bike to Transit Program Progress Report.* May, 2003.

[68] Source: Chicago Deaprtment of Transportation. Chicago Safe Routes to School Program http://www.biketraffic.org/saferoutes/index.html [Chicagoland Bicycle Federation]

Figure 18
Preferred Travel Mode To School

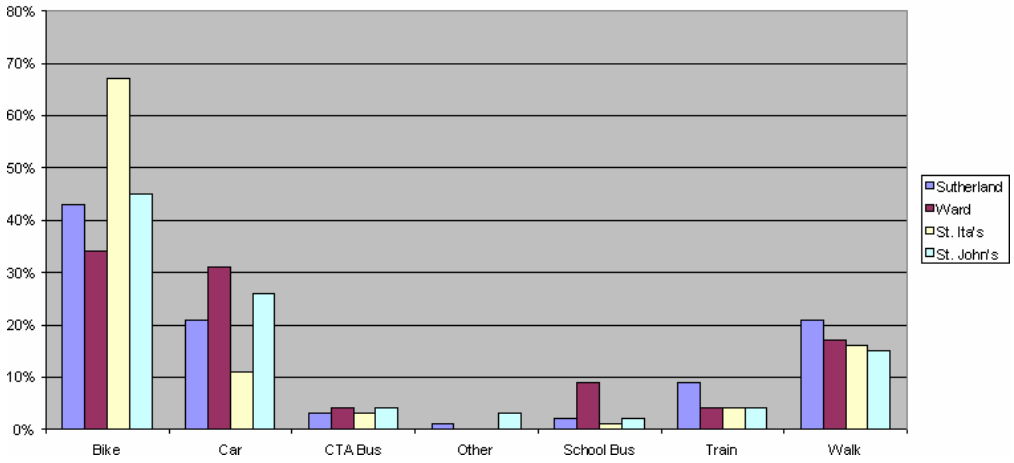


Figure 19
Travel Mode To School

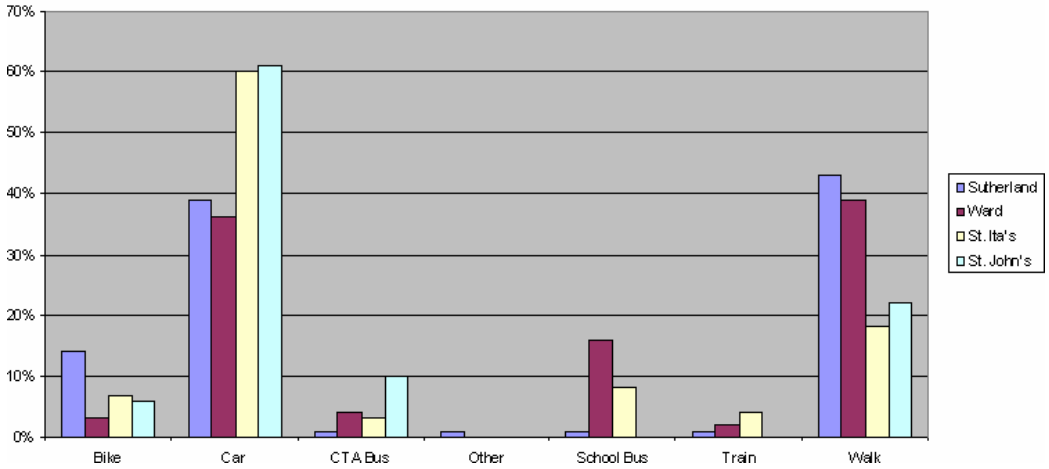
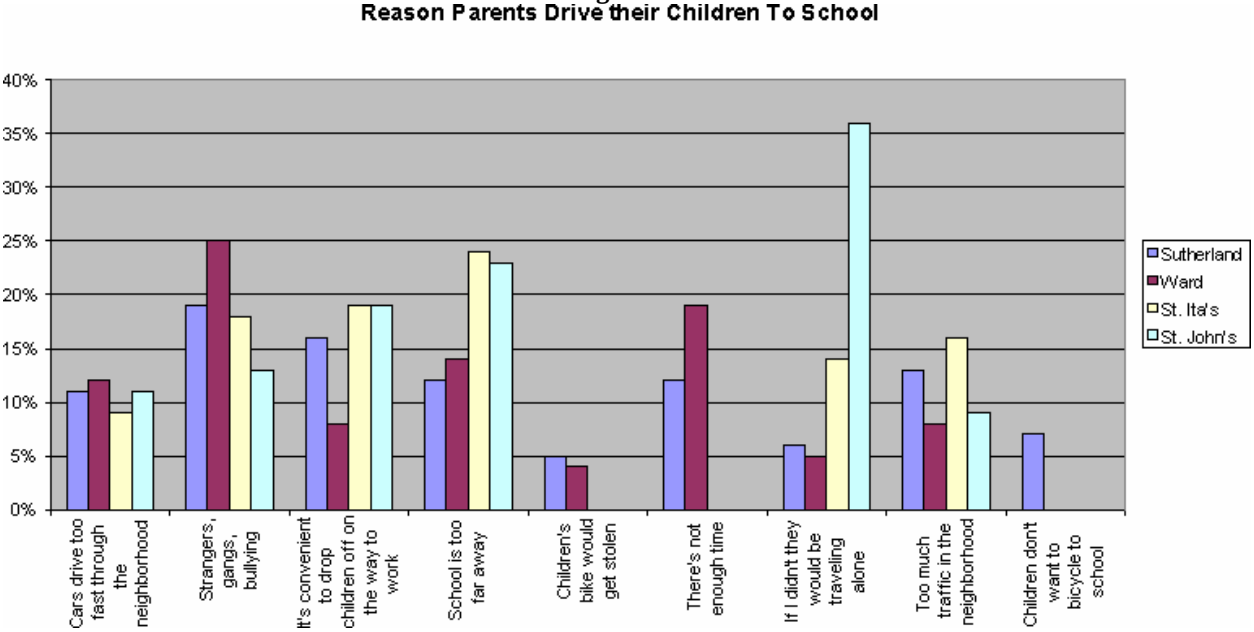


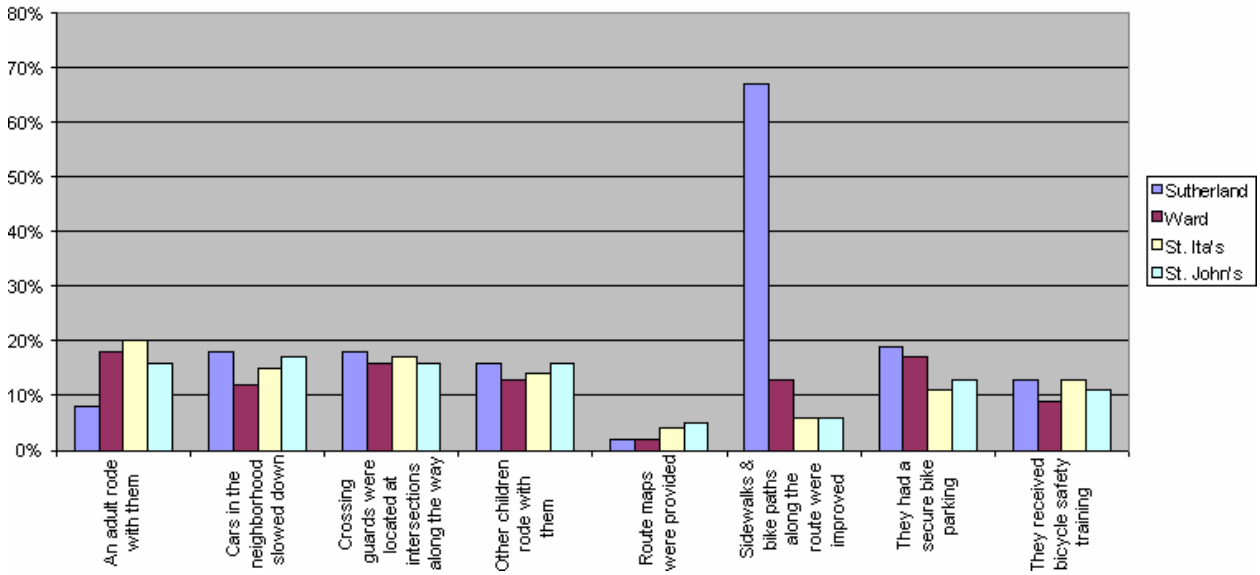
Figure 20
Reason Parents Drive their Children To School



Parents were also surveyed as part of the project. Figure 20 shows why parents drive their children to school. A brief review of these problems shows that some can be resolved. Specifically, while some security concerns cannot be addressed in the context of the transportation system, many concerns leading parents to drive their children to school are related to the transportation system and can be addressed through the development, management, and operation of the transportation system. Specific measures the parents indicated may lead to letting their children bicycle to school are shown in Figure 22.[69]

Figure 21

Parents Would Allow Their Children Bicycle To School If:



[69] Ibid.

The above schools are in the City of Chicago. Regionally, NHTS data undercounts school trips (a preliminary analysis indicates that only 15% of the expected trips are accounted for). However, among the trips tabulated, certain patterns are apparent. 61% of school trips in the region are estimated to be by car, truck, van, or SUV. An additional 25% are by bus or rail (21% by school bus). The remainder, 14%, are estimated to be walking trips.[70]

More research may help to determine where in the region walking and bicycling to school works, and whether the success of those places can be replicated elsewhere. It appears from the data that there is a willingness among students to walk and bicycle to school if the conditions are right. Likewise, many others in the region walk and bicycle under the right circumstances. Among the conditions that need to be me is the walkability and bikability of the roads and streets of our region. Such walkability and bikability are the next topic covered by this report.

[70] NHTS, 2001. CATS analysis. As noted previously, NHTS data is not meant for regional analysis. However, analyses here are useful for indicating northeastern Illinois trends to investigate in the absence of our own recent survey. Further research should be carried out to determine whether problems in NHTS data were also carried over to other large, transit-heavy metropolitan areas.

How Walkable and Bikeable is Our Region?

Land Use, Development, and Non-motorized Transportation

Non-motorized transportation and transit access are strongly related to land use and urban form. Some "essential" elements of pedestrian- and transit-friendly design have been identified.[71] We will review these elements, identify data to measure the elements in northeastern Illinois, and point out trends in the data.

Compact Development

Walking and bicycling for transportation is easiest when development is compact. This issue has received a lot of attention in northeastern Illinois. We will show here that some of the trends toward less compact development of the past few decades show early signs of reversing themselves.

Compact development is one of the essential elements of pedestrian-friendly design:

- more residents or employees within walking distance of transit stops or stations;
- more street life and the added interest and security that comes with having more people around;
- a greater propensity to walk or use transit; and
- lower auto ownership rates.[72]

High densities are especially important at ground level. High-rise development surrounded by acres of parking and lawns often does not add up to provide high-density development, and makes people "uncomfortable." Instead, small-scale buildings with lot coverage ratios of 50 to 70% are more suited to walkability.[73]

Information on how widespread such development is within northeastern Illinois is shown in Table 16. The table shows remote sensing land coverage data for northeastern Illinois in 2001. The data indicates that compact development is widespread. The data shows that Cook County in particular has a significant part of its area, and more than 30% of the urban development, with dense land coverages. For this last measure, collar counties range from 17% to 22%.

Another aspect of the table to note is that despite the high level of urban development in northeastern Illinois, a large portion of the region remains as urban open space, forests, wetlands, water, or agricultural developments.

[71] Reid Ewing. *Pedestrian- and Transit-Friendly Design: A Primer for Smart Growth.* U.S. Environmental Protection Agency [Smart Growth Network]. 2001?

[72] Ibid., p. 3.

[73] Ibid.

Table 16
Land Cover, Northeastern Illinois, 1999-2000
Thousands of Acres Based on Remote Sensing Data

Predominant Land Cover		Cook	DuPage	Kane	Lake	McHenry	Will	Total
Urban and Built-up Land	High Density	120	23	10	14	5	16	188
	Low/ Medium Density	263	82	40	64	25	58	532
	Urban Open Space	106	61	33	67	36	55	346
	Subtotal	489	167	83	145	66	129	1,067
	High Density as a Percent of Subtotal	25%	14%	12%	10%	8%	12%	18%
	High Density as a Percent of High+Med+Low	31%	22%	20%	18%	17%	22%	26%
Agricultural Land		22	10	218	55	259	344	920
Forested Land		78	30	28	69	48	43	296
Wetland		9	4	3	13	8	12	49
Other		15	4	4	18	9	15	65
Total		612	215	335	301	391	543	2,397

Prepared by the Chicago Area Transportation Study, September 2003. Source: Illinois Department of Agriculture *Land Cover of Illinois Statistical Summary, 1999-2000.*[74] Revised May, 2004 with Version 2 data released 11/03.

During the 1970's and 1980's, the trend in northeastern Illinois was toward dispersed, rather than compact development. Separated communities grew rapidly. Some suburbs developed with low population and employment densities. Overall, from 1970 to 1990, non-agricultural development accounted for 36 percent of the total region's land area, or 1,350 square miles. In 1990, such development accounted for 49 percent of all land – 1,837 square miles. This change is equal to a 36 percent increase in land development over 20 years. During this same period of time, the population of northeastern Illinois increased by 4 percent.[75]

Some data suggests that during the 1990's, many of these trends stabilized or began reversing. For example, household sizes appear to have stabilized. Average household size decreased from about 3.3 persons per household in 1950 to 3.14 in 1970, then dropped dramatically to 2.72 persons per household in 1990. This accounted for a large part of the increased urban land development. However, from 1990 to 2000, the rate remained relatively stable at 2.73 persons per household. [76]

Likewise, there are early indications of a trend toward more compact development and growth. Table 17 shows the population density on non-agricultural land in the six-county region. The table demonstrates that, even while the non-agricultural area may be growing, the growth is becoming

[74] "High Density" means that most (> 50%) of the land surface is covered with human structures. "Low/Medium Density" is defined as being up to 50% covered with human structures, intermixed with other cover such as urban open space, forest, and partial forest/savanna lands. "Urban Open Space" includes parks, golf courses, cemeteries, and other grassland-like cover within urban and built-up areas. Areas of low/medium density will be intermixed with Urban Open Space. See http://www.agr.state.il.us/gis/stats/landcover/mainpages/glossary.htm for more information on definitions. The source for the remote sensing data was Landsat imagery with a 30 meter by 30 meter pixel resolution. When comparing to other data note the low resolution and that this data reflects land coverage (*objects* detectable from the air) rather than use (*activities* not detectable from the air). General information about the data is at http://www.agr.state.il.us/gis/landcover.html#intro.

[75] Source: Northeastern Illinois Planning Commission. *1990 Land Use in Northeastern Illinois Counties, Minor Civil Divisions, and Chicago Community Areas.* Bulletin 95-1. June 1995.

[76] Source: Chicago Area Transportation Study. *2020 Regional Transportation Plan, 2000 Edition,* and Northeastern Illinois Planning Commission. *Census 2000 General Demographic Profile.* http://www.nipc.cog.il.us/gdp_highlights.htm

more compact. In each of the six counties tabulated, non-agricultural land became more intensely developed over course of the 1992-1997 period.

Interestingly, the overall six-county rate of increase is slower than each component. This derives from more rapid growth occurring in the collar counties than in Cook County. Table 18 shows that as a result of this faster growth, the collar counties have an increasing portion of the region's population.

Table 17
Persons per Thousand Non-Farm Acreage, Northeastern Illinois, 1987-1997

Variable and Year		Cook	DuPage	Kane	Lake	McHenry	Will	Total
Population per Thousand Non-Farm Acres	1987	9,145	3,910	2,782	2,202	1,323	1,580	5,065
	1992	9,099	4,139	2,531	2,378	1,416	1,732	5,020
	1997	9,280	4,415	3,005	2,435	1,627	1,808	5,096
% Change in Above	1987-1992	- 0.5	5.9	-9.0	8.0	7.0	9.6	-0.9
	1992-1997	2.0	6.7	18.7	2.4	14.9	4.4	1.5

Prepared by the Chicago Area Transportation Study, September, 2003. Sources: US Department of Agriculture National Agriculture Statistics Service, *Census of Agriculture* (1987, 1992, 1997); Chicago Area Transportation Study; US Census Bureau, Northeastern Illinois Planning Commission. For details on sources and the calculations used to derive these numbers, see Appendix 3.

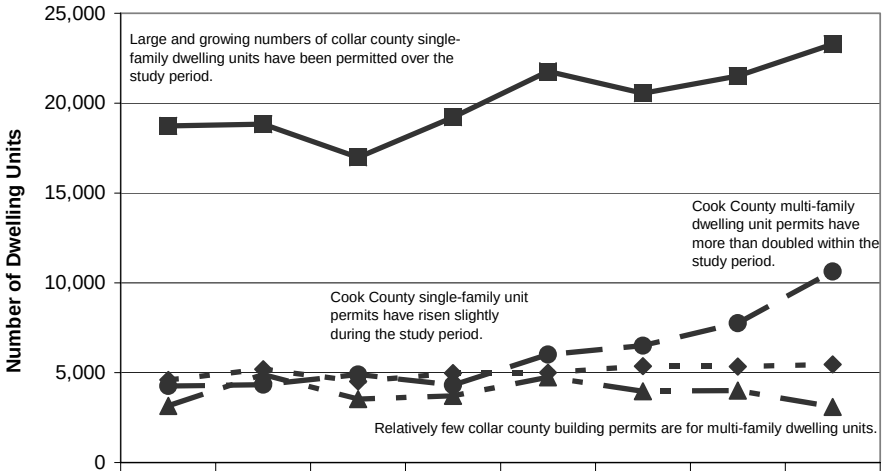
Table 18
Percent of Six-County Population in Each County, Northeastern Illinois, 1987-1997

Year	Cook	DuPage	Kane	Lake	McHenry	Will
1987	71.8	10.3	4.1	6.7	2.3	4.7
1992	69.6	10.9	4.5	7.3	2.7	5.0
1997	67.6	11.1	4.8	7.7	3.1	5.7

Prepared by the Chicago Area Transportation Study, September, 2003. Sources: U.S. Census Bureau, Northeastern Illinois Planning Commission. For details regarding sources, see Appendix 3.

So far we have seen that all parts of the region may be growing more compactly than in the past, but that population growth tends to be highest in the collar counties. Other data is available to characterize the development. For example, the Northeastern Illinois Planning Commission tracks residential development by way of building permits. From this information it is possible to get a rough measure of relative density in new development. Multi-family units generally require less land per housing unit. Multi-family units are more often constructed in mixed-use areas with access to transit. Figure 22 illustrates the differing patterns of residential development in Cook County and the collar counties. The data shows that although single-family collar county land development continues, a strong market for multi-family housing has developed in Cook County.

Figure 22. Building Permits, Northeastern Illinois, 1995-2002



	1995	1996	1997	1998	1999	2000	2001	2002
Cook County Single-Family Units	4,605	5,196	4,519	4,976	4,997	5,369	5,339	5,462
Cook County Multi-Family Units	4,257	4,333	4,910	4,305	6,011	6,508	7,754	10,640
Collar County Multi-Family Units	3,156	4,899	3,535	3,721	4,742	3,972	4,009	3,096
Collar County Single-Family Units	18,739	18,837	16,987	19,225	21,770	20,558	21,516	23,282

Year

Prepared by the Chicago Area Transportation Study, September, 2003
Source: NIPC. The Number and Value of Housing Units Authorized by Residential Building Permits in Northeastern Illinois. http://www.nipc.cog.il.us/permits.htm. Compiled from U.S. Bureau of the Census, Manufacturing and Construction Division.

Quite a bit has been written over the past decade about dispersed development patterns in northeastern Illinois. The above analysis shows that while the population is dispersing, a countervailing trend may be developing that will result in more households living in areas compact enough to facilitate walking and bicycling trips.

Mix of Land Uses

Another essential ingredient of a walking- and transit-friendly community is a mix of land uses.[77] This can either occur with developments that mix uses as an integral part of the development, or which are proximate to other uses. The historic railroad suburbs of northeastern Illinois tend to contain elements of both of these formulae for mixing land uses.

To analyze mixed-use development trends in northeastern Illinois, staff reviewed information from the regional travel demand model regarding the number of local trips. The travel demand information takes into account socioeconomic forecasts reflecting to a degree the development plans of local communities. Thus, the data reflects the balance of attractions between planned local economic development and planned regional centers or competing local centers in attracting trips.[78] Table 19 summarizes the data and shows that the number of local (intra-zonal) trips is projected to rise between 2005 and 2030. On the other hand, as a percentage of total trips, the gains are more modest or disappear. This may indicate that while the mixing land uses may continue, such land development is projected to grow only enough to maintain current local trip ratios. On the other hand, the projected increase in local trips may point to increasing levels

[77] Ewing, op cit., p. 3

[78] Importantly, the model also takes into account the travel costs of a congested transportation network. For a detailed review of the methods employed, see Appendix B to the Conformity Analysis Documentation for the 2030 Regional Transportation Plan for Northeastern Illinois (CATS, October, 2003).

of non-motorized trips, and may help to demonstrate the need to focus on accommodating those trips. The data shows that this increase in non-motorized trips will hold true particularly for home-based non-work trips and non-home-based trips.

Table 19
Projected Local (Intra-zonal) Trips by Trip Type and District
Northeastern Illinois, 2005 and 2030

Home-Based Work Trips:						
	2005			2030		
	Local Trips	Total Trips	% Local	Local Trips	Total Trips	% Local
Chicago Transit Hub	6,441	252,444	2.6%	10,081	350,702	2.9%
Remainder of Chicago and Cook County	50,494	3,597,202	1.4%	57,558	3,987,765	1.4%
Collar Counties	41,439	2,406,455	1.7%	64,205	3,210,117	2.0%
Total	98,374	6,256,102	1.6%	131,844	7,548,584	1.7%
Home-Based Other Trips:						
	2005			2030		
	Local Trips	Total Trips	% Local	Local Trips	Total Trips	% Local
Chicago Transit Hub	192,698	374,961	51.4%	296,383	502,572	59.0%
Remainder of Cook County	365,768	6,183,394	5.9%	406,949	6,730,388	6.0%
Collar Counties	369,495	4,176,000	8.8%	552,784	5,837,810	9.5%
Total	927,960	10,734,356	8.6%	1,256,116	13,070,770	9.6%
Non-Home-Based Trips:						
	2005			2030		
	Local Trips	Total Trips	% Local	Local Trips	Total Trips	% Local
Chicago Transit Hub	258,004	951,193	27.1%	332,076	1,130,975	28.5%
Remainder of Cook County	187,291	2,989,212	6.3%	168,889	3,441,772	4.9%
Collar Counties	100,819	2,233,715	4.5%	155,883	3,041,784	5.1%
Total	546,114	6,174,120	8.8%	646,848	7,614,531	8.5%

Source: Chicago Area Transit Study. Internal data prepared for the Conformity Analysis of the 2030 Regional Transportation Plan, October, 2003. Note: The "*Chicago Transit Hub*" is here defined as being bounded by Fullerton on the north, 31st Street on the south, Western on the west and Lake Michigan on the east. "*Local*" means intrazonal trips. Zone sizes are context-sensitive. They vary from 1/16 of a square mile in the Chicago Loop to 9 square miles in western Kane and southern Will Counties. Thus, while comparisons across time are valuable, direct comparisons between Chicago and the Collar Counties may not be fruitful.
Note: Staff intends to make this analysis more general as part of improvements to the trip generation system.

Short to Medium Block Lengths

Block lengths are another essential feature of walking- and transit-friendly design.[79] Not only do short blocks reduce the distances traveled for walkers as they travel, but also provide opportunities for increased activity (encouraging a greater share of non-motorized trips).

[79] Jane Jacobs. *The Death and Life of Great American Cities*. Random House Modern Library Edition, 1993, pp. 233-243. Originally published 1961.

For example,

> For a high degree of walkability, block lengths of 300 feet, more or less, are desirable. Blocks of 400 to 500 feet still work well. This is typical of older urban areas. However, as blocks grow to 600 to 800 feet or, even worse, to superblock dimensions, adjacent blocks become isolated from each other.[80]

In northeastern Illinois block lengths vary considerably. In Chicago's Central Area, block lengths are typically 300' from east to west and 360' from north to south.[81] Many 19th century suburban downtown areas have block lengths up to 600'. Most other areas have higher block lengths.

CATS' pedestrian environment factor illustrates this region-wide. The pedestrian environment factor for a quarter section (quarter square mile) is the average number of blocks for the quarter section being measured and the eight adjacent quarter sections. The Chicago Loop has an unweighted PEF of 64 (300 feet X 360 feet blocks). Dense city neighborhoods may have a typical PEF of 32 (typically 330 feet X 660 feet); older suburbs, a PEF of 10-20 (block lengths averaging 835 feet to 590 feet per side, respectively), and newer suburbs 5 or less (block lengths averaging more than 1180').[82]

Table 20 shows 1990 PEF values weighted by households by district for northeastern Illinois.[83] The table demonstrates the block lengths traversed by walkers for typical home-based trips in northeastern Illinois. The data shows that while most of Chicago's households are in PEFs indicating short block lengths and corresponding high walkability, lower PEFs abound in the collar counties, particularly in Lake, McHenry, and Will Counties.

Examples of Developments that Encourage Bicycling and Walking

Many efforts are underway in northeastern Illinois to implement land use strategies that facilitate non-motorized travel. These strategies impact density, mixes of use, and the street grid pattern. They are being implemented by government and and the private sector in urban and suburban settings.

[80] Ewing, op cit., p. 4

[81] Chicago Department of Planning and Development. *Chicago Central Area Plan. [Draft Final Report]* 2003. p. 13.

[82] Ronald Eash. "Enhancing Public Transportation and Non-Motorized Modes' Performance in the Regional Transportation Planning Models." *Proceedings of the Metropolitan Conference on Public Transportation Research.* Chicago, June 7, 1996. P. 291-292.

[83] PEF's have not been recalculated for the 2000 census. In addition, they are not projected for the future as part of socio-economic forecasts established by NIPC. Given the importance of this variable in determining the walkability of a community, thought should be given to forecasting this variable. In addition, the values should be recalculated for the 2000 census. An analysis of PEFs for the housing development that occurred in the period from 1990 to 2000 would be useful. These analyses would need to be accomplished as part of future work programs to update the CATS travel demand model inputs.

Table 20
1990 Pedestrian Environment Factors Weighted by 2005 Projected Households
Northeastern Illinois, by District

District	Weighted Pedestrian Environment Factor	Corresponding Average Block Length (Feet)
Chicago CBD	32.8	461
Chicago Balance	26.31	514
Cook Balance	15.58	669
DuPage	10.56	812
Kane	10.76	804
Lake	8.18	923
McHenry	6.22	1,059
Will	7.16	987

Source: Chicago Area Transportation Study. Internal data prepared for the air quality conformity analysis of the 2030 Regional Transportation Plan. August, 2003. These PEF's were calculated somewhat differently than Eash's, but with similar results. The right column was calculated by Soles and Spokes staff.

The strategies are typically market driven. Higher prices for vacant residential land may be driving the adoption of some strategies. At the same time, while large lot single family homes dominate the suburban housing market, developers have realized that there may be profitable niches for pedestrian- and transit-friendly developments in the marketplace.

Figure 23. Centennial Crossing, Vernon Hills.

Digiair digital aerial photo, Engineering Mapping Solutions. Summer, 2002.

There is extensive public and private interest in mixed-use development. The communities of Riverdale, Hanover Park, Highwood, Park Forest, and Richmond have sought input regarding development patterns. Several of the recommendations in these processes focused on mixed-use, compact development with a well-woven street grid.[84] In Oak Park, a coalition formed to maintain the mixed-use character of a development parcel across the street from an el station.[85]

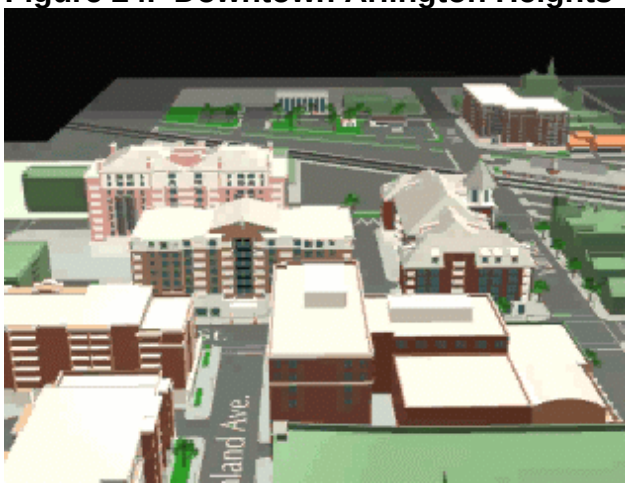
The efforts have led to such

[84] Urban Land Institute, Chicago District Council. *Creating a Village Center Using Transit Oriented Development: Hanover Park, Illinois.* August, 2003; *Park Forest: Building on the Legacy: Creating a New Downtown.* October, 2003. *Riverdale, Illinios: A Vision for the PaceSetter Neighborhood*, October, 2003. *New Places for a Changing Population: Highwood, Illinois,* May, 2003. *Invest in the Past to Plan for the Future: Richmond, Illinois,* April, 2003. Technical Assistance Panels. Co-sponsored by the Campaign for Sensible Growth. Posted at the co-sponsor's Web site at http://www.growingsensibly.org/resources/publications.asp.

[85] Save Our Retail Coalition. *Ridgeland CTA Station Area Redevelopment Vision Plan.* 2002. See http://www.e-int.com/save.our.retail

developments as Centennial Crossing in Vernon Hills, pictured in Figure 23. Here, development is compact, is adjacent to other land uses and transit service (a Metra station across U.S. 45), and is characterized by block lengths in the 300-600 foot range. Several block faces have frontage on a footpath, with alleys providing auto access. The development was very successful.

Figure 24. Downtown Arlington Heights



Source: Village of Arlington Heights Web site, October, 03. http://www.vah.com/info/cbd.asp#

While Centennial Crossing was the first recent neighborhood in suburban northeastern Illinois to adopt traditional neighborhood design (TND), many others have adopted the concept recently.[86] These include The Glen, a 1,181 acre redevelopment of the decommissioned Glenview Naval Air Station, developed by the Village of Glenview. The Glen includes residential neighborhoods, recreation, commerce, and a new train station. Other developments are adopting TND.[87]

Compact development, mixed uses, and short block lengths can also be created by the strategic redevelopment of key sites in a mature community. Such was the strategy employed in Arlington Heights as it planned for the improvement and reinvigoration of its downtown area (see Figure 24).[88]

So far, we have seen that Cook County, particularly the loop district, are characterized by higher densities, higher levels of mixed-use development, and shorter block lengths. These factors result in a higher level of walkability than the surrounding areas. This higher level of walkability may be valuable in explaining the higher level of non-motorized activity we saw in the core of the region in the previous section of this report. Likewise, new trends toward denser suburban development and mixed land uses may lead toward increasing levels of non-motorized activity region-wide. We will now explore the ability of the transportation system to accommodate this travel, first exploring the relation with the transit system, then through direct accommodations for bicycling and walking.

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[86] Traditional neighborhood development is an urban design movement advocating elements of late-19th and early 20th century town planning that include well-connected streets and mixed use development dense enough to have large numbers of origin-destination pairs within walking and biking distance. Several northeastern Illinois towns that grew during late-19th and early 20th century (e.g., Oak Park, Evanston) have many of the features of TND.

[87] Planned and existing examples include Hometown in Aurora and Prairie Crossing, a development in Grayslake named for the crossing of two commuter rail lines. Prairie Crossing used elements of TND, particularly with higher-density housing and planned mixed-use development near the two adjacent Prairie Crossing/Libertyville Stations on the North Central Service and Milwaukee District North Lines (the latter station opened in April, 2004). However, while the development is admirable, it is important to note that it is primarily focused on keeping densities low -- the development is billed as a "conservation community." For the 677 acre site, only 359 homes are planned. An earlier development plan for the site included 2,400 homes. See http://www.prairiecrossing.com/pc/site/about-us.html. Large-scale redevelopment examples in Chicago include the Henry Horner Homes redevelopment and the northern third of the USX South Works site.

[88] Many of the developments discussed here are also considered “transit-oriented design,” (TOD)a concept related to TND but which has the added emphasis of providing connectivity to transit system. Transit connectivity is discussed in detail in the next section.

Non-motorized Transportation in Our Transportation System

This section explores how well the transportation system accommodates walking and bicycling. First, we will discuss the relationship between transit and non-motorized transportation. Next we will approach pedestrian and bicycle transportation facilities from a level of service perspective, from a inventory perspective, from a barrier crossing perspective, and finally from a perspective of population groups needing accommodation.

Transit and Non-Motorized Transportation

Transit and non-motorized transportation are mutually supportive. Most transit riders use non-motorized access or egress for part of their transit trip. Likewise, transit service provides an extension and alternative to foot travel. Having a combination of reliable transit service and a walkable and bikable community allows for a more complete alternative to automotive travel.

Many parts of northeastern Illinois have excellent transit service, with frequent service and good geographic coverage. Some parts of the region lack this service. We reviewed transit's geographic coverage, an essential condition for a walking-friendly community. In particular, since the median walking access trip for transit was approximately one-quarter mile, parallel transit service should be provided every half-mile.[89] To see how well different districts of northeastern Illinois met this service standard, *Soles and Spokes* analyzed the current transit service network and the 2000 Census of Population. The results are shown in Table 21. The data show that the City of Chicago has comprehensive transit service coverage, further enhancing the walking environment. Suburban transit coverage is variable, and ranges from over 70% of the population in suburban Cook and DuPage Counties to less than half of the populations in McHenry and Will Counties.

Table 21
Population within One-Quarter Mile of Transit Service
Northeastern Illinois, by District, 2000

District	Percentage of Total Population within One-Quarter Mile of Transit Service
City of Chicago	98
Cook Balance	72
DuPage	64
Kane	64
Lake	80
McHenry	27
Will	43
Total	75

Source: Chicago Area Transportation Study. Internal data prepared for the air quality conformity analysis of the 2030 Regional Transportation Plan. August, 2003. For this analysis, the population of a block was tabulated as within .25 miles of transit service if any part of the block was within a .25 mile buffer of a bus route (excluding suburban express routes) or rail station. The 2000 population was compared with the 2003 transit network. NOTE: The bus service excludes paratransit, which are nearly universal in northeastern Illinois. However, as these often provide door-to-door service, they are not necessarily related to the walking environment, as fixed route service is.

[89] Ewing, op cit., page 5.

We did not conduct a any region-wide analysis of walking and biking access for transit customers. However, some information is available. For example, a 1996 stated preference survey of station users conducted as part of the Regional Transportation Authority's *Non-motorized Access to Transit Study* showed that the walking and biking environment were a barrier to walking and bicycling for a significant share of transit customers.[90] Using this survey data, a model was developed which indicated that sidewalks or recreation paths, traffic speed, "no turn on red" restrictions at signalized intersections, and crosswalks were statistically significant factors that affect walking to CTA stations. Debris, bicycle parking, curb lane conditions and traffic speed affect biking to these stations. For Metra stations, sidewalks or recreation paths, traffic speed, "no turn on red" restrictions at signalized intersections, crosswalks, pedestrian signals, and pedestrian refuges in roads and streets affect walking. Biking to Metra stations was affected by bicycle parking and curb lane conditions.[91] Applying the model results to several case study communities showed that pedestrian and bicycle improvements could result in more transit customers using these modes, potentially reducing the demand for more expensive off-street parking.[92]

Non-motorized accommodations in several specific geographic areas need to be noted. First, a signal system timed for pedestrian travel complements downtown Chicago's transit system and amenable development pattern. Loop traffic signal cycle lengths are 75 seconds, almost exactly the time it takes for the leading edge of the platoon of pedestrians to travel from one signal to the next on east-west streets leading from the largest commuter rail stations.[93]

Second, in some suburbs, rails to trails projects as well as other path projects are often useful not only for their recreation aspects but as pedestrian and bicycle access to transit stations. It is common to see people using parts of the Illinois Prairie Path on their way to and from commuter rail. More such transit access is anticipated. For example, In Elgin, a bicycle network is being developed with the National Street station as a major node. Along the Metra Milwaukee District North Line, the proposed Techny Trail is expected to link communities with rail stations.

Pedestrian and Bicycle Facilities - A Level of Service Approach

A pedestrian facility is an accommodation provided anywhere that a pedestrian would want to walk. This includes along roadways and highways, on sidewalks and on multi-use off-road trails. Since we have shown that most pedestrian trips are less than a mile, the *Soles and Spokes Plan* is

[90] Regional Transportation Authority. *Non-motorized Access to Transit. Final Report.* 1996.

[91] Ibid. pp. 4-4 to 4-8

[92] Ibid. pp. 6-1 to 6-15.

[93] *Soles and Spokes* measured the cycle length and pedestrian walking times. The pedestrian speed works out to about 5.6 feet per second -- quite fast by most measures (the national average is about 4); but attained by a surprisingly large number of Loop walkers. Faster average walking speeds of pedestrians in large cities has been documented. See William Whyte's *City* (New York: Doubleday, 1988) Chapter 4: The Skilled Pedestrian. Chicago's Loop signals are timed so the leading edge of the pedestrian platoon doesn't bunch up on the curb, but has the impact of having slower travelers bunching up at the end of the cycle, frequently beginning to cross during the pedestrian clearance interval. The Chicago Loop signal system, with uniform cycle lengths to be operated simultaneously is optimal for vehicles as well. For closely spaced intersections with balanced flows, the optimal signal timing plan is simultaneous coordination (signal cycle offsets = 0). With simultaneous coordination, the issue becomes cycle length and signal splits (Gordon Newell, *Theory of Highway Traffic Signals* University of California at Berkeley Institute of Transportation Studies. Course Notes UCB-ITS-CN-89-1. June, 1989, p. 370). Here the Chicago Department of Transportation was able to consider pedestrian travel in determining cycle length. The CMAQ program funded improvements to this signal system. More study of this may be useful.

not concerned with documenting a regional network of pedestrian facilities, but rather with defining pedestrian facilities as an accommodation along and across roadways and paths. Typically, these facilities are in the form of sidewalks, paths, and crosswalks. They can also include shoulders where traffic volumes and speeds are low. A grassy right-of-way is sometimes an alternative for the able-bodied. However, good pedestrian accommodation is an accessible sidewalk physically separated from traffic by a parkway or some physical barrier such as a fence.[94,95] Modern roadway design recognizes that pedestrians will be walking along all roads and streets with developed frontage. In addition, a mixture of bicycles and pedestrians will use all off-road trails.

A bicycle facility is anywhere that a cyclist would want or need to ride. This includes both roadways and multi-use trails. According to the American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities*, an on-road bicycle facility is defined as any roadway upon which bicycles are not specifically prohibited. The AASHTO *Guide* further separates designated or signed bikeways into three major categories: off-road paths, on-street bicycle lanes and signed on-street routes. The *Guide* provides design guidance and technical definitions for each one.[96]

In order to assess the current level of pedestrian and bicycle accommodation along roadways, the *Soles and Spokes Plan* has utilized Pedestrian Level of Service (PLOS) and Bicycle Level of Service methodology and tested them for application in the CATS region.

Level of Service Measures

The Soles and Spokes plan emphasizes performance measures for evaluating existing walking and bicycling conditions and for tracking future progress. In recent years, models such as Bicycle Level of Service (BLOS) and Pedestrian Level of Service (PLOS) have been developed to quantify the perceived comfort level of both on-road cyclists and pedestrians along the road.[97]

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[94] AASHTO's Fourth Edition of *A Policy on Geometric Design of Highways and Streets* (Washington, D.C., American Association of State Highway and Transportation Officials, 2001) [*Green Book*] says the following (among other guidance, all on page 362):

- "In general, wherever roadside or land development conditions affect regular pedestrian movement along a highway, a sidewalk or path area, suitable to conditions, should be furnished."
- "As a general practice, sidewalks should be constructed along any street or highway not provided with shoulders, even though pedestrian traffic may be light. Where sidewalks are built along a high-speed highway, buffer areas should be established so as to separate them from the traveled way."
- "Sidewalks should have all-weather surfaces to assure their intended use."
- "Pedestrian facilities such as sidewalks must be designed to accommodate persons with disabilities."

[95] In this document, as is usual in northeastern Illinois, "parkway" is defined as a planted area between the roadway and the sidewalk. In other areas, this planted strip may be known as a terrace, boulevard, boulevard strip, grassplot, tree lawn, or parking (*American Heritage Dictionary, 4th Edition).* "Parkway" is referred to in AASHTO's *Green Book* as buffer strips, buffer areas, or planted strips.

[96] AASHTO *Guide for the Development of Bicycle Facilities*, 1999, pp. 6-9. Also see AASHTO, *A Policy on Geometric Design of Highways and Streets*, op cit., page 371.

[97] The CATS Bicycle and Pedestrian Task Force had previously studied the leading bicycle suitability measures. A trial of the BLOS model was used in Kane County's bike plan. Through the work completed in Kane County and elsewhere, BLOS has received an increasing level of acceptance as a suitability measure in the region. The BLOS and Pedestrian Level of Service (PLOS) models were selected to analyze a sample of walking and bicycling conditions throughout the northeastern Illinois. Consultant team member Sprinkle Consulting International developed the PLOS and BLOS models used here.

Bicycle Level of Service

The bicycle level of service model is a method of evaluating the bicycling conditions of shared roadway environments. It uses some of the same physical traffic and roadway factors used to assess highway level of service. However, unlike the motorized LOS measures that focus on speed and capacity, BLOS is an "experiential" measure rating comfort and perceived safety of a range of adult cyclists. This model reflects the effect on bicycling suitability or "compatibility" of factors such as roadway width, bike lane widths and striping combinations, traffic volume, pavement surface conditions, motor vehicles' speed and type, and on-street parking. BLOS is used to analyze mid-block cross-sections, but not intersections.[98]

Pedestrian Level of Service

Similarly, pedestrian level of service evaluates walking conditions from the point of view of perceived comfort and safety. The model reflects walking conditions due to factors such as roadway/street width and striping combinations, presence of a sidewalk, parkway, traffic volume, motor vehicles' speed and type, on-street parking, and other factors. Note that while the BLOS model is a measure of *on-road* bicycling conditions, the PLOS model rates walking conditions *along* the road – or at least out of the travel lanes.[99]

BLOS and PLOS inputs are shown in Table 22. An evaluation of the models is in Appendix D. A key point is that many highway design features associated with pedestrian and bicycle safety are included in these measures.

Table 22
BLOS and PLOS Input Measures

BLOS Input Measures	PLOS Input Measures
ADT - Traffic volume	ADT - Traffic volume
Directional, Peak-to-daily, and Peak Hour Factors	Directional, Peak-to-daily, and Peak Hour Factors
# of through lanes	# of through lanes
Speed limit	Traffic speed
% Heavy Vehicles	Buffer width
Surface condition rating	Sidewalk width
Width of outside lane	Width of outside lane
On-street parking permitted, % occupied parking	On-street parking permitted, % occupied parking
Pavement width to the right of outside lane stripe (including paved shoulder, parking area, bike lane)	Pavement width to the right of outside lane stripe (including paved shoulder, parking area, bike lane)
Parking width (to the right of a bike lane)	Existence and spacing of trees

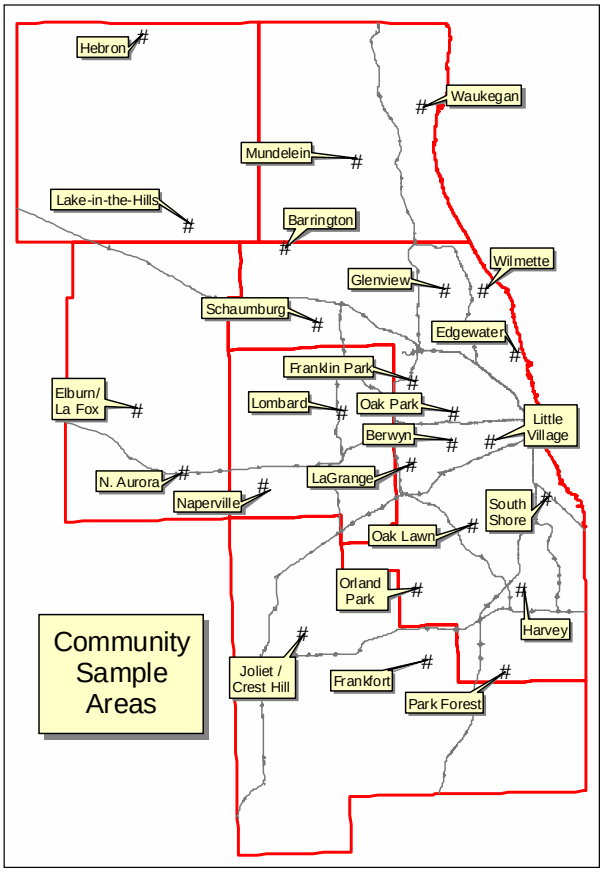
[98] Landis, Bruce W. "Real-Time Human Perceptions: Toward a Bicycle Level of Service" *Transportation Research Record 1578*, Transportation Research Board, Washington DC 1997. [Included in Appendix D]
[99] Landis, Bruce W. "Modeling the Roadside Walking Environment: A Pedestrian Level of Service" in Transportation Research Record 1773, TRB, National Research Council, Washington, DC, 2001. [Included in Appendix D]

Measuring Conditions on Chicagoland Roadways

The *Soles and Spokes Plan* development process applied the BLOS and PLOS models to road corridors in the CATS planning area. To accomplish this, the consultant team sampled roads in the region to collect data for the analysis.[100]

1000 miles of area roadways were measured for their BLOS and PLOS values. A two-faceted sampling methodology was devised to provide a broad sample of existing bicycling and pedestrian conditions throughout the region. Over 700 miles of roadway improvements scheduled in CATS' 5-year Transportation Improvement Program (TIP) were measured. This provided a benchmark for tracking current road design trends – the "before" of future before-and-after studies.[101] In addition, we sampled 25 diverse communities of 2-3 square miles each, located throughout the region.

Figure 25
25 Community Areas Sampled for BLOS and PLOS



Note: Expressway system is shown for orientation only.

The 25 community sample areas (seen in Figure 25) were chosen from the 11 suburban Councils of Mayors and the City of Chicago to represent the full range of urban, suburban, transitional and rural communities. The selected communities provide a diverse distribution of geography, development style, and population density. When possible, each sample area included a range of land-use types,

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100 Ideally, all parameters necessary for BLOS and PLOS calculation could be retrieved from a roadway database. IDOT's Illinois Roadway Information System (IRIS) is the best available source, with data for the vast majority of the region's significant roads. IRIS has the fields necessary to calculate BLOS for roads without on-street parking (if Directional, Peak-to-daily, and Peak Hour Factors are assumed). However, only 25% of IRIS' 10,000+ miles of non-expressway roads in Chicagoland have a complete set of current data. For example, 43% of the miles have old (1995 or earlier) or no traffic volume data. The best data exists for the state roadways, while the quality of local and county-level data varies widely. Other PLOS parameters – including sidewalk and parkway widths – are not included in IRIS. Also, some significant local roads within communities are missing from the database. For these reasons, a data collection effort was found necessary.

101 *Soles and Spokes* has identified the following caveats regarding BLOS and PLOS data:

- BLOS and PLOS data was collected in Winter, 2002-2003. BLOS and PLOS values will change with changing traffic and cross-section values. Thus, the values shown here show a snapshot in time that can serve as a baseline for future comparisons. Staff understands that some of the values have changed in the intervening time. These changes are likely to accelerate for projects in the TIP.
- Bicycles may be prohibited on some of the roads for which BLOS and PLOS was evaluated.
- On-street bicycling was the focus of the BLOS evaluation, with the understanding that some bicyclists prefer on-street cycling because of the benefits of using through arterial routes. Thus, in at least one location (South Shore Drive in the South Shore Community Area), a low BLOS score was registered despite the presence of an adjacent side path.

including retail, industrial, and residential. Other significant destinations, such as the town center and any transit stations, were included.

The community sampling methodology focused on higher order roads, including arterials and collectors. In newer communities, non-grid development often results in arterial and collector streets being the only options available to get anywhere. It should be noted that many older communities with a grid-style roadway system do have side-street alternatives. These quieter roads are often more pleasant for walking and bicycling, especially if they provide direct routes with good crossings of busier roads and a minimum of intersection stops. However, most of the significant destinations are on busier roadways, so data collection focused on these streets in these types of communities as well.

CATS' Transportation Improvement Program (TIP) is northeastern Illinois' agenda of surface transportation projects over the next 5 years. The TIP is includes all project programmed with federal funds, and regionally significant capacity-adding projects programmed with local funds. The roads on this list were measured for their BLOS and PLOS values, except for interstates, simple re-surfacing projects with no change in cross-section, and roads under construction at the time of the sample. TIP roads were chosen as part of the sampling methodology because major roadway projects are an opportunity to improve conditions for bicyclists and pedestrians. TIP roads were examined as a way of tracking how the region's current transportation investments are accommodating non-motorized travel. BLOS and PLOS were measured "before" the projects. "After" can be measured when the projects are eventually completed, or can be calculated based on the proposed changes to the roadway. Comparing the differences will shed light on whether bicycling and walking conditions are improving – or whether opportunities are being lost. Finally, adding non-motorized accommodations as part of the original roadway project is much more cost-effective than doing a retrofit project later, so application of BLOS and PLOS to TIP projects was also seen as a potential cost-saving measure.

Sampling Results - Maps

The following pages provide maps of both the Bicycle Level of Service and Pedestrian Level of Service for each community sampling area and for the region's TIP roads. The ratings have been stratified into grades from "A" (best conditions) to "F" (worst conditions). In motorized LOS ratings, "D" – or even "E" – is often considered acceptable. This is not true for BLOS and PLOS. For example, "C" is sometimes considered a target minimum level for experienced adult cyclists, while a broader range of riders prefer at least a "B".

BLOS and PLOS values on sample roads are shown in Figures 26 through 33. Transit centers and regional trails are shown on the community maps. These two destinations are popular for non-motorized travel. The maps for TIP roads show the region as a whole.[102]

[102] Detailed information on individual roadwork projects or community samples is available on a Geographic Information System (GIS) coverage of BLOS and PLOS data.

Figure 26.
BLOS Community Sample Maps for Orland Park, Chicago South Shore, Oak Lawn, Crest Hill/Joliet, Harvey, LaGrange, Frankfort, and Park Forest

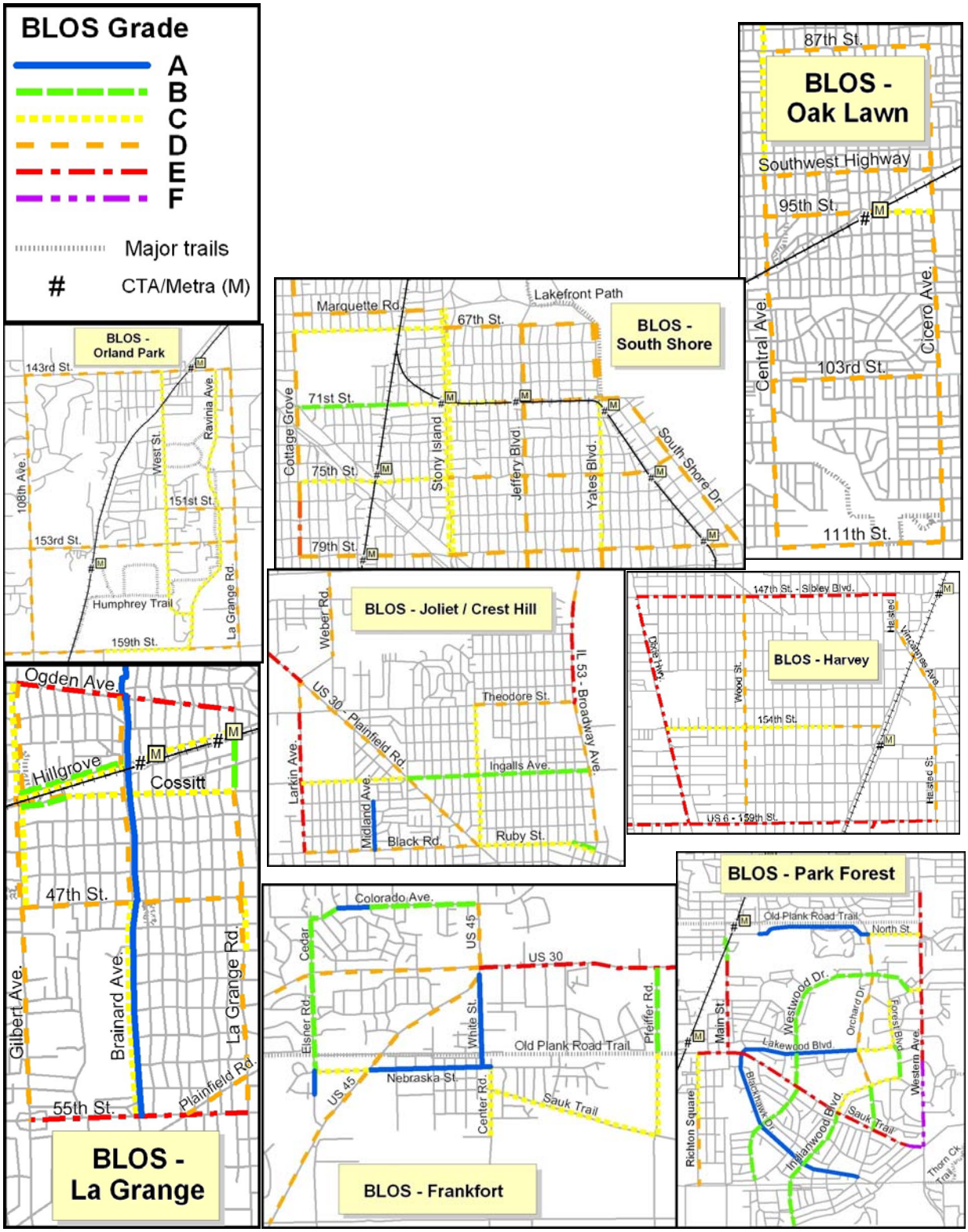


Figure 27
BLOS Community Sample Maps for Glenview, Wilmette, Franklin Park, Chicago Edgewater, Berwyn, Oak Park, Lombard, and Chicago Little Village

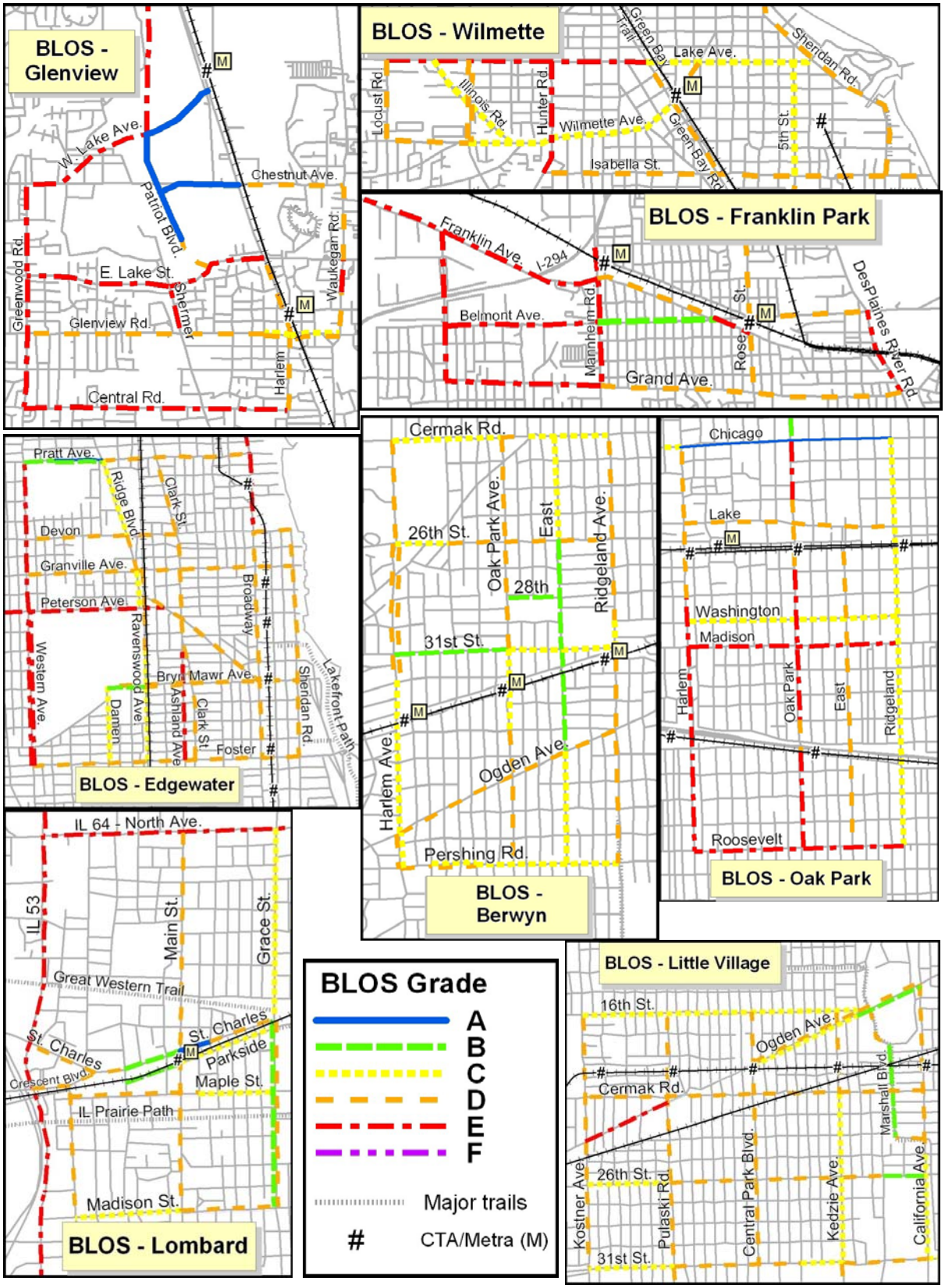


Figure 28
BLOS Community Sample Maps for Hebron, Waukegan, Lake in the Hills, Mundelein, Elburn, North Aurora/Aurora, Barrington, Schaumburg, Naperville

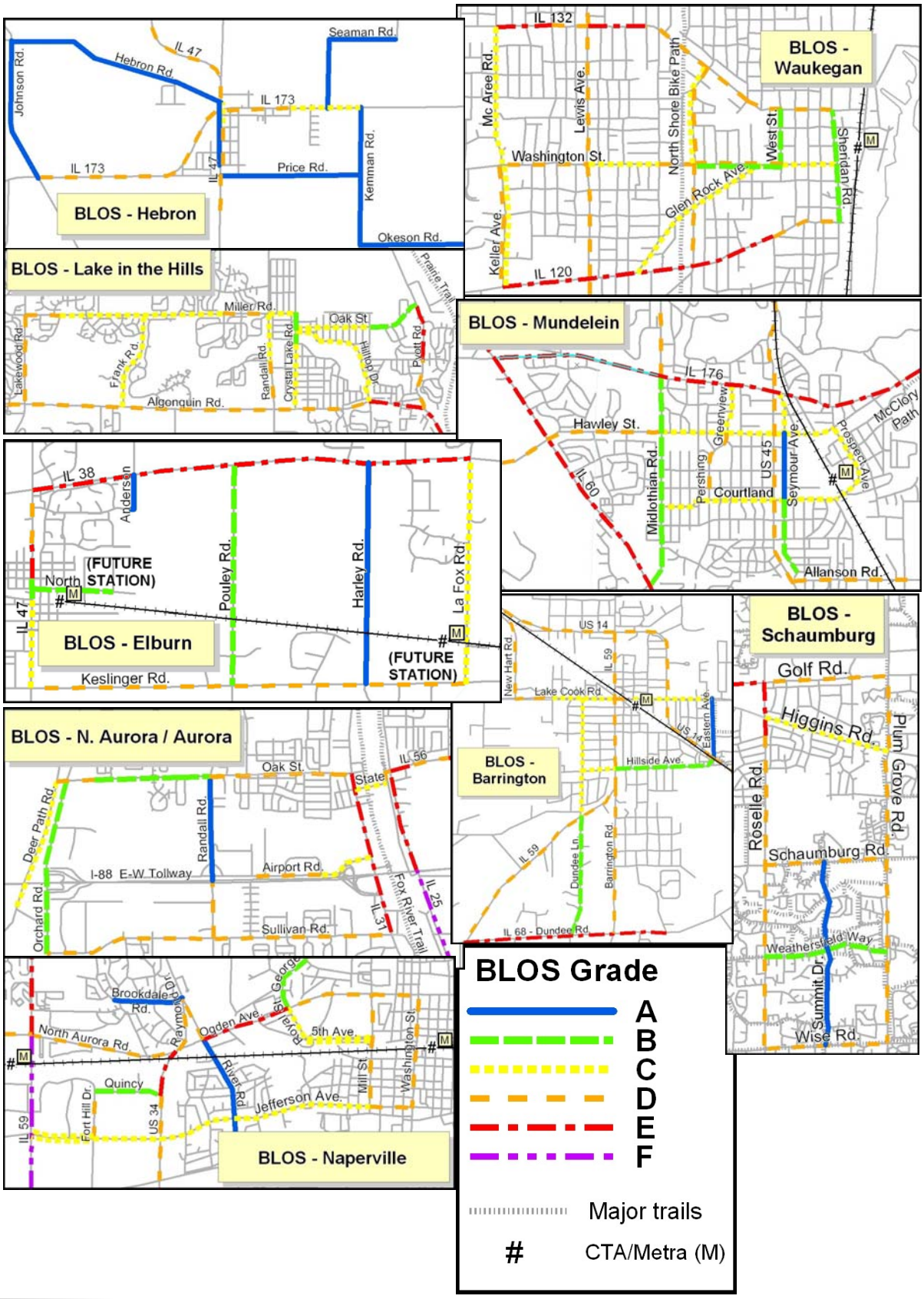
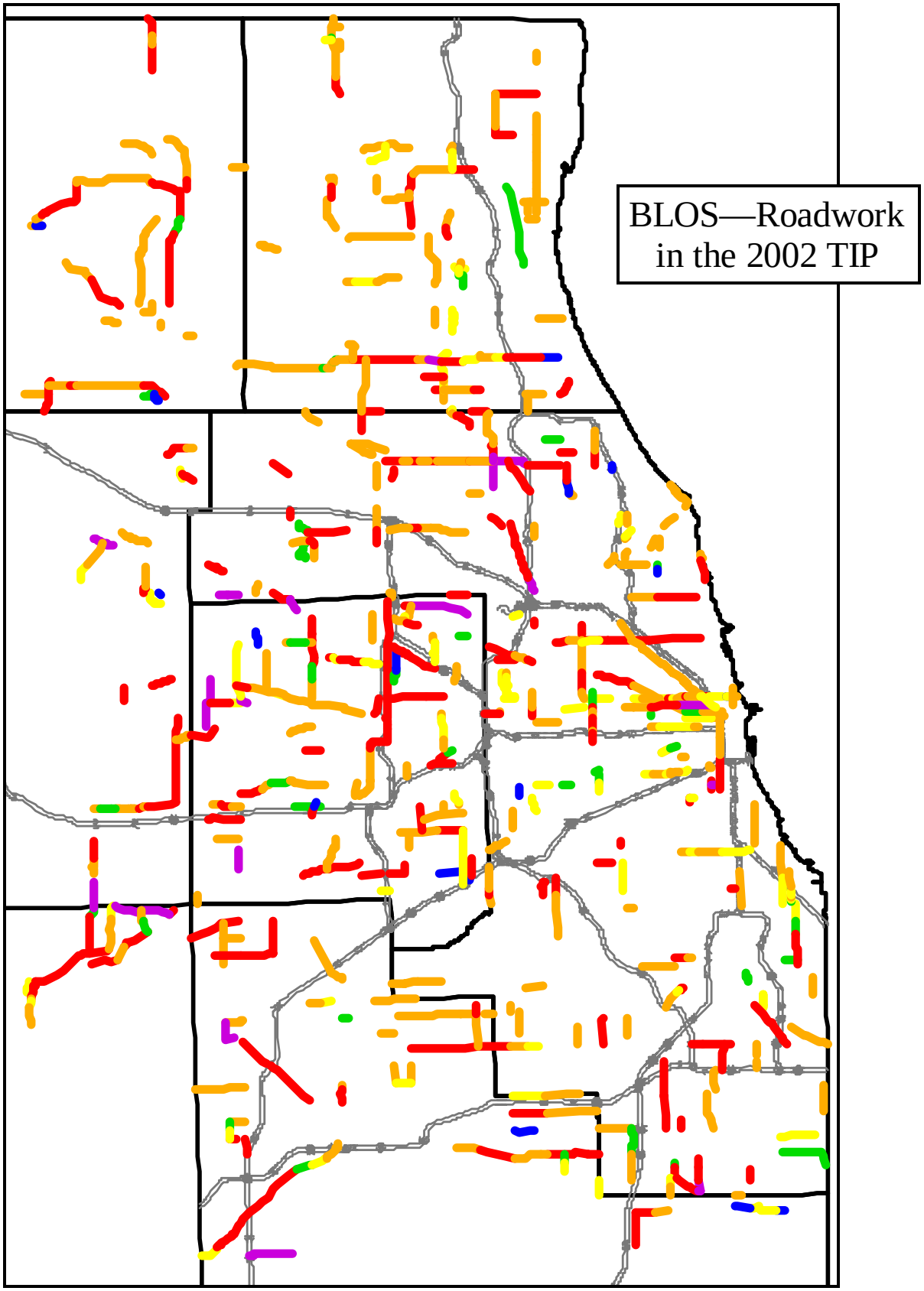


Figure 29
BLOS Regionwide Map of Roads Listed in
CATS' FY 2002-2006 Transportation Improvement Program (TIP)



Note: Expressway system is shown for orientation only.

Figure 30
PLOS Community Sample Maps for Orland Park, Chicago South Shore, Oak Lawn, Crest Hill/Joliet, Harvey, LaGrange, Frankfort, and Park Forest

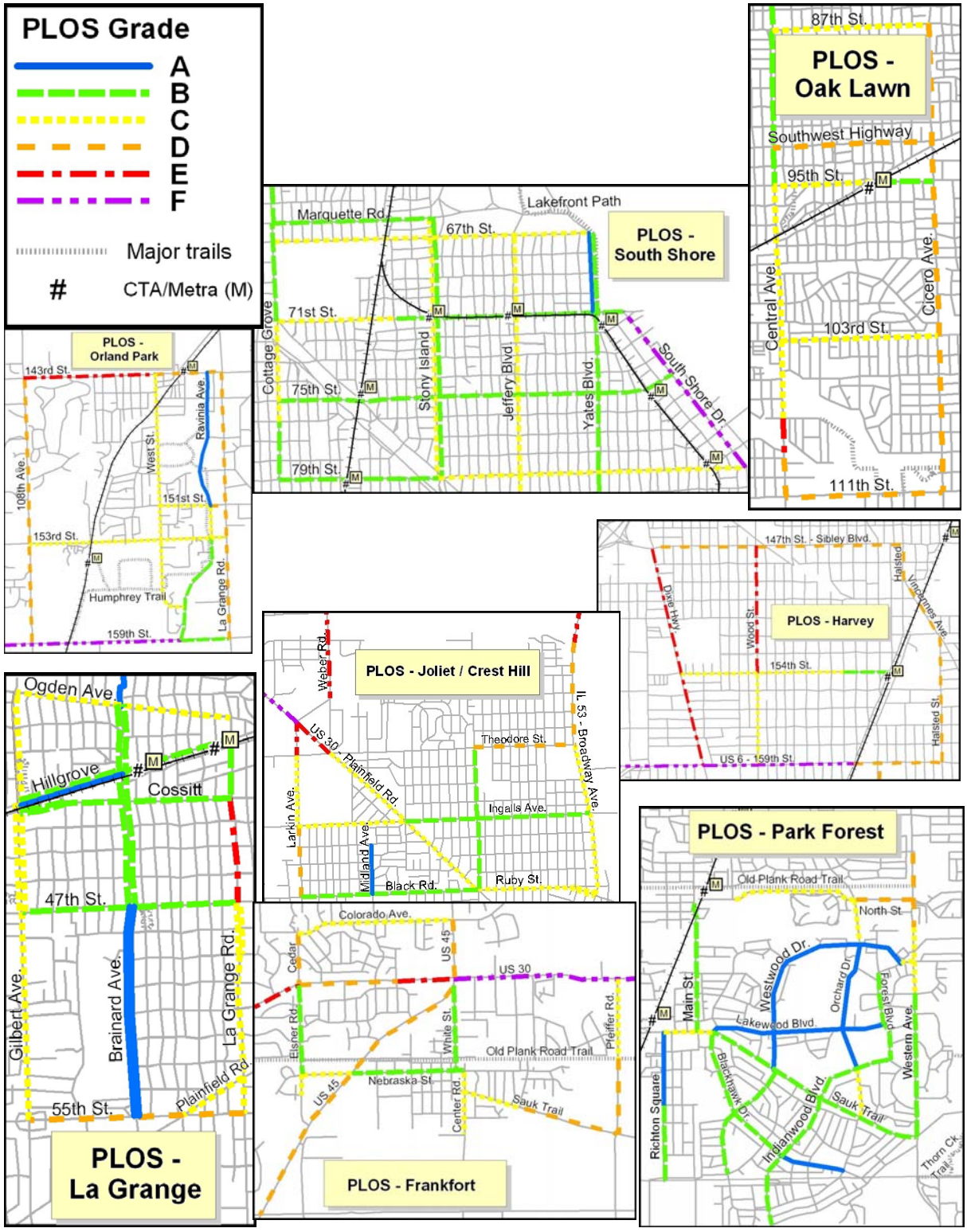


Figure 31
PLOS Community Sample Maps for Glenview, Wilmette, Franklin Park, Chicago Edgewater, Berwyn, Oak Park, Lombard, and Chicago Little Village

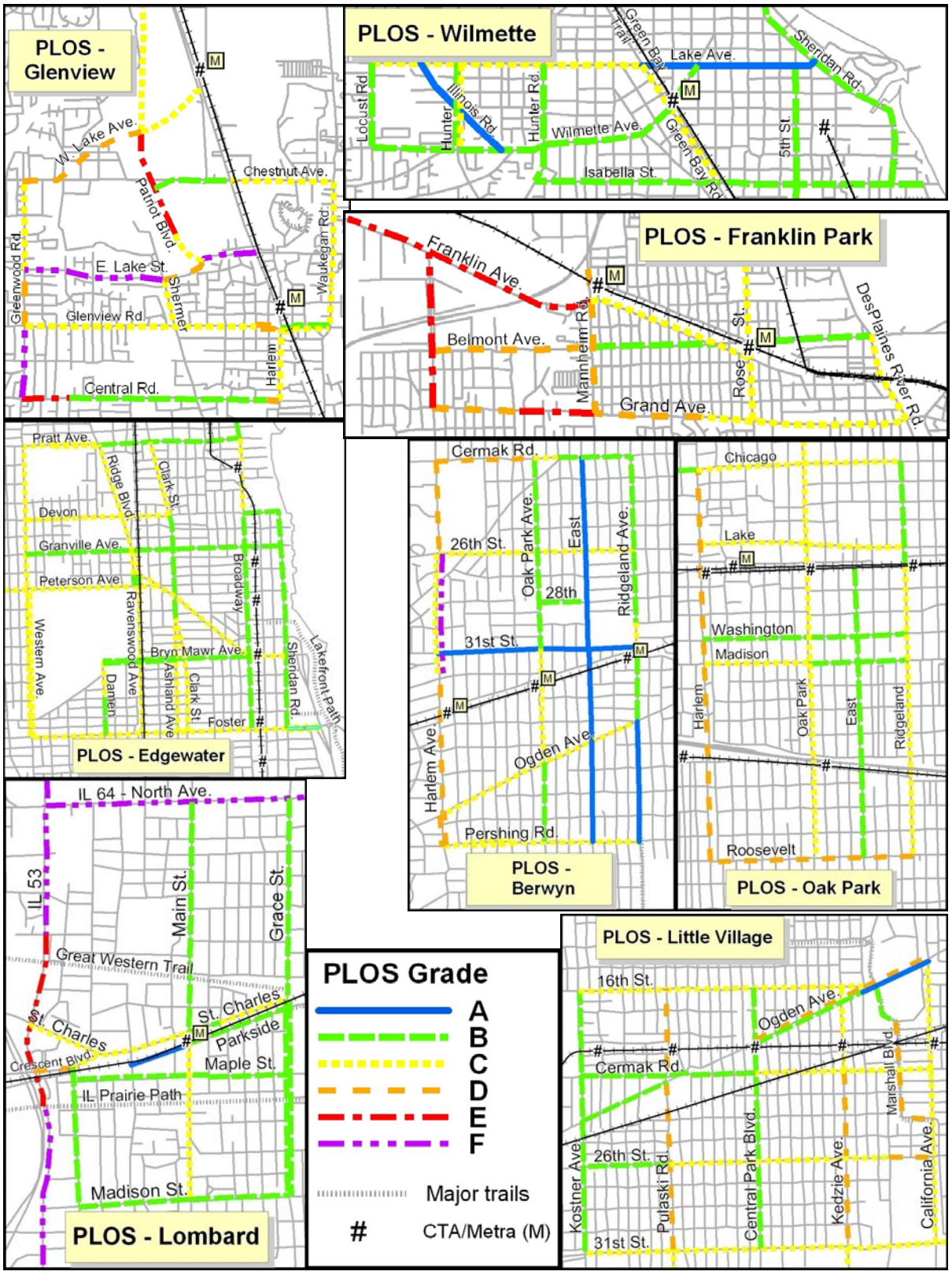


Figure 32
PLOS Community Sample Maps for Hebron, Waukegan, Lake in the Hills, Mundelein, Elburn, North Aurora/Aurora, Barrington, Schaumburg, Naperville

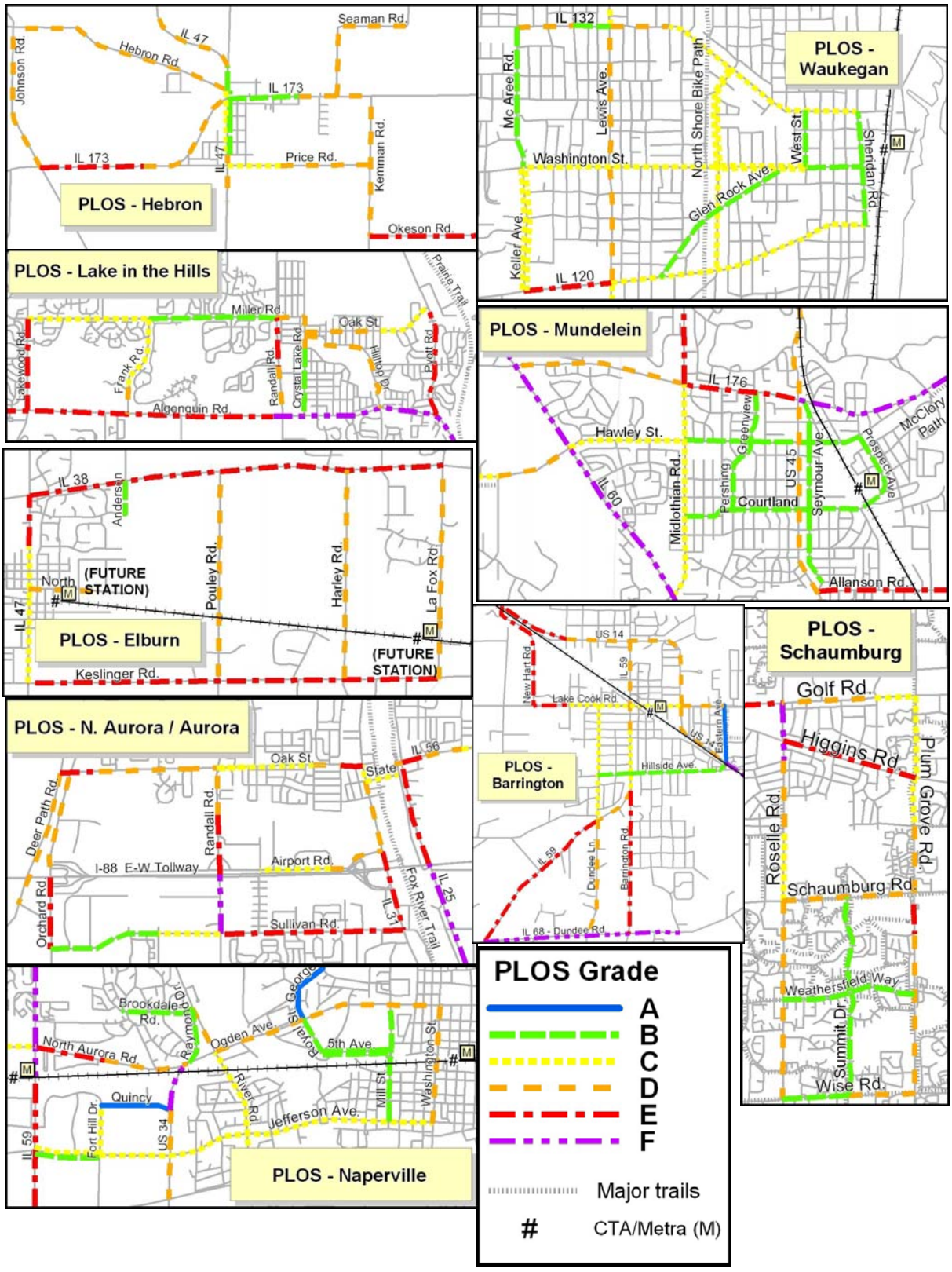
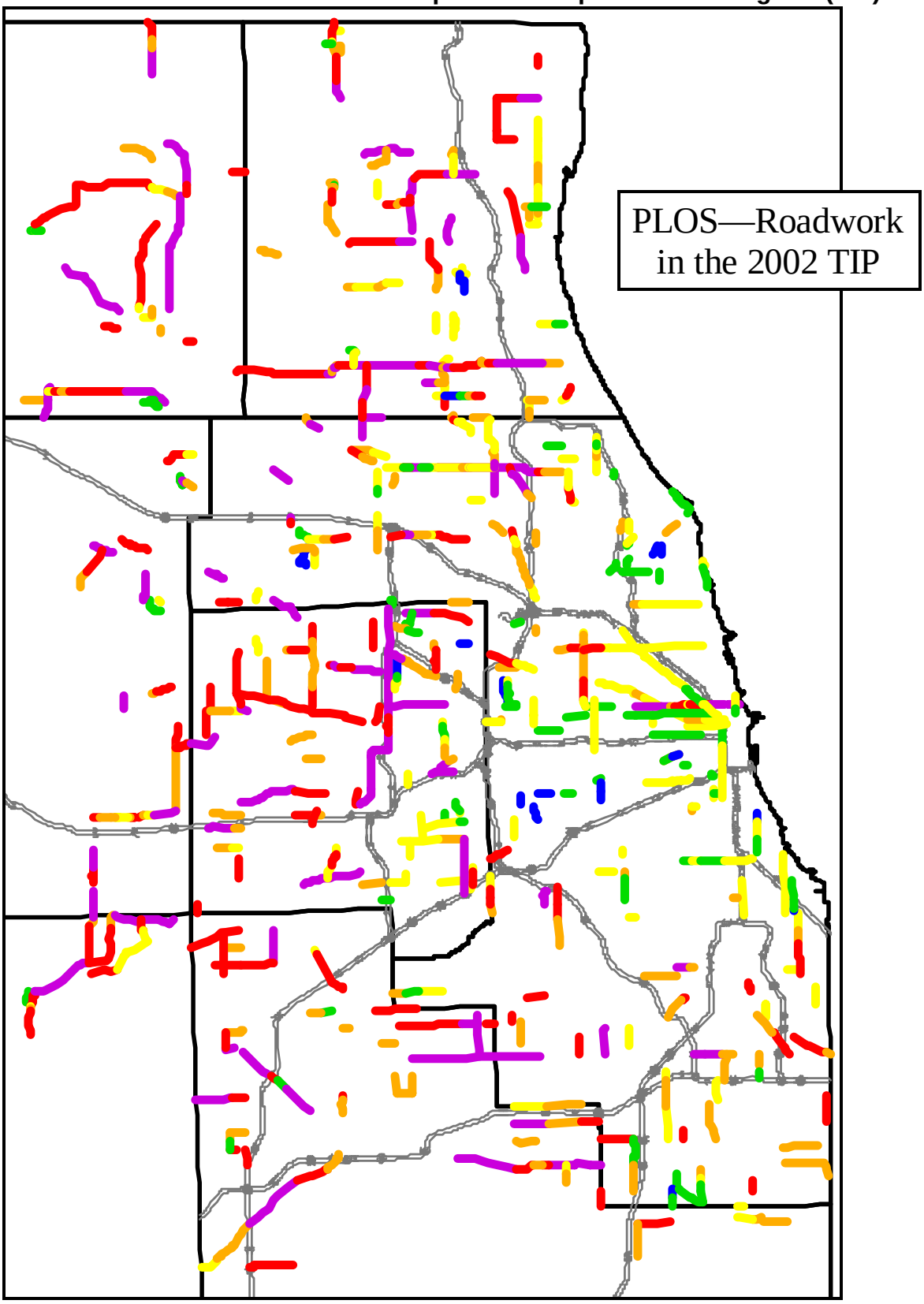


Figure 33
PLOS Regionwide Map of Roads Listed in
CATS' FY 2002-2006 Transportation Improvement Program (TIP)



Note: Expressway system is shown for orientation only.

Sampling Results – Analysis

Several trends were observed in both the data collection and analysis. Non-motorized accommodation and level of service vary by the era of the community's development, by the community's density, and by the policies of the individual road jurisdiction agency.

The table below lists each community's average values, weighted by the length of each measured segment. Also summarized are averages by county, including both community samples and all "TIP Roads." These values reflect only the samples collected and are not intended as an overall rating of the suitability of any particular community's roadways for walking or bicycling.

Table 23
Weighted Averages of BLOS and PLOS Community Samples

Community	BLOS		PLOS	
Barrington	3.62	D	4.22	D
Berwyn	3.47	C	3.21	C
Chicago - Edgewater	4.13	D	2.71	C
Chicago - Little Village	3.71	D	2.88	C
Chicago - South Shore	3.67	D	2.65	C
Elburn	3.28	C	4.32	D
Frankfort	2.96	C	3.5	D
Franklin Park	4.47	D	3.51	D
Glenview	4.03	D	3.47	C
Harvey	4.39	D	4.28	D
Hebron	2.20	B	4.06	D
Joliet / Crest Hill	3.77	D	2.87	C
La Grange	3.35	C	2.42	B

Community	BLOS		PLOS	
Lake-in-the-Hills	3.64	D	4.18	D
Lombard	3.74	D	3.22	C
Mundelein	3.95	D	4.12	D
Naperville	3.44	C	3.21	C
N. Aurora / Aurora	3.81	D	4.22	D
Oak Lawn	3.98	D	3.45	C
Oak Park	3.77	D	2.91	C
Orland Park	3.74	D	3.6	D
Park Forest	3.03	C	2.51	C
Schaumburg	3.49	C	3.34	C
Waukegan	3.57	D	3.27	C
Wilmette	3.03	C	2.14	B

Note: LOS A < 1.5 , 1.5<=B<2.5, 2.5<=C<3.5, 3.5<=D<4.5, 4.5<E. See text.

Table 24
Weighted Averages of BLOS and PLOS Samples by County
For TIP and Community Samples

	BLOS	PLOS
TOTAL of all community samples	3.63 (D)	3.33 (C)
City of Chicago	3.94 (D)	3.00 (C)
Cook County	3.94 (D)	3.34 (C)
DuPage County	4.06 (D)	4.26 (D)
Kane County	4.00 (D)	4.54 (E)
Kendall County	4.32 (D)	4.64 (E)
Lake County	3.89 (D)	4.33 (D)
McHenry County	3.80 (D)	4.72 (E)
Will County	3.97 (D)	4.37 (D)
TOTAL of all samples (including "TIP Roads")	3.99 (D)	3.97 (D)

Note: LOS A < 1.5 , 1.5<=B<2.5, 2.5<=C<3.5, 3.5<=D<4.5, 4.5<E. See text.

The community sample roads included both arterials and collectors. Usually, roads scheduled in the Transportation Improvement Program are heavily-traveled arterials; their BLOS and PLOS ratings indicate worse travel conditions for walkers and bicyclists than the community averages. The TIP projects provide an opportunity to improve conditions on roadways which are especially important non-motorized connector routes in less densely developed communities.

Pedestrian Level of Service Evaluation

Pedestrian Level of Service tended to improve as the density of development and prevalence of sidewalks increased. Most roadways in older, grid pattern areas have sidewalks – the key factor in PLOS ratings. In suburbs that developed or expanded in the 1970's and 1980's with lower density, sidewalks were often omitted. At that time the grid pattern was abandoned in favor of isolated subdivisions and developments that rely exclusively on arterials and major collectors for access. This places increased importance on making arterials and collectors accessible for non-motorized travel, shown in the LOS analysis to be frequently missing.

Sidewalk requirements have returned in most towns. However, towns often rely on developers to construct sidewalks as specific parcels are improved. Widespread gaps remain, either on undeveloped parcels, on parcels developed before sidewalks were required, and in unincorporated areas between towns. Also, many large road projects – such as state roadway reconstruction projects – are still being built in developed or developing areas with sidewalks missing on one or both sides.

Recent road expansions often come at the expense of the parkway between sidewalks and the roadway, especially in areas with constrained rights-of-way. Roadway development on the suburban fringe frequently includes considerably larger rights-of-way to permit both roadway expansions and a wide buffer – as developers build the sidewalks. Parkway trees, which improve pedestrians' perception of safety, are the norm in Chicago, the nearest suburbs, and some outer suburban town centers. Parkway trees are becoming more common again.

Traffic speed and volume are important factors affecting both the Pedestrian and Bicycle Levels of Service. In general, denser areas such as Chicago, the inner suburbs, and the suburban town centers have lower speeds on arterials than the rest of suburban development. Busier roads are less comfortable for non-motorized travelers. For the sampled roads, roadways with less than 10,000 cars per day average a BLOS "C" (3.36) and a PLOS "C" (3.21), while roads with ADTs higher than 20,000 average a BLOS "D" (4.39) and PLOS "E" (4.65).

Bicycle Level of Service Evaluation

County BLOS averages were fairly consistent throughout the region, at a "D." Lane width plays a large role in the BLOS score, while existence of a paved shoulder, bike lane, or lightly-used parking lane is even more significant. 12' lanes have been common in construction across the region for some time. Narrower rural lane widths – often 10' – are being widened to two or four-lane suburban roadways. In some places, lane widths of main collectors and even residential collectors are considerably wider than 12'. Also, IDOT frequently builds 13' wide outside curb lanes during its reconstruction roadwork to accommodate bicycle travel.

The existence of paved shoulders varies widely by agency, particularly by county. Lake County roads often have 2'-4' shoulders. DuPage has wider shoulders on some roads in less-developed areas. Cook County roads sometimes have 3' shoulders, but rumble strips often eliminate their contribution to accommodation for cyclists. Kane County will frequently add 1.5' paved

shoulders during simple repaving – any more would require a more significant reconstruction. A number of significant Kane roads include very wide paved shoulders. A few McHenry roads have shoulders, as do some old and new Kendall roads, including Oswego. Schaumburg was a pioneer with bike lanes, with 3' striping added to many collector and residential roads. Chicago has very aggressively retrofitted bike lanes throughout the city in recent years. Finally, some IDOT roads have shoulders of varying width, in some less-developed areas and on roads with a very large right-of-way.

Paved shoulders – and bike lanes – are probably the most important factor in on-road bicycle conditions. While a few agencies are adding shoulders in new roadway projects, other existing shoulders are vanishing due to lane expansion projects that use curb-and-gutter sections to reduce right-of-way acquisition needs.

The data collection effort provided insight on both existing conditions and developing trends in the region, with an emphasis on arterial and collector roads. Most significant destinations are on these roads, so making them amenable to travel by bicyclists and pedestrians is key. Previous studies of "priority travel zones" have confirmed this fact, finding that the arterial part of a short travel trip is the most likely barrier for non-motorized travel, particularly non-grid suburban areas.

BLOS and PLOS data collection enabled the *Soles and Spokes Plan* to analyze existing conditions. The BLOS and PLOS measures have other uses as well. These are set forth in Appendix E.

Pedestrian and Bicycle Facilities - An Inventory Approach

Pedestrian Facilities Inventories and Plans.

The *Soles and Spokes Plan* collected sidewalk inventory information as part of its survey of municipal governments. Local agencies were asked what percent of their street had adjacent sidewalks.[103] Figure 34 shows that many municipalities in northeastern Illinois have extensive sidewalk coverage rates, but also shows that many municipalities do not.[104] This information is weighted by population and tabulated in Table 25. Table 25 shows that more than 85% of the population in northeastern Illinois live in communities where the sidewalk coverage rate is more than 75%. Almost 60% of the population live in communities with a coverage rate of 95% or more.

Table 25
Percent of Municipal Population by Percent of Roadway with Adjacent Sidewalks
By District, Northeastern Illinois, 2003

Sidewalk Coverage	Chicago (%)	Suburban Cook (%)	Collar Counties (%)	Northeastern Illinois (%)
< 50%	0	6	11	5
50 - 74%	0	18	26	12
75 - 94%	0	35	55	24
95% or more	100	41	8	59
Total	100%	100%	100%	100%

Source: Chicago Area Transportation Study, *Soles and Spokes Survey, 2002.* Sidewalk coverage reflects local estimate. Percentages reflect reporting municipalities.

As noted above, sidewalk coverage rates reflect local estimates. As noted below, information differs in quality, but is good overall. The *Soles and Spokes Survey* revealed that approximately 18% of suburban communities maintain an electronic inventory of sidewalks, representing 23% of Cook County suburban population and 28% of the collar county suburban population.

A number of municipalities have devised plans for additional pedestrian facilities. These plans have taken the form of pedestrian elements of bicycle and pedestrian plans, transportation plans, comprehensive plans, or park and recreation plans. Overall, 65% of suburban Cook County and 74% of collar county municipalities indicated that they had additional sidewalks or paths planned.

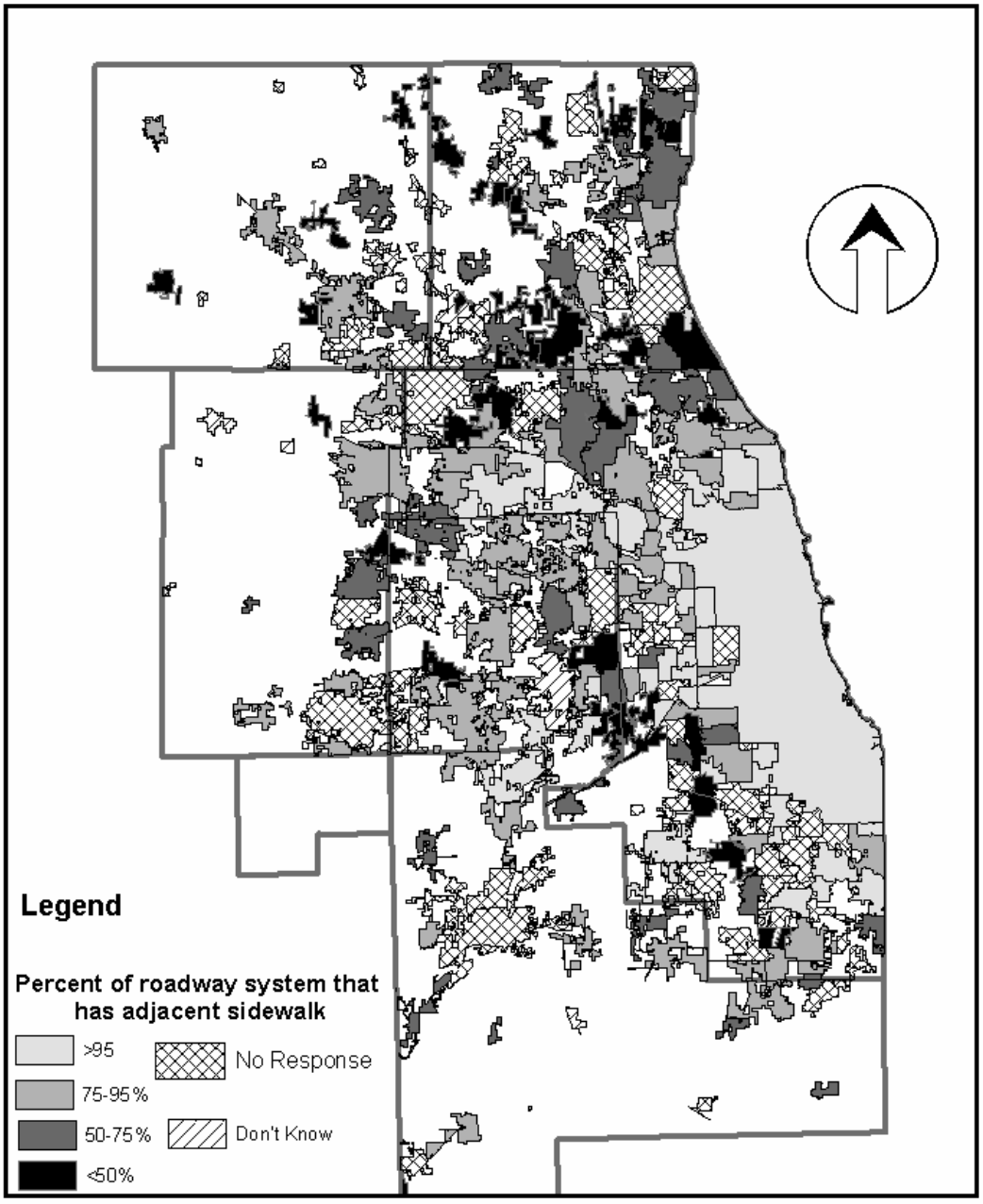
[103] The survey was conducted in the summer of 2002, with two follow-up exercises. All municipalities were surveyed. The response rate was 70%.

[104] The data in Figure 34 reflects the information available to the local agencies. For eight communities, a comparison was made between estimated sidewalk coverage and sidewalks visible from digital aerial photographs. Sidewalk coverage estimates from aerial interpretation were higher than local estimates in two cases, the same in two cases, and lower than local estimates in four cases. In two of the cases, the difference between the estimate from aerials was less than three percentage points from the range provided in the local estimate. So while local estimates are suitable for analyzing regional trends, they are not suitable for regional travel demand modeling.
In heavily forested sections, aerial interpretation yielded six square miles per hour; in unforested areas, aerial interpretation yielded twelve square miles per hour. Given the availability of aerials with limited foliage at a 1' resolution, it is now possible to develop a regional sidewalk sample with few resources. Additional study of the feasibility of this will proceed.

Figure 34
Local Estimates of Sidewalk Coverage
Northeastern Illinois, 2002

Prepared by the Chicago Area Transportation Study
December, 2002
Revised November, 2003

0 5 10 20 Miles



Bicycle Facilities Inventories and Plans

For most travel, the road network is the bicycle network. However, as shown in the level of service analysis, existing road conditions offer a low level of bicycle service in many areas of the region. As a result, governments have adopted a number of strategies to facilitate bicycle travel to commerce, schools, homes, recreation and industry. Among the most basic of these strategies is designating and informing the public about suitable routes for travel. Highway agencies can also improve bicycle level of service by striping lanes or adding wide shoulders to roads. Alternatively, governments can build and maintain separate facilities along roads or on separate rights-of-way.

Table 26 shows the prevalence of some of these accommodating strategies in municipalities in northeastern Illinois. We report the data both by percent of municipalities and those municipalities weighted by population. As can be seen in the table, Chicago reported having a variety of types of bicycle accommodations. In the suburbs, larger portions of collar county populations were served by bicycle facilities than suburban Cook county populations. Off-street paths and trails are the most prevalent type of accommodation, reported by most municipalities. Small portions of suburban communities report on-street facilities or on-street routes. Some suburban municipalities also have established processes to accommodate bicycles during roadway design. Some municipalities also reported maintaining electronic maps or inventories of their bicycle facilities, an aid to planning facilities.

Table 26
Percent of Municipalities with Bicycle Facility Activities
By District, Northeastern Illinois, 2003

Bicycle Facilities Activities	Chicago	Suburban Cook		Collar Counties		Total	
		Percent of Municipal Governments	Weighted by Population	Percent of Municipal Governments	Weighted by Population	Percent of Municipal Governments	Weighted by Population
Report existing off-street bicycle facilities	100%	50%	51%	59%	56%	55%	71%
Report existing on-street bicycle facilities	100%	16%	16%	29%	35%	24%	54%
Report existing on-street marked routes	100%	12%	18%	31%	34%	23%	54%
Report process to accommodate bicycles in roadway design	100%	23%	30%	31%	32%	28%	58%
Electronic map of bicycle facilities	100%	18%	29%	22%	30%	21%	56%

Source: Chicago Area Transportation Study, *Soles and Spokes Survey, 2002.* Data reflects local reports of facilities and activities within municipalities. Percentages reflect reporting municipalities.

Bicycle Information System Facilities Database

A Bicycle Inventory System (BIS) has been developed as part of the *Soles and Spokes Plan.* The Bicycle Information System (BIS) is a compilation of all the known existing or proposed bikeways within the CATS six-county region. The computerized system contains bicycle facility data for Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will counties. The BIS facilitates querying, updating, and displaying bicycle facilities data. Data contained within the BIS includes the facility names and characteristics as well as location and contact information.

The BIS includes a general location both for bikeway planning and roadway improvement planning. This general location will identify that a bicycle facility exists near a roadway or identifiable feature, and the geo-database will then identify additional information as available. This additional information can include the type of facility (path, bike lane or on-street route), surface type, existing or proposed, and the public agency responsible for development and maintenance.

This data will allow local and regional agencies to

- develop an overall regional network;
- make intelligent funding decisions on filling system gaps or upgrading existing facilities;
- coordinate facility connections where they cross municipal or county boundaries; and
- ensure consideration or inclusion in any roadway improvement plans that may cross or be parallel to a designated bicycle facility.

The inventory does not constitute a capital plan for program development. Staff does not anticipate that the individual facilities on the inventory will be endorsed as part of the *Soles and Spokes Plan.* Nor will inadvertent omission constitute a lack of endorsement.

A list of agencies that contributed data to the BIS as of December, 2003 are in Appendix F. Appendix F also includes a list of known bicycle planning efforts that could be included in the BIS as need arises from project studies.

Additional technical information about the BIS, including collection methodology, data gaps, data structure, and future needs, see the *Bicycle Inventory System Report* produced as part of the plan development effort.

Connectivity and Distribution of Bicycle Facilities

An examination of the distribution of developed bikeway systems throughout the region seems to indicate a relationship between development patterns and provision of bicycle facilities. Put simply, densely developed communities have more bikeways. In particular, urban areas tend to have bike lanes and signed bike routes on streets. These bikeway systems tend to be in older urban areas where bicycling has become common and grid street systems can provide connectivity for a variety of bicycling skills. By contrast, suburban and rural areas have provided riders predominantly with off-road facilities such as multi-use paths. For the most part, these off-road facilities have been developed along natural recreational corridors (rivers, forest preserve green belts) or abandoned or unused railroad rights-of-way (Illinois Prairie Path, North Shore Trail)

Figure 35
Existing and Planned Bikeways

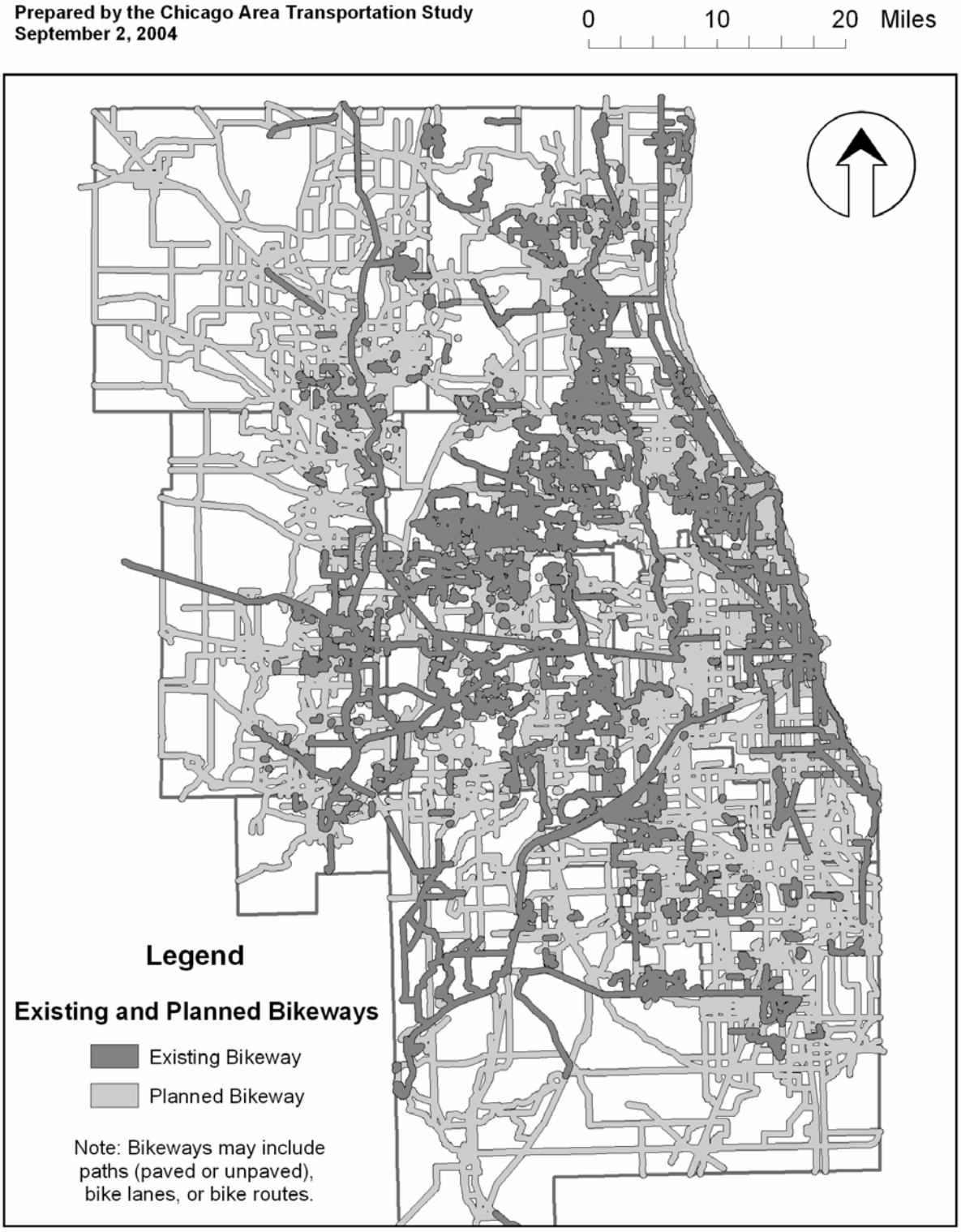


Figure 35 shows the extensive network of existing and planned bicycle facilities in the BIS.

In addition, *Soles and Spokes* sought to determine what portion of the population and land area is within a quarter mile of an existing or planned bicycle facility. Table 27 demonstrates that a

much of the population and land area of northeastern Illinois is within a quarter-mile of an existing bicycle facility. An even larger portion of the population and land is within a quarter-mile of the planned bicycle network.

Table 27
Percent of Population and Land within 1/4 Mile of Existing and Proposed Bikeways
By District, Northeastern Illinois, 2003

District	Percent of Population within 1/4 Mile of an Existing Bikeway	Percent of Population within 1/4 Mile of an Existing or Planned Bikeway	Percent of Land Area within 1/4 Mile of an Existing Bikeway	Percent of Land Area within 1/4 Mile of an Existing or Planned Bikeway
Chicago	47	90	34	78
Cook Balance	40	86	33	73
DuPage	56	86	41	70
Kane	47	77	15	52
Lake	52	80	26	53
McHenry	31	93	6	45
Will	29	67	10	40
Kendall (Part)	22	42	9	31
Region	45	86	21	55

Prepared by the Chicago Area Transportation Study, 2003. Data Sources: Bicycle Inventory System, 2003; U.S. Census of Population and Housing, Block Level Population Statistics, 2000. Note: Population within 1/4 mile is measured by total population of all blocks that intersect a 1/4 mile buffer around each facility. The land area is the total land within those 1/4 mile buffers.

Do facilities matter?

Some data is available to show relationships between the inventory of pedestrian and bicycle facilities and trip-making behavior in northeastern Illinois. The data does not necessarily show cause, but shows an indication that walk- and bike-trip-making and pedestrian and bicycle facilities may be related.

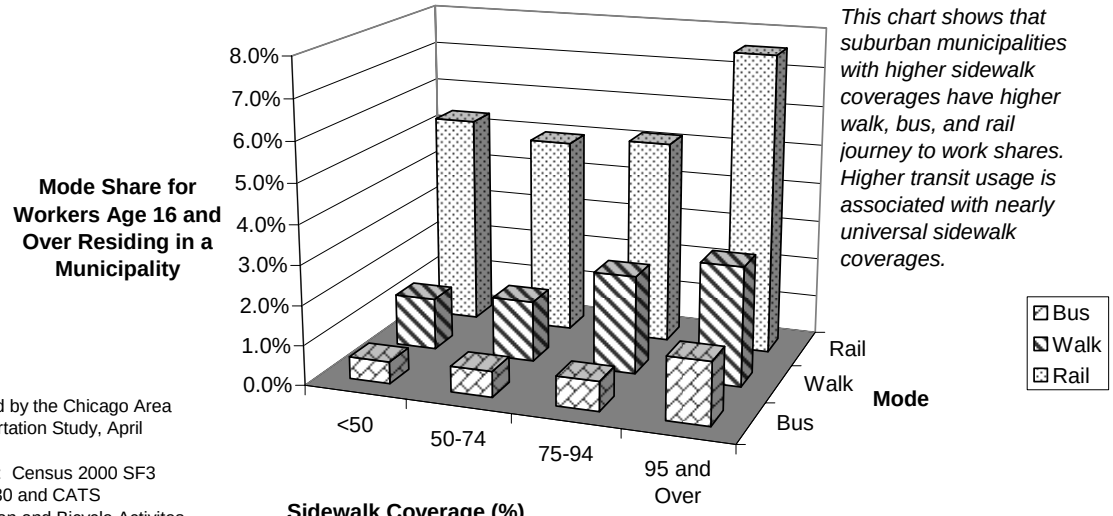
Figure 36 shows the relationship between sidewalk coverage (the percent of streets with an adjacent sidewalk) and work-trip mode shares for rail, walking, and bicycling for suburban municipalities. The chart shows that the higher the sidewalk coverage, the higher the walk-trip mode share. For transit, there is also a relationship with sidewalk coverage, but only when there are sidewalk coverage rates above 95%.

Figure 37 shows the relationship between sidewalk coverage and vehicle availability to households. Areas with higher sidewalk coverage tend to have fewer vehicles per household. In communities where there sidewalk coverages are 95% or more, there are an average of 1.64 vehicles available per household. In communities where the sidewalk coverage is less than 50%, there are an average of 1.92 vehicles per household, or 17% higher than communities with high sidewalk coverages.

Figures 36 and 37 indicate that sidewalks might matter in determining travel behavior. However, the story is more difficult to discern for bicycle facilities because the rates of bicycle travel are much lower than for walking. In addition, most bicycling is known to occur on streets without

Figure 36
Suburban Means of Journey to Work by Mode and Municipal Sidewalk Coverage, Northeastern Illinois, 2000

This chart shows that suburban municipalities with higher sidewalk coverages have higher walk, bus, and rail journey to work shares. Higher transit usage is associated with nearly universal sidewalk coverages.

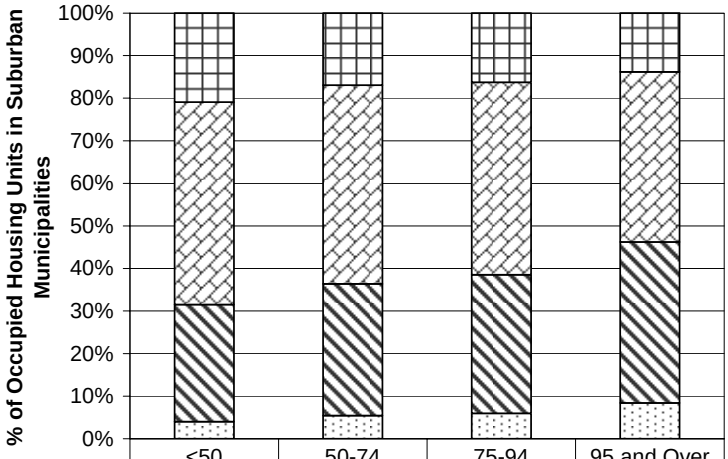


Prepared by the Chicago Area Transportation Study, April 2003.
Sources: Census 2000 SF3 Table P30 and CATS Pedestrian and Bicycle Activites Survey

	<50	50-74	75-94	95 and Over
Bus	0.5%	0.6%	0.7%	1.6%
Walk	1.3%	1.5%	2.5%	3.0%
Rail	5.3%	5.0%	5.2%	7.6%

Figure 37
Occupied Housing Unit Vehicle Availability by Municipal Sidewalk Coverage, Northeastern Illinois Suburban Municipalities, 2000

This chart shows that higher sidewalk coverages are associated with lower vehicle ownership and leasing rates in suburban communities.



Weighted Average Vehicles Available per Occupied Housing Unit by Municipal Sidewalk Coverage, Suburban Northeastern Municipalities, 2000:
Sidewalk Coverage < 50%: 1.92
50 - 74%: 1.81
75 - 94%: 1.77
95% and over: 1.64

	<50	50-74	75-94	95 and Over
3 or More Vehicles Available	20.9%	16.9%	16.3%	13.8%
2 Vehicles Available	47.6%	46.7%	45.2%	39.9%
1 Vehicle Available	27.5%	30.9%	32.6%	37.9%
No Vehicles Available	4.0%	5.4%	6.0%	8.4%

Prepared by the Chicago Area Transportation Study, April 2003.
Sources: Census 2000 SF3 Table H44 and CATS Pedestrian and Bicycle Activites Survey

designated accommodations. Therefore, from the demand perspective, bicycle facilities are only significant at the margins.

We know from limited census information collected for the last week of March every ten years that the number of bicycle commuters is rising, particularly in the City of Chicago (see Figure 8 in the section of this report entitled "Who Is Walking and Bicycling in Northeastern Illinois?"). In Chicago, an increase in bicycle use has accompanied additional facility development. Chicago had a total of 89.5 miles of on-street bicycle lanes in 2003, 35.9 miles of which had been in place by 2000, and up from 0.2 miles in 1995. This, in combination with other Chicago efforts, may have influenced the 50% increase in bicycle commuting shown in census data from 1990 to 2000. A CATS analysis of on-street bike count data collected by volunteers showed preliminary indications that the increase in bike use may be strongest at bike lane locations, though the difference was not statistically significant because of very high variation in individual counts.[105] Based on the preliminary indication, a more rigorous regression analysis was conducted. The analysis, reviewing counts conducted over a number of years, locations, and times, shows that bike lanes have discernibly higher bicycle counts than other locations, after controlling for variables such as time, season, and day of the week.[106]

In suburban areas, comprehensive statistically reliable bicycle count data is cost-prohibitive to obtain, and census data is limited to journey to work trips in March. However, this limited information shows that, among 170 suburban communities responding to the *Soles and Spokes* municipal survey, those reporting bicycle facilities (trails, lanes, or marked routes) showed an increase of 26.7% in the share of bicycle trips (an increase of 42% in the total number); while communities without bicycle facilities showed an increase in 13.2% in the mode share for bicycle work trips (an increase in 18% in the total number).[107]

In summary, limited data indicates that pedestrian and bicycle facility development is associated with increased numbers or shares of trips by walking and bicycling.

[105] $E(\mu)$ for bike lanes is 0.0601 +/- 0.085, while $E(\mu)$ for other locations is 0.0382 +/- 0.0845, where $E(\mu)$ is the expected value of the natural logarithm of the ratio of the counts for successive years. For this analysis, missing counts were interpolated, and multiple counts for the same location/year were averaged to control for variation. Another analysis disaggregated the changes by year. Summing natural logarithms of ratios over time, a typical location with a bike lane, with a 1996 index = 100, would have a 2003 index value of 150. For locations without bike lanes, an index of 1996=100 yields a 2003 index of 96. Again, variation was very high, so the results were only indicative and suggested further investigation.

[106] n=521, t=10.81 ($p<.0001$) for bike lane variable; for model, F=84.31 ($p<.0001$) with R^2 =49.55. See Appendix G for the full model.

[107] The total numbers are low because of the March data collection time frame, but are the best available. Full details are in Appendix G.

Pedestrian and Bicycle Facilities - A Barriers Approach

Travel from place to place on foot, by bicycle, by wheelchair, or by walker requires facilities from the origin to the destination. A missing link in the course from origin to destination may make the trip impossible, reducing the person's mobility and the community's economic activity and social cohesion. We refer here to these missing links in the pedestrian and bicycle infrastructure as barriers. This section will explore the extent of barriers to travel in the pedestrian and bicycle infrastructure in northeastern Illinois.

Barrier Corridors

Rivers, roads and rails form the basis of our transportation system, but frequently form barriers to the mobility of pedestrians and bicyclists. *Soles and Spokes* reviewed the ability to cross a variety of these barriers. Three corridors were reviewed as case studies: The I-90 Corridor, the Des Plaines River from River Forest to Libertyville, and the Burlington Northern Santa Fe rail corridor from Chicago to Naperville. As case studies, they are not necessarily representative of the region as a whole, but present a good indication of the scope of barriers these types of corridors present.

Case Study: I-90 (Chicago Skyway, Dan Ryan Expressway, the Kennedy Expressway, and the Northwest Tollway)

The Grand Illinois Trail under I-90 at 100th Street and Ewing (prior to extension of Burnham Greenway through site). Photo courtesy of www.bikegit.org. Used by permission.

Chicago Skyway. I-90 passes through the City of Chicago as an urban freeway, interfacing with the dense street network at numerous access points. On the south side of Chicago, I-90 was constructed by the City of Chicago parallel to the Norfolk Southern rail right of way, presenting a wide transportation corridor to cross. The corridor includes approximately 30 grade-separated crossing opportunities in the 7-mile stretch from Ewing Avenue to State Street, or more than 4 per mile. All of the viaducts include sidewalks under the toll bridge and railroad, though many of the sidewalks exhibit signs of deferred maintenance. There appear to be numbers of walkers using the corridor crossings. In addition, most of the streets passing under the viaducts are moderate volume, suitable for bicycling. Bicycle lanes parallel this stretch of I-90 here on South Chicago Avenue. Bicycle routes recommended in the City of Chicago's Bike Map pass under the facility at six locations.[108] In addition, the Burnham Greenway was recently extended across the corridor at 100th Street, providing an enhanced link from the East Side to Calumet Park and the on-street routes to the Lakefront Path.

[108] City of Chicago Department of Transportation. *Chicago Bike Map: Streets for Cycling.* Spring, 2003. The locations are Marquette, Martin Luther King Drive, 71st, 76th, Jeffery/83rd, 93rd, Ewing. Some of these routes have existing or planned bicycle lanes.

Dan Ryan Expressway. I-90 traverses the remainder of the south side below street grade until south of Chinatown, where the expressway is elevated. The below grade section has twelve crossings in five miles; typically spaced one-half mile apart. Four of the crossings are recommended bike routes; bike lanes are planned on one of these routes. Four transit access locations are also provided here for the CTA Red line. The above-grade section skirts the Bridgeport neighborhood, with several crossings. Two of the crossings are planned bike lanes.[109]

As the expressway crosses the Chicago Central Area, crossings become very numerous. In the three-mile long segment between Cermak Road and Chicago Avenue, approximately 23 crossings have been built over or under I-90, or more than seven per mile. Many of these crossings are spaced less than 500 feet apart. 10 of the crossings are recommended bike routes; bike lanes exist or are planned at six of these crossings.[110]

Kennedy Expressway. From the Chicago Central Area to Rosemont, crossings of I-90 remain numerous. From Milwaukee Avenue to the Edens junction, there are approximately 23 crossings (about 3.5 per mile). Eleven of the crossings are recommended bike routes, including several bike lanes.

Milwaukee Avenue over the Kennedy Expressway. Bike lanes were added to this segment in 2002 to link Wicker Park and Ukrainian Village with the Loop. Up to 200 bicyclists were tallied during 2-hour count periods in this section of Milwaukee on weekday afternoons in the summer of 2003. Photo courtesy of www.bikegit.org. Used by permission.

There are approximately 18 additional crossings from the Edens junction to the River Road toll plaza, four of which provide transit system access to the Metra Union Pacific Northwest Line and the CTA Blue Line. The western-most of these, at Cumberland Avenue, is noteworthy because it links the CTA station to adjacent suburban-style office campuses, with sidewalks in the rear of the sites along the Kennedy Expressway right-of-way. This design element significantly improves transit access to these offices and shows that suburban design can accommodate transit access in a freeway corridor.

Of the 18 crossings of the Kennedy from the Edens junction to the River Road toll plaza, six are recommended bike routes. Four of these (including an existing and a proposed bike lane) are within a few blocks of the Jefferson Park Metra/CTA Transfer Station.

Northwest Tollway. As I-90 transitions out of Chicago and into suburban Cook County, the distances between crossings tend to grow on average. Between the River Road Toll Plaza and I-290/IL 53, there are approximately twelve crossings, or 1.2 crossings per mile. From IL 53 to IL 25, there are eight crossings, an average of about one crossing every 1.5 miles. From IL 25 to US 20, there are approximately 13 crossings, an average of one per mile; almost half of the crossings are in Fox River Valley communities. Many of these crossings do not have continuous sidewalks.

[109] Ibid.
[110] Ibid.

Only two of the thirty-two on-street crossings along the Northwest Tollway are judged "excellent" or "medium" among recommended roads on the Chicagoland Bicycle Federation map (2003), though several improvements are planned.[111]

From this case study, we can see that the general land use and accessibility patterns of the region are magnified along the I-90 corridor. In Chicago, there are a large number of crossings, particularly in the Central Area. However, in suburban areas, there are few crossing opportunities, resulting in low accessibility for non-motorized travel.

Case Study 2: Burlington Northern Santa Fe (BNSF) Railroad Right of Way, Chicago to Naperville.

Along the BNSF Railroad, the patterns shown for I-90 are repeated, though more access is afforded across the BNSF right-of-way. The BNSF Railroad is heavily used for both freight and Metra commuter rail service. In Chicago, there are approximately 5.0 crossings per mile, with sidewalks provided. Nine of thirty-three crossings are recommended bicycle routes, with existing or planned bicycle lanes on six of these crossings.

In suburban Cook County, there are 3.1 crossings per mile, some of which are at station locations. A continuous sidewalk existed across the right-of-way and approaches for 28 of 30 crossings. Seven crossings are identified as suitable local streets for bicycling in the West Central Municipal Conference's West Central Bikeway Plan. Three additional on-street improvements are suggested, as well as two off-road trails.[112] Pedestrian improvements are complete or planned along parallel local streets through much of this segment. This segment has a number of heavily used commuter rail stations.

BNSF RR and the CTA Blue line crossing of Marshall Boulevard south of Douglas Park. Commuter railroad crossings in Chicago tend to be closely spaced and also tend to have sidewalks. However, some crossings are long and dark as they pass under rail yards.

Illinois Route 83 over the BNSF Railroad tracks. Crossings like this are not the norm along the BNSF Railroad.

[111] Upgrades at Golf Road (Rolling Meadows) and Meacham Road (Schaumburg) are planned. An off-road crossing is planned east of the Prairie Stone development (Hoffman Estates). Kane County has adopted a conceptual plan to develop several crossings.

[112] West Central Municipal Conference. West Central Bikeway Plan. Prepared by the Chicagoland Bicycle Federation, 1996.

In DuPage County, from County Line Rd. west to Illinois Route 59, there are 29 crossings, or 1.8 crossings per mile. 24 of 28 crossings (86%) with enough information included continuous sidewalks across the corridor and approaches.

On of these crossings is a pedestrian underpass at the Naperville (Washington Street) Station. Such underpasses allow separation of pedestrian activity from moving trains on multiple tracks.

Eight DuPage County crossings are shown as existing bikeways or Class A suitable roads in the *DuPage County Regional Bikeway Plan Map*. Two additional bike crossings are planned, including the East Branch and West Branch DuPage River Trails. Bikeway improvements are also planned along two roadways not now listed as suitable.[113]

This case study shows that the accessibility of crossings across the BNSF right-of-way remains high well into the suburbs. The rail right-of-way is not as great a barrier to travel as was shown in the case of the Northwest Tollway. This difference may be due to the longstanding access to the commuter rail stations, around which many of the cities and villages of DuPage County grew.

Case Study 3: Des Plaines River from River Forest to Libertyville
The third case study reviewed the Des Plaines River corridor between Old Spring Road in Libertyville and Madison Street in River Forest. The corridor is comprised of forest preserve for much of this distance. Again, the case study reviewed the opportunities to cross the corridor on foot or bike.

From Madison Street to Higgins, there are eleven street crossings, or 1.4 per mile. Only three of these have sidewalks provided. An additional five have "goat paths" showing demand for pedestrian accommodations that are not provided. An additional crossing has a wide shoulder. Three crossings are listed as "medium" among recommended routes in the Chicagoland Bicycle Federation map. None of the crossings are listed as "suitable local streets" in the North Central Council of Mayor Bikeway Plan. Three crossings are slated for on-road improvements. In addition, several crossings are possible as part of an improvement of the Des Plaines River Trail, though access to this facility from neighboring cities and villages is now limited. The street crossings in this area have an average speed limit of 34 mph.

This is the Lake Avenue Bridge over the Des Plaines River. The attractive bridge was built in 2001 by the Cook County Highway Department. It features wide sidewalks on both sides of the bridge and access to the Des Plaines River Trail, used by walkers and mountain bikers as an alternate segment of the Grand Illinois Trail. However, access from surrounding communities to the bridge and trail remain for the future.

From north of Higgins to Dundee Road, a distance of about 10.7 miles, there are twelve crossings, or 1.1 crossings per mile. There are three crossings with sidewalks (including those

[113] DuPage County Regional Planning Commission. *DuPage County Regional Bikeway Plan Map*. Prepared in cooperation with the DuPage Mayors and Managers Conference. October, 2002.

accessing Oakton Community College), six goat paths, and three crossings with wide shoulders. One of the streets is listed as having "excellent" cycling conditions in the Chicagoland Bicycle Federation map. This map shows three crossings described as "most suitable in the vicinity" but with "narrow lanes," "higher speed traffic and volume." Bicycle and pedestrian level of service values for roads measured across the Des Plaines River show an E or F level of service. None of the crossings are included in the Northwest Bicycle Plan. However, there are several trail crossings by the Des Plaines River Trail. However, access to the trail from neighboring villages is again limited. The street crossings in this area have an average speed limit of 41 mph.

From north of Dundee to Old Spring Road, a distance of about 10.6 miles, there are six crossings, or 0.6 crossings per mile. There are two crossings with sidewalks or sidepaths, one goat path, and two other crossings with wide shoulders. Two of the six streets are listed as having "excellent" cycling conditions in the Chicagoland Bicycle Federation map. This map shows one crossing described as "most suitable in the vicinity" but have "narrow lanes," "higher speed traffic and volume." There are several trail crossings by the Des Plaines River Trail. Lake County maintains the North Shore Bike Path across the Des Plaines and providing access to the Des Plaines River Trail east of Libertyville. The Des Plaines River Trail has additional access south of Townline Road and also to several local roads shown on the Chicagoland Bicycle Federation Map as having "excellent cycling conditions." Three additional bikeway access points are planned as part of Lake County's *Year 2020 Transportation Priority Plan (2002).* However, one trail crossing of the Des Plaines River along Illinois Route 22 was recently removed by the Illinois Department of Transportation as part of a road improvement. The average speed limit for road crossings of this part of the corridor is 41 miles per hour.

This case study shows quite different characteristics than the other case studies. None of the corridor is heavily urbanized; rather, it is largely forest preserve. The Des Plaines corridor plays a much stronger role in community separation than the other two corridors reviewed. While crossings of the corridor become more widely dispersed as one travels to the periphery of the region, the quality of the crossings tends to improve, particularly for bicyclists.

Overall, the case studies showed that roads, rivers, and rails create barriers to walking and bicycling of varying intensity. For I-90 and the BNSF railroad, the effects of the roads corresponded to the effects of the surrounding land uses. The Des Plaines corridor, particularly in Cook County, showed mixed access quality throughout the study area, presenting the greatest barriers to bicycling and walking among the three corridors.

Special Barriers to Mobility for the Elderly and People with Disabilities

A large portion of the region's population is elderly or disabled. Table 28 shows the elderly and disabled population by District in northeastern Illinois.

Table 28
Population of the Elderly and Disabled, Northeastern Illinois, 2000, By District

County	Total Population (over 5)	Total Population Over 65	%	Total Disabled Population (Over 5)	%	Total Elderly/ Disabled Population	%
Chicago	2,896,016	298,803	10%	604,676	21%	766,118	26%
Suburban Cook	2,046,107	331,462	16%	368,882	18%	580,699	28%
DuPage	904,161	88,794	10%	101,008	11%	162,322	18%
Kane	404,119	33,981	8%	55,563	14%	78,349	19%
Lake	644,356	54,989	9%	76,658	12%	113,769	18%
McHenry	260,077	20,913	8%	27,086	10%	40,996	16%
Will	502,266	41,610	8%	57,868	12%	84,422	17%
Total	7,657,102	870,552	11%	1,291,741	17%	1,826,675	24%

Prepared by the Chicago Area Transportation Study, May, 2003. Note: Total Elderly/Disabled Population = (Total Population over 65 – Total Disabled Population *over 65*) + Total Disabled Population. Source: U.S. Census Bureau, Census 2000 SF3

If, as forecast, the elderly population doubles in northeastern Illinois between 2000 and 2030, the portion of the region's population over 65 will rise from 11% to 18%.

The proportion of those with disabilities may also rise with a rising population, since age is often accompanied by disability. Table 29 shows that the proportions of both people with disabilities increase with age.

Table 29
Proportion of Population 5 and Over by Type of Disability and Age Group
Six-County Northeastern Illinois Region, 2000

	5 to 15 years:	16 to 20 years:	21 to 64 years:	65 and over	Total
With one type of disability:	4.0%	8.7%	9.2%	19.4%	9.4%
Sensory disability	0.5%	0.5%	0.8%	3.2%	1.0%
Physical disability	0.4%	0.4%	1.6%	9.3%	2.2%
Mental disability	2.9%	1.6%	0.6%	1.0%	1.1%
Self-care disability	0.3%	0.1%	0.1%	0.2%	0.1%
Go-outside-home disability		2.4%	1.0%	5.7%	1.4%
Employment disability		3.8%	5.1%		3.5%
With two or more types of disability:	1.1%	5.3%	8.1%	21.2%	8.1%
Includes self-care disability	0.8%	0.9%	1.6%	9.5%	2.3%
Does not include self-care disability:	0.4%	4.4%	6.5%	11.7%	5.8%
Go-outside home and employment only		2.9%	3.5%		2.4%
Other combination		1.5%	3.0%		2.0%
No disability	94.9%	86.0%	82.7%	59.5%	82.5%

Prepared by Chicago Area Transportation Study, January, 2004. Source: Census 2000: SF3PCT26 Sex By Age By Types Of Disability For The Civilian Noninstitutionalized Population 5 Years And Over [101 universe: civilian noninstitutionalized population 5 years and over]

These demographic changes may impact the need for a more diverse transportation network as more people age, are unable to drive alone, and shift to other forms of transportation. Among the working population, journey to work mode share varies by disability status. Table 30 shows work trip mode for the six-county Chicago area. People with disabilities are less likely to drive alone and are more likely to carpool in each area shown as well as region-wide. People with disabilities may be less likely to use transit, walk or bike in the areas studied; however, because people with disabilities disproportionately choose to live in Chicago, the region-wide totals indicate that people with disabilities are more likely to be transit users, walkers or bicyclists for the journey to work. Thus, region-wide, 13.8% of people with disabilities use public transit, compared with 12.2% of others. Likewise, 4.1% of the people with disabilities walk or bicycle, compared with 3.5% of others.

Table 30
Means of Transportation to Work by Area and Disability Status
For Workers Age 16 and Over
Six-County Northeastern Illinois Region, March, 2000

Journey to Work Mode	City of Chicago		Suburban Cook		Collar Counties		Six County Region	
	Disability	No Disability	Disability	No Disability	Disability	No Disability	Disability	No Disability
Drove alone	48.9%	50.4%	72.2%	76.2%	75.5%	80.2%	63.0%	69.9%
Carpool	16.8%	13.9%	13.2%	9.6%	13.3%	8.4%	14.8%	10.5%
Public Transit	24.5%	25.4%	7.1%	8.3%	4.2%	4.8%	13.8%	12.2%
Bicycle or walked	5.7%	6.3%	3.3%	2.5%	2.4%	2.0%	4.1%	3.5%
Taxicab, motorcycle or other means	1.9%	1.5%	1.4%	0.6%	1.3%	0.9%	1.6%	1.0%
Worked at home	2.3%	2.4%	2.8%	2.8%	3.3%	3.6%	2.7%	3.0%

Prepared by Chicago Area Transportation Study, January 2004. Source: U.S. Bureau of the Census. Census Transportation Planning Pack, Part 1 (by residence) for Illinois; Table 1-008.

We have seen that the elderly and disabled are disproportionately concentrated in Chicago, where transit services are widely available and the population groups are more likely to be able to get around without needing to drive alone. We saw in Table 4A, in part I of this report, that the elderly are more vulnerable to injury and death resulting from a collision than other population groups. Another factor that will be increasingly important in the policy environment is that the elderly are becoming increasingly likely to be drivers in fatal collisions. If populations age in areas where alternatives to driving are limited, older drivers may present increasing dangers to themselves and others. Thus, the U.S population over 70 rose by 20% from 1990 to 2000, but the number of drivers over 70 involved in fatal collisions increased by 24% and the number of driver fatalities over age 70 rose by 31%, all while total numbers of drivers involved in fatal collisions and total driver fatalities both declined.[114]

[114] National Highway Traffic Safety Administration, 2001. *Traffic Safety Facts 2000: Older Population.* [National Center for Statistics and Analysis]. Table 2, page 4. "Involvement of Older Population in Traffic Fatalities, 1990 and 2000."

Americans with Disabilities Act of 1990

Federal, state, and local governments have passed numerous laws to increase the accessibility of transportation infrastructure, government programs, and public transportation. The history of accessibility laws and associated design standards is described later in this section.

The most significant piece of legislation for the disabled is the Americans with Disabilities Act of 1990 (ADA). The ADA protects the rights of people with disabilities by ensuring equal opportunity in the areas of employment, state and local government services, public accommodations, and telecommunications. Although it is a civil rights law, it also deals with design and construction standards to ensure access to public facilities for the mobility impaired.

Title II of the ADA required all state or local government entities with 50 or more employees to develop a ***transition plan,*** by July 26, 1992.[115] A transition plan requires governments to identify, strategize, and remove barriers that deny people with disabilities access to government facilities, programs, and activities. The deadline to remove the architectural barriers identified in a transition plan was January 26, 1995.[116] All state and local governments, regardless of size, were required by January 1993 to establish a ***self-evaluation plan*** to make the program and policy changes required to achieve compliance with the ADA.[117]

Local governments and government agencies, such as a state department of transportation or a public transit agency were required to write and implement a transition plan. According to the ADA, a transition plan should have, at minimum:

1. Performed a *self-evaluation* which identifies physical obstacles in the public entity's facilities that limit the accessibility of its programs or activities to individuals with disabilities;
2. Described in detail the methods that will be used to make the facilities accessible;
3. Specified the schedule for taking the steps necessary to achieve compliance and, if the time period of the transition plan is longer than one year, identify steps that will be taken during each year of the transition period; and
4. Indicated the official responsible for implementation of the plan.[118]

As part of the *Soles and Spokes Survey* of municipal governments in 2002, we asked municipal governments whether an ADA transition plan was in place, 32% of governments indicated "yes," while 24% indicated "no." A large portion of the respondents (44%) did not know. It appears that since the requirement for transition plans is nearly 10 years old, most of those surveyed were not aware of efforts to comply with this requirement. Among those that responded "yes" or

[115] A rough measure of municipal employment is somewhat less than 1 employee for each 100 residents. (U.S. Department of Commerce, Census Bureau. 1997 Census of Governments. http://www.census.gov/prod/gc97/gc973-1.pdf. Since the median population of municipalities in northeastern Illinois is about 10,000, one would expect about half of municipalities to have more than 50 employees and thus have a transition plan.

116 ADA Title II Technical Assistance Manual, US Department of Justice. http://www.usdoj.gov/crt/ada/taman2.html.

[117] http://www.welfarelaw.org/ada_manual/chapter_3.htm

[118] ADA Title II Technical Assistance Manual, US Department of Justice. http://www.usdoj.gov/crt/ada/taman2.html.

"no," it appears that more municipalities have transition plans than one would expect region-wide (see foot note on previous page).

Full information about transition plans, self-evaluation plans, and complying with the ADA is posted at the US Department of Justice's ADA home page, http://www.usdoj.gov/crt/ada/adahom1.htm. Information relative to transit services is at http://www.fta.dot.gov/ada/. The U.S. Access Board also maintains a home page at http://www.access-board.gov/.

Section 35.151(e) of the ADA established accessibility requirements for new construction and alterations for access to public facilities. It required that all newly constructed or altered streets, roads, or highways must contain curb ramps or other sloped areas at any intersection having curbs or other barriers to entry from a street level pedestrian walkway. All newly constructed or altered street level pedestrian walkways must have curb ramps or other sloped areas at intersections to streets, roads, or highways. This requirement is in force regardless of the size of the government entity. In addition, the Justice Department interprets an "alteration" to a street to include street resurfacing, but not pothole patching.[119]

Regulations clarify the application of the general requirement for program accessibility to include the provision of curb cuts at existing crosswalks.[120] Regulations require that the transition plan contain a schedule to provide curb ramps or other sloped areas at existing pedestrian walkways, giving priority to walkways serving government offices and facilities, transportation, public accommodations, and employers. Pedestrian "walkways" include locations where access is required for use of public transportation, such as bus stops that are not located at intersections or crosswalks.[121]

After passage of the Americans with Disabilities Act, new and revised design guidance was developed to provide accessible transportation for the disabled. Implementation of this guidance is taking place. Early guidance was provided as part of specialized manuals.[122] The guidance has recently been mainstreamed by inclusion in *A Policy of Geometric Design of Highways and Streets (2001)* developed by the American Association of State Highway and Transportation

119 U.S. Department of Justice. *The ADA and City Governments: Common Problems.* "Issue: Curb Ramps." http://www.usdoj.gov/crt/ada/comprob.htm.

120 28 C.F.R. § 35.150(d).

121 Department of Justice, Office of the Attorney General, 28 CFR PART 35, "Nondiscrimination on the Basis of Disability in State and Local Government Services"

122 The most important documents related to accessibility include: (1) U.S. Access Board. 1991. *American with Disabilities Accessibility Guidelines* (AADAG);

(2) State of Illinois Joint Committee on Administrative Rules. *Administrative Code. Title 71 Public Buildings, Facilities And Real Property Chapter I: Capital Development Board. Part 400 Illinois Accessibility Code.* [implements ADAAG in Illinois]. http://www.sos.state.il.us/departments/index/code/title71.pdf

(3) U.S. Access Board. 1999. *Accessibility Guidelines for Outdoor Developed Areas Final Report.*

(4) U.S. Department of Transportation. *Designing Sidewalks and Trails for Access. Part I Review of Existing Guidelines and Practices.* July, 1999.

(5) U.S. Department of Transportation. *Designing Sidewalks and Trails for Access. Part II Best Practices Design Guide.* September, 2001.

Officials[123] and the 2003 *Manual of Uniform Traffic Control Devices* (*MUTCD*) promulgated by the Federal Highway Administration. Standards and guidance were added to the manual in 2003 providing accommodations for the elderly and disabled through work zones, as well as additional protections crossing signalized streets[124].

Accessible Non-Motorized Transportation in the Chicago Area

The implementation of ADA design standards, retrofitting inaccessible pedestrian infrastructure, and implementing policies that promote sidewalk construction create transportation options that serve and may attract the elderly and disabled.

Curb cuts are an essential piece of infrastructure to provide access for those using mobility aids, such as walkers or wheelchairs. In the 2002 CATS *Soles and Spokes Survey*, municipalities were asked to estimate the percentage of crosswalks with curb cuts within their jurisdiction. Table 31 shows that most of the municipal population of northeastern Illinois (62%) lives in municipalities with nearly universal curb cuts, largely in the City of Chicago. In suburban Cook County, the percent of the municipal population living in municipalities with curb cut coverage of 95% or more is 29%; this falls to 25% in the collar counties. At the other extreme, Table 31 shows that 7% of the suburban Cook municipal population and 14% of the collar county municipal population live in communities where less than half of the crosswalks have curb ramps.

[123] American Association of State Highway and Transportation Officials. 2001. *A Policy on Geometric Design of Highways and Streets, 2001*. Fourth Edition. Washington D.C. For example, standards for the design of curb ramps are discussed in detail on pages 365-371.

124 Federal Highway Administration. *Manual of Uniform Traffic Control Devices.* (MUTCD). The MUTCD is posted at http://mutcd.fhwa.dot.gov/pdfs/2003/pdf-index.htm. Recent changes affecting people with disabilities:

- At signalized locations with a demonstrated need, pedestrians with special needs may be provided with additional crossing time by means of an extended pushbutton press. See Section 4E.08.

- Guidance regarding the length of the pedestrian clearance interval was changed so that the distance used to determine the clearance interval is measured to the far side of the traveled way (or a wide median), instead of the center of the farthest traveled lane (or a wide median). See Section 4E.10.

- A great deal of attention was given to temporary traffic control to reduce work zone injuries and fatalities. Work zone traffic control is often substantially more complex than normal operations. Section 6D.01 (Pedestrian Considerations) was substantially improved and clarified. In addition, a new section (6D.02) was added to regarding accessibility considerations. The new section includes the standard that "when existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility." See also Section 6F.12 and 6F.13. Section 6F.68 gives guidance regarding detectable edging for people with visual disabilities.

Pedestrian and accessibility needs are addressed in implementing temporary traffic control signals (Section 6F.80). A new section (6G.05) was added regarding work affecting pedestrian and bicycle facilities. This section supplements the 6D.02 standard above with the standard "Where pedestrian routes are closed, alternate pedestrian routes shall be provided." The standards for provision of accommodations are further clarified in the case of urban streets (Section 6G.11) where the MUTCD includes the standard "Where transit stops are affected or relocated because of work activity, access to temporary transit stops shall be provided."

Table 31
Percent of Crosswalks with Curb Ramps For Northeastern Illinois Municipalities, By District, 2002, Weighted by Population

Estimated Percent of Crosswalks Having Curb Ramps	Chicago	Suburban Cook	Collar Counties	Total
<50	0%	7%	14%	5%
50-74	0%	26%	17%	11%
75-94	0%	38%	44%	21%
95 and over	100%	29%	25%	62%
Total	100%	100%	100%	100%

Prepared by the Chicago Area Transportation Study, February, 2004. Source: CATS Bicycle and Pedestrian Activities Survey (*Soles and Spokes Survey)*, 2002.

Of course, curb cuts are not the only accommodation for elderly and disabled pedestrians. Basic sidewalk infrastructure improvements are also important; this work was discussed in the section on "Pedestrian Facilities – Inventories and Plans" in this report. Additional design elements from such documents as the MUTCD, AASHTO *Green Book, ADAAG* can also be important. However, the data above shows that work still needs to be done in regards to providing accessible pedestrian infrastructure.

Intersection Size and Intersection Control as a Barrier

Crossing wide roads can be a barrier to pedestrian activity, particularly for children, the elderly, and people with disabilities. Intersection crossings can be particularly problematic because turning traffic and complex right-of-way rules make the simple "look left, look right, look left again," or "look both ways before crossing the street" inadequate to address the dangers. Crossing wide, complicated intersections with conflicting turning movements may be beyond the cognitive and physical abilities of children.[125] This cognitive difficulty applies to older adults as well.[126] Here we will establish why this is a barrier to travel, then quantify the extent of the problem and determine whether there is a trend.

Big intersections take a long time to cross. At a typical pedestrian speed used for timing signals of 4 feet per second, crossing an intersection with three through lanes in each direction, dual left turn lanes, and a right turn lane takes 27 seconds. An elderly pedestrian or child traveling at 2.5 feet per second might take 43 seconds. In turn, the additional time required to clear the queue that developed on the major street while waiting for the pedestrian to clear requires longer and longer cycle lengths, adding greatly to both pedestrian and vehicle delay. When two major roads intersect, with each approach cross-section containing nine lanes, the cycle length problem caused by pedestrian crossings is compounded. As a result, pedestrian crossings are sometimes omitted from such intersections, resulting in the creation of a significant barrier to pedestrians.

Soles and Spokes investigated the characteristics of arterial and collector intersections in the regional travel demand model networks. This information is presented in Table 32. Table 32 tells us that the number of through travel lanes exiting intersections in Chicago tends to be higher than in suburban locations. Chicago values are expected to remain stable through 2030.

[125] MacGregor, Carolyn, Alison Smiley, and Wendy Dunk. "Identifying Gaps in Child Pedestrian Safety: Comparing What Children Do with What Parents Teach." *Transportation Research Record 1674. p. 32.*

[126] Organisation for Economic Co-operation and Development. 2001. *Ageing and Transport: Mobility Needs and Safety Issues.* Paris: OECD. p. 51. http://www1.oecd.org/publications/e-book/7701051e.pdf

Suburban Cook County arterial and collector intersections tend to have fewer through lanes than in the City of Chicago. However, there is a slow trend toward larger intersections in suburban Cook County. For example, the number of intersections with 5 exiting through lanes falls from 430 to 410, while the number of intersections with nine through lanes exiting is expected to rise from 34 to 44.

Collar county arterial and collector intersections tend, on average, to have few through lanes exiting. Collar counties have many two lane roads with T or offset intersections. There is a moderate trend toward larger and consolidated intersections in the collar counties. Thus the number of collar county intersections with three through lanes exiting is expected to fall from 1931 to 1865; the number of collar county intersections with four through lanes exiting is expected to fall from 1155 to1060. Collar county intersections with five or more through lanes exiting are forecast to rise. Thus, the number of collar county intersections with five through lanes exiting will rise from 649 to 721; those intersections with nine through lanes exiting are expected to rise from 17 to 37.

Table 32
Number of Intersections by Number of Through Lanes Exiting
Northeastern Illinois Regional Travel Demand Model Networks
By District, 2005 and 2030

Number of Through Lanes Exiting Node	Chicago		Suburban Cook		Collar Counties		Total	
	2005	2030	2005	2030	2005	2030	2005	2030
1	3	3	1	2	12	12	16	17
2	33	30	37	34	160	165	230	229
3	134	130	332	335	1961	1835	2427	2300
4	390	390	344	328	1155	1060	1889	1778
5	303	298	430	410	649	721	1382	1429
6	410	407	416	416	456	495	1282	1318
7	166	175	192	202	147	185	505	562
8	200	202	228	237	139	175	567	614
9	68	71	34	44	17	37	119	152
10	59	61	26	31	14	26	99	118
11	16	16	6	9	1	6	23	31
12	6	6	7	8			13	14
13	3	3					3	3
14	2	2					2	2
Grand Total	1793	1794	2053	2056	4711	4717	8557	8567

Prepared by the Chicago Area Transportation Study, February, 2004. Source: Regional travel demand models used to support the air quality conformity analysis of the 2030 Regional Transportation Plan. Used time period 3 (am peak period). Figures reflect intersections with an intersecting arterial link. Data includes Cook, DuPage, Kane, Lake, McHenry, Will, and part of Kendall County.

We have shown why large intersections are a problem for pedestrians. Safety and simply making it across the intersection in the pedestrian phase are both issues with big intersections.

The data shows a trend toward larger intersections in the collar counties, and to a lesser extent in the suburban Cook County. No data is available regarding the proliferation of turn lanes and dual left turn lanes, which are a problem of equal or greater importance than though lanes, since the threat of collision can come from behind or from odd angles, a circumstance when pedestrians and moving traffic are less likely to see each other.

Likewise, no data is available regarding countermeasures for pedestrians. Such countermeasures can include median refuges (especially combined with establishing mid-block crossings), remote accommodation of left turns (e.g., Michigan U-turns), and paired one-way streets, and boulevard treatments. These countermeasures have the advantage of also reducing vehicle delay. Another countermeasure is the provision of grade separations of pedestrian and automotive traffic.

Snow and Ice as a Barrier for Pedestrians

Snow and ice can act as a barrier to pedestrian travel, especially for the elderly and disabled. While a survey of sidewalk conditions after snowstorms was beyond the scope of this report, *Soles and Spokes* tried to determine the extent of municipal efforts to clear sidewalks after storms so they can be used by all travelers. To do this, *Soles and Spokes* looked up Web information for sidewalk snow removal. Web pages were found for municipalities representing about 7,069,000 northeastern Illinois residents. These Web pages sometimes included or consisted of municipalities' codified ordinances.

Reviewing the municipalities' information, several different types of programs or policies were discerned. Some municipalities say nothing about snow removal from sidewalks. Others include language on their Web site or posted newsletters encouraging snow removal, often appealing to people to remember students. Some municipalities operate matching services linking people unable to shovel their sidewalks with volunteers or those willing to shovel for a fee.

Many municipalities regulate sidewalk snow removal. A large number of municipalities prohibit dumping snow on the sidewalk in the course of removing snow from driveways, parking lots, etc.; some of these municipalities limit the prohibition to commercial establishments. A substantial number of communities also require the owners and/or occupants of property to remove snow from public sidewalks abutting the premises; a few of these regulations are limited only to commercial establishments.

Some municipalities operate their own public sidewalk snow removal operations. These operations vary from limited operations covering only business districts to village-wide sidewalk snow removal programs. Most of the village-wide or wide-spread sidewalk snow removal programs go into effect after substantial snowfalls, often 3 or 4 inches of snow.

A summary of the population of northeastern Illinois represented by these different regulations or programs is presented in Table 33. This table shows mechanisms are in place to ameliorate sidewalk snow and ice for a substantial part of the population. Enforcement of the regulations cannot be evaluated, but the presence of the regulations and programs indicate a concern about the issue among a number of municipal policy-makers. However, it appears that some communities have not developed any regulation or program to ensure the investment in sidewalk infrastructure pays off year-round.

Table 33
Number of Residents Living in Municipalities with Sidewalk Snow Removal Information Posted on a Municipal Web Site,
Northeastern Illinois, Winter, 2004.

Type of Program Posted	Number of Residents Affected
No information	1,728,607
Encouragement of public sidewalk snow shoveling	1,028,060
Matching volunteer or paid snow shovelers with those seeking service	170,089
Regulation prohibiting dumping snow on public sidewalks	1,019,307
Regulation requiring commercial establishments or multi-family dwelling to clear snow from public sidewalks abutting property	241,034
Regulation requiring all property owners or occupants to clear snow from public sidewalks abutting property	3,243,395
Municipal government service to clear snow from public sidewalks in limited areas (usually commercial districts or by request from registered elderly/disabled residents).	307,276
Municipal government service to clear snow from public sidewalks in widespread areas of municipality	170,477

Prepared by the Chicago Area Transportation Study, February, 2004. Source: Various Web sites, 2000 Census of Population and Housing. Note: Some communities may have more than one program; thus, some populations were counted twice. The material collected has been posted at www.solesandspokes.com and is available upon request from CATS Planning Division staff.

Bicycle Prohibitions as a Barrier for Bicyclists.

Because of real or perceived dangers of on-road bicycling, some municipal governments have banned on-road bicycling on selected streets. Such bans are not common and tend to be concentrated in North Shore communities. However, where they exist, they can present a serious impediment to bicycle travel.[127] On the other hand, at least some prohibitions "on the books" are not enforced. Thus, of its prohibition, one municipality wrote "This ordinance has not been enforced for at least 10 years, and will not be enforced unless the Village Board wants to revisit this issue such as updating the ordinance, and posting signs in the village indicating that bicycles are not permitted on certain streets."[128]

[127] The following arterial and collector roads have signed bicycle prohibitions:

- Evanston: Ridge Road from Emerson to Howard
- Geneva: IL 31 from Fabyan to 3rd St.
- Glenview: Milwaukee Ave (at Union Pacific tracks)
- Lake Bluff: Sheridan from Great Lakes NTC to Scranton or Blodgett
- Wilmette: part of Lake Avenue
- Winnetka: Winnetka Avenue; Sheridan from Scott to Tower

(Wilson to Murtha, February 2, 2004, May 21, 2004; Barsotti to Murtha, May 12, 2004)

[128] Lustig to Murtha, May 27, 2004.

. . .

In this section of the *Soles and Spokes Plan's Existing Conditions and Regional Trends* report, we looked at the facilities for pedestrians and bicyclists from a variety of perspectives: a land use perspective, a level of service perspective, an inventory perspective, and a barrier perspective. We will now turn our attention to the financing of facilities for non-motorized users.

Funding and Implementation of Pedestrian and Bicycle Improvements in Northeastern Illinois

Transportation project funding can be a challenge. Projects may have many phases of planning, design, and implementation. Projects typically involve multiple agencies. Sponsors of pedestrian and/or bicycle related projects often are not sure where to turn for funding. Competition for resources can be fierce.

As part of the plan development process, *Soles and Spokes* gathered information on the funding and progress of pedestrian and bicycle projects. We wanted to learn more about how ped/bike improvements are funded, whether there is a mismatch between demand and resources, and whether some types of projects have higher implementation rates than others.

Pedestrian and bicycle oriented projects include: sidewalks, bicycle parking, trails, bridges, bicycle lanes, intersection improvements and promotional programs. Sometimes projects are "stand alone" (for example, adding a sidewalk to an existing roadway) and sometimes they are elements of a larger transportation project (for example, adding a sidewalk during roadway reconstruction). Our research examined both kinds of implementation strategies.

Bicycle- and Pedestrian-Focused Projects

Pedestrian and bicycle improvements and programs are funded in a variety of ways. CATS maintains the Transportation Improvement Program (TIP), which lists federally funded projects and regionally significant, non-federally funded projects planned for implementation in the upcoming years. The TIP provides information on project funding sources and project progress. For example, the TIP might show that a trail project secured funding for an initial design study to determine the project's feasibility and alignment, with a preliminary estimate of construction costs. If all goes well, a project then moves into detailed design, right-of-way acquisition, detailed estimates of costs, then construction and construction oversight. Some projects listed in the TIP are funded for all phases. Others seek funding separately for each new phase.

CATS staff used the TIP and other sources to investigate not only the state of funding for pedestrian and bicycle projects, but also their progress towards implementation. Secure funding does not guarantee construction of the project. One way to determine if a project is making progress is to see if the funds have been used, or obligated. We researched projects funded through federal and state transportation funding programs, as well as those that are implemented as part of larger transportation projects.

Transportation Funding Programs

The Congestion Mitigation and Air Quality Improvement (CMAQ) Program and Illinois Transportation Enhancement Program (ITEP) are the largest fund sources for pedestrian and bicycle projects in northeastern Illinois. Table 34 shows that over $90 million in CMAQ and ITEP funds were used to program 232 bicycle and pedestrian projects since the beginning of ISTEA in 1992. The locally-programmed surface transportation program (STP-L) is another significant funding source. Table 35 shows that STP-L funds were involved in 29 (22%) of the 109 pedestrian and bicycle projects in the *FY 2002 - 2006 TIP*. See Appendix H for details.

Table 34
ISTEA and TEA-21 Funding of Bicycle and Pedestrian Projects
Northeastern Illinois, 1992-2003, as of March, 2003

Program	Dollars Programmed (Federal Share, Rounded to Nearest Thousand)			Number of Projects Funded		
	ISTEA	TEA-21	Total	ISTEA	TEA-21	Total
CMAQ	16,914,000	26,857,000	43,771,000	71	80	151
ITEP	26,987,000	20,117,000	47,104,000	53	28	81
Total	43,901,000	46,974,000	90,874,000	124	128	232

Prepared by the Chicago Area Transportation Study, May, 2003. Sources: IDOT, *Illinois Transportation Enhancement Programs, 1993, 1994, 2000-2002, 2001-2003,* www.catsmpo.com/progs/List of Approved CMAQ Projects_021803.pdf, showing list of programmed projects.

Table 35
Funds Programmed for Bicycle and Pedestrian Projects
Northeastern Illinois, as of March, 2003

Fund Source	Dollars Programmed (Rounded to Nearest Thousand)	Number of Projects
CMAQ	$18,953,000	46
ITEP	19,132,000	29
Locally-Programmed Surface Transportation Program (STP-L)	12,540,000	24
Operation GreenLight Transit (OGL)	3,522,000	9
High Priority Project (HPP)	901,000	1
Total	$55,048,000	109

Prepared by the Chicago Area Transportation Study, May 2003. Source: *FY 2002-2006 Transportation Improvement Program for Northeastern Illinois,* as of March 14, 2003.

Department of Natural Resources Funding Programs

Some pedestrian and bicycle funding in northeastern Illinois originates from the Illinois Department of Natural Resources (IDNR). The IDNR Bicycle Trail Grant Program tends to fund more recreationally oriented projects than the transportation programs discussed above, but the projects still often serve transportation needs. The program usually funds stand-alone projects, but is occasionally used as a match source for large federally funded projects. Since 1990 through March, 2003, the annual average total project cost for IDNR-funded projects is about $5.3 million per year for northeastern Illinois. Details by district and year are in Appendix H.

Case Study— FY 2001 Funding Decisions

As the analysis above suggests, the funding mix for transportation projects is somewhat complex. To determine whether complexity thwarted improvements, we reviewed a set of submittals for funding to determine the progress of the project. We researched the status of the 41 bike and pedestrian projects that sought CMAQ funding in 2001. Of the 24 projects that were not programmed for CMAQ funds that year, we looked to see if other resources were found. We also looked at the progress of the projects that were programmed through CMAQ that year. We compared the projects by type to see if some kinds of projects were more successful than others at getting funding and making progress towards construction.

In 2001, there were 41 CMAQ applications for pedestrian and/or bicycle projects. Of those, 17 (41%) were programmed; 24 were not. Half of the unfunded projects were picked up by other sources, such as municipal funds, STP-L funds, ITEP and Operation GreenLight. At least four projects were programmed for CMAQ during a subsequent round. At least 12 other projects were on hold because of lack of funding. See Table 36.

Table 36
Status of Pedestrian and Bicycle Projects Not Programmed by CMAQ in 2001

Project Status	# of projects	Alternative Funding Source	# of projects*
Still not funded	12	N/A	
Found other funding	12	Locally Programmed STP	6
		Transportation Enhancement	3
		CMAQ (other year)	4
		Municipal Funds	2
		Operation GreenLight	1
Total	24		
**Some projects have more than one primary funding source*			

Prepared by the Chicago Area Transportation Study, May, 2003. Data reflects interviews with project sponsors and TIP status as of March, 2003.

24 of the 41(59%) projects seeking funding from CMAQ in 2001 are still active or complete. Two additional projects are active, but have changed significantly in scope. One grade separation project is now an at-grade crossing improvement. A trail project is now a sidepath project. The figures in Table 37 suggest that sidepaths make up a large share of projects seeking funding (37%), but that they have the second lowest success rate at receiving CMAQ or other funding (53%). Bridge and grade separation projects comprised 15% of the application pool. Only a third of these projects are active.

Eleven of the unfunded, on hold projects are sidepaths or bridge/grade separation projects, or have those facilities as major components. This is likely related to their high cost relative to other ped and bike related projects. These projects also tend to be complex, requiring right of way acquisition and complex design. Many are attempts to retrofit transportation projects that didn't address walking and biking needs when built or reconstructed.

Table 37
Type and Status of Pedestrian and Bicycle Projects Seeking CMAQ Funding in 2001

Type	Complete or Active	Changed, Inactive, Dropped or Unknown	Totals	Percent of Total Applications	Percent Complete or Active
Bridge/grade separation	2	4	6	15%	33%
Sidewalk	7	0	7	17%	100%
Trail	6	3	9	22%	67%
Sidepath	8	8	16	39%	50%
Bike parking	2	0	2	5%	100%
Bicycle Encouragement	1	0	1	2%	100%
	26	15	41		

Prepared by the Chicago Area Transportation Study, May, 2003. Data reflects interviews with project sponsors and TIP status as of March, 2003. Note: Sidepaths are defined as roadside facilities designed for bicycling, 8' or more in width (typically 10-12'). Sidewalks are typically 5' in width, but may be more, and are designed for pedestrians.

Thus, the primary complexity for project implementation for stand-alone bicycle and pedestrian projects may be associated primarily with the projects themselves, rather than the funding process. Complex proposals such as grade separations tend to have a low implementation rate. Less complex proposals, on the other hand, seem more likely to be able to navigate the funding process.

Funding Bicycle and Pedestrian Improvements within Other Transportation Projects

In addition to the above investments, governments also invest money in bicycle and pedestrian facilities as part of other, larger transportation investments. For example, when a road is reconstructed, a sidewalk or bike facility can be included in the highway project. As part of plan development, CATS staff set out to investigate the extent and effectiveness of the transportation improvement process for improving the bicycle and pedestrian environment.

Staff reviewed all IDOT *Notices of Lettings* from July 1, 1999 to June 30, 2000. These lettings comprise almost all state-funded and federally funded local agency projects in the region. Pavement and bridge sections in IDOT's District 1 included more than 675,000 square feet of sidewalks. At about $5.50 per square foot, these pedestrian accommodations cost more than $3.7 million to construct. These funds came from a mix of IDOT, federal, and local agency funds.[129]

Do roadway projects routinely accommodate pedestrian travel through the provision of sidewalks?

The analysis below shows that the current policy environment provides a large amount of sidewalks as part of construction projects. But a significant portion of the roadway system remains without a continuous sidewalk, even in residential, commercial, industrial, school and park areas after large transportation investments. Institutional and funding variations failed to explain these gaps. For example, the local match is greater for state-sponsored projects than federally funded, locally sponsored projects. However, this variation in local cost participation does not seem to have a significant relationship to the provision of sidewalks. To change the results of the funding decisions, it appears that more than the match rate may need to change.

51 of the 110 IDOT District 1 paving sections let from July 1999 to June 2000 included sidewalks in the *Notice of Letting*. Projects with a high level of investment tend to include some sidewalks. 13 of 17 reconstruction projects, and 11 of the 13 roadway widening or widening and resurfacing projects included sidewalks. Of the 54 resurfacing projects, 18 included sidewalks in the *Notice of Letting*.

Sidewalk investments vary within project type. Among widening and widening/resurfacing projects with a defined length, 0.8 miles of sidewalk were provided per project mile on average

[129] The local municipality or county usually decides whether to include the sidewalk in the construction project, even for IDOT projects. In the case of IDOT projects, the local agency is responsible for 50% of the construction cost; in the case of federally funded local agency projects, the municipality would typically absorb 20% of the construction cost. Right-of-way participation varies. County policies vary from full county funding to no participation. See the following section regarding policies.

per project, with a range of 0 to 1.44.[130] Reconstruction projects provided 0.5 miles of sidewalk per project mile on average per project, with a range from 0 to 1.5. For resurfacing projects, this dropped to 0.1 miles of sidewalk provided per project mile on average per project, with a range from 0 to 2.5.[131]

To determine the source of the variation in the provision of sidewalks, *Soles and Spokes* analyzed a sample of capital maintenance and capital improvement projects on arterial and collector highways. Resurfacing projects and other projects not requiring a project development report were not included, nor were intersection improvements less than .5 miles long.

We selected a stratified sample of 48 projects for which a project development report would be required. Lettings from April 2000 back to November 1996 were used.[132] Beginning with the April 2000 letting, we worked back within each stratification, gathering data for every project that met the criteria until we arrived at the sample. Twelve projects were collected for each stratification in a two by two matrix of IDOT or local project sponsorship by Cook County or collar county locations. Cost, location, project length, square feet of sidewalks included on the letting, surrounding land uses, and inspection of digital aerial photographs with a 2 foot resolution were collected for each project.

Variation in the Level of Expenditures for Sidewalks and Sidewalk Coverage

Sidewalk expenditures as a percentage of total project construction costs were established for each element of the stratified sample. Table 38 shows a summary of the information:

Table 38
Estimated Expenditures for Sidewalks as a Percent of Construction Awards
Linear Arterial and Collector Projects Subject to Phase-1 Engineering
Northeastern Illinois, 1996-2000

Sponsor	Cook County	Collar Counties
IDOT	2.4%	1.6%
Local Agency	4.5%	4.3%

Prepared by the Chicago Area Transportation Study, May, 2003. Notes: Data based on stratified sample of federal- or state-funded projects greater than 0.5 miles long for which a project development report would be required. Used $5.50 per square foot as the price for sidewalk construction. Sidewalk square feet information from Notices of Letting published by IDOT. Project cost data from CATS based on IDOT information.

By choosing the sample from just projects that required a project development report, process variables explaining the above differences have been controlled.

Much of the variation between IDOT and local agencies in the proportion of project funds provided for sidewalks is because IDOT road investments are much higher on a per mile basis. The next section shows that much (but not all) of the variation disappears when the data is reviewed in terms of miles, rather than dollars.

[130] Providing sidewalks on both sides of the street for the entire project would yield 2.0. However, many sidewalks last for 40 to 50 years, double the life of roadway pavements. So one would expect full long-term sidewalk investments to be as low as 1 mile per mile of project, assuming maintenance of a completed network of sidewalks and no disruption of existing sidewalks.

[131] These numbers are unweighted.

[132] Except the March, 2000 letting, which was unavailable.

A hypothesis explaining lower IDOT expenditure rates for sidewalks is that sidewalks are less likely to be constructed as part of IDOT projects than local agency projects because of a lower IDOT match rate. To test this hypothesis, Table 39 was developed. Table 39 shows the proportion of a complete sidewalk build-out that was included in the lettings.

Table 39
Proportion of Sidewalk Build-out Environment Included in Project Construction Letting By Sponsor Agency and Project Location
Northeastern Illinois, 1996-2000

Sponsor	Cook County	Collar Counties
IDOT	30%	22%
Local Agency	36%	25%

Prepared by Chicago Area Transportation Study, May, 2003. Notes: Data based on stratified sample of federal- or state-funded arterial or collector projects greater than 0.5 miles long for which a project development report would be required. Project length information from IDOT and CATS. Sidewalk square feet constructed from IDOT Notice of Letting. Sidewalk build-out environment assumed to be two five-foot sidewalks on each side of the road. The project cost of this build-out environment is approximately $290,000 per mile.

IDOT-sponsored projects have a somewhat lower rate than locally-sponsored projects, but Table 39 shows that the big difference in sidewalk provision is between Cook County and the collar counties. This raised the question of whether differences in land use or pre-project conditions explain the variation.

Soles and Spokes reviewed aerial photography with 2 foot resolution to determine how land use affected the provision of sidewalks for the projects in the stratified sample. Each project was broken into discrete sections of typical land use, with each side of the street analyzed separately. *Soles and Spokes* reviewed whether segment engineering and construction activities resulted in a continuous sidewalk for the project segment.[133] Table 40 shows the results of this analysis.

Table 40
Percent of Sample 1996-2000 Constructed Segments
With Continuous Sidewalks in the Post-Project Environment,
Northeastern Illinois, 2002

With Adjacent **Residential** Land Use:

Sponsor	Cook County	Collar Counties	Total
IDOT	54.6%	50.5%	52.8%
Local Agency	62.0	50.9	55.6
Total	56.3	50.6	53.7

With Adjacent **Commercial or Industrial** Land Use:

Sponsor	Cook County	Collar Counties	Total
IDOT	58.1%	38.0%	47.6%
Local Agency	53.3	48.5	51.3
Total	57.1	39.5	48.2

[133] As noted previously, there is an existing sidewalk inventory into which most projects fit. So the analysis only reviews post-project conditions. This controls for whether there were sufficient sidewalks in the pre-project condition.

With Adjacent **School or Park** Land Use:

Sponsor	Cook County	Collar Counties	Total
IDOT	*	*	*
Local Agency	*	44.9	58.0
Total	*	56.8	55.8

Note: * indicates that the aggregate segment sample < 5 miles or number of segments < 12.

With Adjacent **Cemetery, Transportation, or Agriculture** Land Use:[134]

Sponsor	Cook County	Collar Counties	Total
IDOT	46.3	3.2	18.4
Local Agency	17.5	40.3	29.1
Total	37.5	10.5	21.0

Prepared by Chicago Area Transportation Study, May, 2003. Notes: Data based on stratified sample of federal- or state-funded arterial or collector projects greater than 0.5 miles long for which a project development report would be required. Projects let 1996-2000 with local agency or IDOT sponsorship. Land use determined using visual inspection of Digiair aerials and Rand McNally's Chicago 6-County 2002 atlas. Multiple adjacent land uses are possible. Sidewalk coverage was determined using Digiair aerial photography taken in the summer of 2002, by which time construction activity had ceased for sample projects. Resolution of aerial photography 2 feet. Sidewalk coverage and land use data was collected separately for each side of the road.

Comparing the land uses in Table 40, the data seem to indicate that the provision of sidewalks is more clearly related to existing land use and location than to whether the sponsoring agency is IDOT or a local agency. Thus, the difference between the 50% local sidewalk cost share required for IDOT projects and the 20% local share typical for locally-sponsored federally-funded projects does not appear to be as important as other factors in explaining whether sidewalks are provided.

More importantly, the data seem to indicate that current mechanisms do not result in continuous sidewalks, even in the midst of urban and suburban land uses, in a large portion of road construction projects.

Summary and Analysis

The current policy environment provides a large amount of sidewalks as part of construction projects. But a significant portion of the roadway system remains without a continuous sidewalk, even after construction projects adjacent to residential, commercial, industrial, school and park areas. The analysis above showed that institutional and funding variations failed to explain these gaps in the sidewalk system. Rather, the current system has at its core dispersed local government decisions regarding sidewalk policies and resources to be allocated for sidewalks. Since local governments have varying and sometimes very limited resources, the level of investments in sidewalks reflects those constraints as well as the local political mandate for sidewalks. Thus, provision of sidewalks varies across jurisdiction and across the region, leaving gaps in the provision of sidewalks even after road construction projects.

Expenditures in the Context of a Transportation System

Adding the total funds from road improvement projects analysis to the bicycle and pedestrian projects for FY 2000, approximately $12.1 million in regional transportation funds was being spent on federally funded and state funded pedestrian and bicycle improvements in northeastern Illinois. Adding DNR funds to the total brings this to $15.9 million. This is nearly 2% of the

[134] The cemetery, transportation, or agriculture land uses were by far the most varied among the categories studied. The disparities in land use appear to be reflected in the disparities in associated sidewalk coverage.

$806 million in regional highway program awards for the year, or about 1.5% if DNR funds are excluded.[135] Sidewalk construction provided as part of highway projects, at $3.7 million, accounted for about 0.46% of the highway awards.

Looking at a longer time frame, the $51 million total for bike-ped focused projects from 1998 to 2002 was 1.3% of the $3.975 billion highway program for the period, or more than 1.7% if routine sidewalk construction at the same rate as in 2000 is included.[136]

Clearly, bicycle and pedestrian improvements are a small part of the regional funding puzzle. How do these relatively small numbers fit into the regional transportation system? Perhaps the best way to answer that question is from the project development cost perspective. Table 41 shows a summary the development costs per mile (excluding right-of-way) for a multi-modal arterial boulevard, a concept of the *Shared Path 2030* process (complete details are in Appendix I). Table 41 shows us that even for enhanced high-level, enhanced bicycle and pedestrian accommodation, the costs are not a large portion of the total costs.

Table 41
Enhanced 4-Lane Multi-modal Urban Arterial Development Cost
Excluding Right-of-Way and Structures

Improvement	Cost per Mile	% of TOTAL
Fixed Pavement Elements (suitable for ADT of 40,000 passenger vehicles) Clearing, grubbing, rough grading, excavation, Reworking *in situ* subbase, 4" granular subbase, compaction, 8" reinforced joint plane concrete, miscellaneous and contingencies	1,610,852.37	18.1%
Freight Elements (suitable for an additional heavy vehicle ADT of 4,000) Change to 10" reinforced joint plane concrete (mechanistic analysis), additional excavation, intersection design enhancements (maintaining small curve radii), miscellaneous and contingencies	141,169	1.6%
Urban Drainage Tied curb and gutter, storm sewer, inlet and catch basins (complete), miscellaneous and contingencies	1,129,083	12.7%
Bus Rapid Transit Bus rapid transit stations with roadway geometric and non-motorized access enhancements, miscellaneous and contingencies	2,500,000	28.1%
Traffic Signals	500,000	5.6%
ITS Smart Corridor Elements Surveillance, detection, signal coordination with adaptive control, traveler information integration, variable message signs, transit signal priority, emergency vehicle signal preemption, miscellaneous and contingencies	1,179,167	13.2%
Urban and Suburban Treatments Street lighting, tree planting, raised center median (pedestrian refuge/boulevard), parkway, miscellaneous and contingencies	1,258,922	14.1%
Bicycle and Pedestrian Accommodations 2X4' bike lanes (additional pavement to freight standards), 2X5' sidewalks, at-grade crossings, curb ramps and landings, bike/ped signal activation, miscellaneous and contingencies	622,487	7.0%
TOTAL	8,906,228	100.0%

Prepared by the Chicago Area Transportation Study, February, 2004. Figures exclude right-of-way. Figures in 2001 dollars. See Appendix I for details and sources.

[135] Highway program source: CATS, *FY 04-09 TIP*. October, 2003. p. 3-10.
[136] Ibid.

Table 41 does not account for the program costs associated with structures, pavement and drainage maintenance, and operations. Highway structures may cost $35 per square foot or more. Table 41 also does not account for the substantial costs of projects to maintain and expand the region's expressway system, which may run $7.3 million per lane mile or more. The bottom line is that bike and pedestrian improvements are likely to run much less than 7% of the regional highway program total, even if the design above becomes standard for arterials. However, the table above demonstrates that costs to routinely accommodate bicycle and pedestrian improvements can be substantial. Thus, the costs to accommodate pedestrian and bicycle travel should be fully programmed at the time a transportation project is programmed.

System Maintenance

Maintenance comprises a large portion of transportation system expenditures. Because of widespread policies requiring local maintenance for non-motorized facilities, most of the funds for maintaining bicycle and pedestrian facilities are local, rather than state or federal in origin. In addition, federal funds tend to be geared toward improving, rather than maintaining, infrastructure for non-motorized transportation.

Soles and Spokes was unable to determine the adequacy of maintenance expenditures for sidewalks and bicycle facilities. However, as part of the *Soles and Spokes* survey of municipalities, we were able to determine that 78% of responding municipalities had reconstruction/replacement programs for their sidewalk systems, representing 82% of the municipal population of northeastern Illinois. Chicago has a sidewalk reconstruction/replacement program, and 90% of suburban Cook County municipal residents live in communities with such a program. This figure drops to 69% for municipal residents of the collar counties. Thus, while we are unable to determine adequacy, there is evidence to indicate widespread implementation of maintenance programs, with implied commitment from elected officials.

Policies and Programs

Pedestrian and Bicycle Transportation Policies Adopted by Federal and State Governments and by the Region

A number of plans have established policies for bicycle and pedestrian transportation. A sample of these is discussed below.

Pedestrian and Bicycle Transportation in the State Transportation Plan

The transportation plan identifies anticipated trends, needs, and issues that will affect transportation service and demand in the next 25 years. In addition, the plan sets long-range goals, priorities and policies for developing future transportation programs with specific projects within the parameters of realistic funding resources.

Connecting Illinois: the Illinois State Transportation Plan identifies the following goals, among others:

- Ensure mobility and access to the transportation system for individuals with disabilities as contained in the Americans with Disabilities Act.
- Maintain the performance of the Illinois transportation system at a high level of safety to ensure the safety of all users of the system, including transportation operators, passengers, shippers, and pedestrians.
- Promote safe and convenient travel facilities for pedestrians and bicyclists.
- Encourage programs to reduce the use of single occupant vehicles where other options are feasible and can be made available.
- Evaluate all potential transportation systems and modes, singularly and in combination, to solve transportation problems.
- Ensure that the design of new facilities includes evaluation of the potential for accommodating multiple modes to assure future flexibility for intermodal development.
- Promote use of public transportation, railroads, carpools, vanpools, bicycles, walking, and telecommunications to reduce transportation-related energy consumption.
- Maintain a transportation funding structure that provides adequate resources for demonstrated transportation needs, incorporating federal, state, local, and private revenue sources; and one that provides equitable funding for all transportation modes and jurisdictions.[137]

The 2030 Regional Transportation Plan for Northeastern Illinois

Shared Path 2030, the process to develop the 2030 Regional Transportation Plan for northeastern Illinois, proceeded concurrently with the development of this report. The concurrent development process facilitated information being shared between the two processes. Hence, some of the themes raised in scoping the *Soles and Spokes Plan* have been adopted as strategic guidance for the transportation system in northeastern Illinois. A number of strategies were officially adopted as part of the *2030 Regional Transportation Plan* that could directly affect the

[137] Illinois Department of Transportation. May 1995. pp. 20-28.

environment for bicycle and pedestrian travel. Adopted "community strategies" that promote local community quality include:

- "A variety of transportation choices will be offered to all communities at an appropriate level of service.
- "Transportation improvements will be coordinated with community development activities to offer efficient transportation service.
- "Transportation improvements should support the functions of existing and planned adjacent land uses.
- "Transportation improvements should be designed, managed and operated to encourage compact land development.
- "Plans and designs for transportation improvements should be sensitive to community context" (see inset at right).
- "Transportation improvements should be consistent with official historic, cultural and/or agricultural plans."
- The RTP also recommends that special emphasis be placed on the land-use principles of "transit oriented development" (see inset below).

Context-sensitive solutions *(Excerpt from 2030 Regional Transportation Plan for Northeastern Illinois, pp. 84-85):*

The RTP recommends sensitivity to the effects transportation facilities have on the environment and communities. New and better ways of designing transportation facilities are evolving based on growing interest in better integrating these facilities into the communities they serve.

Most communities host transportation facilities that serve a regional function. The process of planning, designing, constructing and improving these facilities should involve early and intensive involvement with community stakeholders to preserve and enhance the human and natural environment in the project area.

Important principles of context-sensitive solutions include:

Safety for both travelers and the community is paramount.

Transportation's harmony with the environmental, scenic, aesthetic, historic, and natural resource values of the area are as important as improved mobility and accessibility.

Information resources of all involved parties should be efficiently and effectively used.

Transportation should minimally disrupt community quality.

Transportation should be seen as adding lasting value to the community.

Transit-oriented Development *(Excerpt from 2030 Regional Transportation Plan for Northeastern Illinois, pp. 85-87):*

Transit-oriented development (TOD) is the design and development of land around transit stations and bus stops that encourage people to use public transportation. The purpose of transit-oriented development is to build active and convenient communities that link people to their jobs as well as to commercial, retail and entertainment centers, in addition to reducing the need for multiple, longer-distance trips.

Separate transit-oriented developments connect each other, contributing to a more vital region overall. Successful transit-oriented development requires a high level of transit service that will accommodate a variety of travel purposes. To sustain a high level of transit service, transit-oriented development should provide compact building densities, mixed land uses, adequate (but not excessive) parking, ample quality bicycle storage and comfortable and secure pedestrian accommodations.

The RTP recommends that transit-oriented development be pursued in all major capital projects and new transit service. The RTP also encourages communities to embrace transit-oriented development principles to support existing transit service and to encourage additional transit investment.

In addition, transit oriented development should foster development in a manner that consistently locates services (retail, medical, social services, and recreational) in close proximity to where the elderly and disabled live. Also, facilities that house seniors and people with disabilities, such as assisted living centers, retirement homes and senior housing developments should be designed in a manner that facilitates the use of public transportation.

The RTP also recommends a variety of strategies to improve safety. General safety strategies include the following:

- "Separation of conflicting modes in the design of high-volume access-control facilities.
- "Routine accommodation of safe and comfortable pedestrian and bicycle use in arterial facility design.
- "Special attention to correcting and avoiding hazards created by vehicular traffic in community settings and on shared-use facilities.
- "Special attention to ensuring the safety of children, seniors and persons with disabilities while using or adjacent to transportation facilities."[138]

In addition, the RTP also recommends pursuing several strategies specifically oriented at the bicycle and pedestrian transportation, including Safe Routes to School, encouraging community members and government officials to "work together to make streets safer for pedestrians and bicyclists along school routes, while encouraging both parents and their children to enjoy the health and community benefits of walking and biking."[139] The RTP also calls for special attention to the safety needs of seniors and people with disabilities.[140] Shared use multi-modalism, providing transportation choice in a safety-conscious environment, is also recommended (see box at right).

Shared use design and pedestrian safety(Excerpt from 2030 Regional Transportation Plan for Northeastern Illinois, p. 98):
When programming funds for arterial improvements, special attention should be paid to addressing locations where pedestrian injuries and fatalities frequently occur. Roadway improvement funds should be devoted to improving pedestrian safety where necessary. In addition, discretionary transportation funds should be directed toward providing a variety of safe and convenient pedestrian options. Shared-use arterial design should include safe and inviting sidewalks and crosswalks for pedestrians. Other examples include traffic calming techniques, such as curb bulb-outs and traffic circles in key places.

Shared Use Principles, from "Strategic Systems" (Excerpt from 2030 Regional Transportation Plan for Northeastern Illinois, p. 107)
Improvements pursued under each of the strategic regional systems: arterials, transit, bicycle and pedestrian and freight should subscribe to the following principles of "shared-use" in their design and implementation.

- The purpose of the facility is to move people and goods.
- The safety of pedestrians and bicyclists is as important as the safe accommodation of vehicles.
- Community use requires small-scale design considerations.
- Convenient pedestrian access to buses encourages transit use.
- Offering traffic priority to transit vehicles encourages transit use.

In addition, pedestrian and bicycle transportation have been incorporated into a "Bicycle and Pedestrian Strategic System." Important elements of the strategic system include routine accommodation, mechanisms to facilitate non-motorized travel, non-motorized access to transit, travel information for pedestrian and bicycle travel, promotion of biking and walking, and support for the development of the *Soles and Spokes Plan.*

[138] Ibid., p. 94.
[139] Ibid., pp. 95-96.
[140] Ibid., pp. 96-98.

Tea-21/FHWA

To implement the non-motorized provisions of the Transportation Equity Act for the 21st Century (TEA-21) this, the Federal Highway Administration has released policy guidance at http://www.fhwa.dot.gov/environment/bikeped/guidance.htm. Among the guidance is the following policy statement (http://www.fhwa.dot.gov/environment/bikeped/design.htm#d4):

Policy Statement -- US Dept. of Transportation, February 28, 2000

1. Bicycle and pedestrian ways shall be established in new construction and reconstruction projects in all urbanized areas unless one or more of three conditions are met:
   - bicyclists and pedestrians are prohibited by law from using the roadway. In this instance, a greater effort may be necessary to accommodate bicyclists and pedestrians elsewhere within the right of way or within the same transportation corridor.
   - the cost of establishing bikeways or walkways would be excessively disproportionate to the need or probable use. Excessively disproportionate is defined as exceeding twenty percent of the cost of the larger transportation project.
   - where sparsity of population or other factors indicate an absence of need. For example, the Portland Pedestrian Guide requires "all construction of new public streets" to include sidewalk improvements on both sides, unless the street is a cul-de-sac with four or fewer dwellings or the street has severe topographic or natural resource constraints.
2. In rural areas, paved shoulders should be included in all new construction and reconstruction projects on roadways used by more than 1,000 vehicles per day, as in States such as Wisconsin. Paved shoulders have safety and operational advantages for all road users in addition to providing a place for bicyclists and pedestrians to operate.
   Rumble strips are not recommended where shoulders are used by bicyclists unless there is a minimum clear path of four feet in which a bicycle may safely operate.
3. Sidewalks, shared use paths, street crossings (including over- and undercrossings), pedestrian signals, signs, street furniture, transit stops and facilities, and all connecting pathways shall be designed, constructed, operated and maintained so that all pedestrians, including people with disabilities, can travel safely and independently.
4. The design and development of the transportation infrastructure shall improve conditions for bicycling and walking through the following additional steps:
   - planning projects for the long-term. Transportation facilities are long-term investments that remain in place for many years. The design and construction of new facilities that meet the criteria in item 1) above should anticipate likely future demand for bicycling and walking facilities and not preclude the provision of future improvements. For example, a bridge that is likely to remain in place for 50 years, might be built with sufficient width for safe bicycle and pedestrian use in anticipation that facilities will be available at either end of the bridge even if that is not currently the case.
   - addressing the need for bicyclists and pedestrians to cross corridors as well as travel along them. Even where bicyclists and pedestrians may not commonly use a particular travel corridor that is being improved or constructed, they will likely need to be able to cross that corridor safely and conveniently. Therefore, the design of intersections and interchanges shall accommodate bicyclists and pedestrians in a manner that is safe, accessible and convenient.
   - getting exceptions approved at a senior level. Exceptions for the non-inclusion of bikeways and walkways shall be approved by a senior manager and be documented with supporting data that indicates the basis for the decision.
   - designing facilities to the best currently available standards and guidelines. The design of facilities for bicyclists and pedestrians should follow design guidelines and standards that are commonly used, such as the AASHTO *Guide for the Development of Bicycle Facilities*, AASHTO's *A Policy on Geometric Design of Highways and Streets*, and the ITE Recommended Practice "*Design and Safety of Pedestrian Facilities*".

Other policy guidance is located at the former Web address.

Implementation Policies and Programs

For IDOT and county agencies, a survey was conducted in mid-2002 that solicited information regarding their programs and policies to implement bicycle and pedestrian accommodations on roads over which they have jurisdiction (funding and operating control). What follows is a summary of their responses, or where they did not respond, material that was available in printed or electronic format.

IDOT[141]

Basic IDOT policy regarding bicycle and pedestrian accommodations is contained in the Bureau of Design & Environment (BDE) manual. The manual is complex; complexity made summaries in earlier drafts of this document prone to error. Hence, excerpts of the 2002 Manual are included as reference in an accompanying document "Documentation of IDOT Policy."

Many sections of the manual related to design of pedestrian and bicycle accommodation demonstrate deep understanding at IDOT regarding best practices for accommodations. Section 17-2 in particular shows that, given the resources, IDOT can design facilities appropriate for all road users. However, other sections of the manual, particularly the parts of Section 5 requiring local agency cost participation, may result in uneven results for sidewalks and bicycle facilities, like those shown in Table 40 and in the BLOS/PLOS maps in Figures 26-33.

IDOT has recently awarded a contract for "a feasibility study to evaluate the existing bicycle system and establish prioritized listings of improvements for each district."[142]

County Highway and Transportation Division Policies and Activities

Cook County Highway Department[143]

Pedestrian activities

Plan

The Cook County Highway Department does not have a pedestrian plan. There are a number of subregional and local plans throughout the county.

Sidewalk Policy

As of October 25, 2002, Cook County Highway Department has a written policy related to inclusion of sidewalk additions/improvements as part of widening and resurfacing or reconstruction projects. The practice of Cook County Highway Department is to solicit local input on the inclusion of such items as part of project development. Sidewalks can also be constructed via permit. The maintenance is the responsibility of the local agency.

Intersection Policy

Cook County Highway Department considers pedestrian signals and push buttons where there is known pedestrian traffic and the provision of sidewalks.

[141] Material taken from electronic sources.

[142] http://www.dot.state.il.us/press/r012104.html (accessed March 2, 2004).

[143] Interview, 2002.

Special ped projects

Unknown

Bicycling activities

Plan

Cook County Highway Department does not have a bicycle plan. There are a number of subregional and local plans throughout the county.

Bikeways Policy

Cook County Highway Department solicits input on bicycle accommodations from local agencies and the Forest Preserve District of Cook County. Inclusion of accommodations is considered on a case-by-case basis. With regard to design, CCHD follows IDOT/AASHTO design. CCHD does not have a cost participation policy with regard to bike lanes or paths.

Special Bike Projects

Unknown

DuPage County Divisions of Transportation[144]

Pedestrian activities

Plan

DuPage County does not have a stand-alone pedestrian plan. However, they do have a countywide bikeway plan that contains policies related to pedestrian activities and recommended pedestrian improvement projects. They also have a ten-year Roadway Improvement Plan.

Sidewalk policy

The county's policy is to provide for pedestrian needs when engineering or constructing roads. For sidewalks on county roads, there is no cost sharing with municipalities. Instead, the county pays the entire cost including removals, relocations, etc. DuPage County has a written policy related to sidewalks, stating that 5-foot wide sidewalks will be constructed in developed areas or areas with significant pedestrian activity. In rural areas or areas with low expected pedestrian activity, other accommodations are provided (carriage paths or wide paved shoulders).

Intersection policy

The bikeway plan recommends improvement projects including the installation of pedestrian signalheads.

Special Pedestrian Projects

The County has funded 3 separate pedestrian improvement projects in the last 5 years totaling 16 miles with an expenditure of $2,079,073. These are sidewalks exclusively (e.g., this does not include multi-use paths or trail projects).

[144] Survey response, 2002.

Bicycling related activities

Plan

DuPage County has a Regional Bikeway Plan, and publishes a periodic implementation status report. The DuPage County Regional Bikeway Plan now includes 637 miles with 282 miles constructed to date. Working with all bikeway agencies, the plan identifies priorities for bikeway improvements. The county also publishes the 2002 DuPage County Trail Guide and 2002 Existing and Proposed Bikeways in DuPage County. The county places an emphasis on system expansion and improvement projects, but hopes to be able to devote more time to promotion and education over the next year.

Bikeways Policy

The county has a written bikeways policy. The goal is to develop municipal and regional bikeway systems that provide a coordinated countywide system for non-motorized transportation. The county's policy is to consider bicycle needs, where feasible, when engineering or constructing roads.

Special Bike Projects

The 1996 countywide bikeway plan identified 21 high priority projects sponsored by different agencies, including the DuPage Couny Division of Transportation.

Kane County Division of Transportation[145]

Kane County also has a Bicycle/Pedestrian Planning Committee.

Pedestrian activities

Ped Plan

Kane County has a Bicycle and Pedestrian Plan (2002). Facility and land use strategies for encouraging walking are discussed. The 2030 Transportation Plan and 2030 Land Resource Management Plan contain pedestrian elements (adoption is expected in Fall, 2004).

Sidewalk policy

There is not a written sidewalk policy. Cost-sharing is determined on a case-by-case basis. The county strongly encourages the building and connection of sidewalks, and urges municipal provision of sidewalks.

Intersection policy

Kane County has a policy of consideration of installation of at-grade or grade separated crossings and pedestrian signal heads on major arterial roads. The county is studying arterial roads for possible crossings and safety enhancements of crossings.

Special Ped Projects

Kane County took a leading role in organizing and executing the 2001 Walkable Communities Workshop in Batavia. The county anticipates assisting other communities as these workshops are developed in the future.

[145] Survey response, 2002.

Bicycling Activities

Plan

Kane County has a Bicycle and Pedestrian Plan (2002). The 2030 Transportation Plan and 2030 Land Resource Management Plan contain pedestrian elements (adoption is expected in Fall, 2004).

Bikeway Policy

An on/off street bikeway network is discussed and outlined in the Bicycle Plan, and an Action Plan for both planning and facility implementation is included. The county's policy is to include some level of bicycle accommodations during all road improvement projects. Options include paved shoulders, sidepaths and crossings. They have produced the Kane County Bicycle Map (2003). In the next five years, the county hopes to incorporate Bicycle Level of Service (BLOS) standards into all road projects. The county has used BLOS so far to develop two editions of the Kane County Bicycle Map (2003 and 2004). The planning map has also been approved by the County Board. It is the county's position that bicycles should be accommodated on all local streets.

Special Bike Projects

An on/off street bikeway network is discussed and outlined, and an Action Plan for both planning and facility implementation is included.

Lake County Division of Transportation[146]

Pedestrian activities

Plan

Lake County does not have a pedestrian plan.

Sidewalk Policy

The county is willing to accommodate sidewalks if the local government pays.

Intersection Policy

The county pays for crosswalk markings when warranted and requested. Pedestrian signals are decided on a case-by-case basis.

Special ped projects

Unknown

Bicycling activities

Plan

Lake County has adopted a long range bicycle facilities plan.

Bikeways Policy

Unknown

[146] Survey response and interview, 2002.

Special bike projects

Lake County included 27 bikeway projects in its current five-year Highway Improvement Plan. Over the next five years, the county plans on continuing its construction of bike lanes and multi-use paths. They have produced a bikeways map and GIS database, and have constructed bike lanes and multi-use paths.

McHenry County Highway Department[147]

Pedestrian activities

Plan

The county has no stand-alone pedestrian plan. The county has a 2010 Transportation Plan (adopted in 1995) which highlights work being done by the McHenry Conservation District on creating trails. The plan recommends unspecified bikeway improvements on several roads, mainly rural arterials, to supplement the trails. No specific pedestrian recommendations are made. The plan also mentions the possibility for integrated land use-transit planning along the IL 47 corridor. Follow through on these projects is unclear, as the current Five Year Plan does not include implementation of any bike or pedestrian-specific projects. The county has a 2010 land use plan.

Sidewalk Policy

There are no known pedestrian related projects or written policies by McHenry County.

Intersection Policy

Unknown

Special ped projects

Unknown

Bicycle activities

Plan

In 1996, The County produced a Subregional Bicycle Plan, prepared for the McHenry County Council of Mayors. The plan notes that the establishment of an ongoing bicycle planning advisory committee is critical to the plan's implementation. As of today, there has been no establishment of this committee.

Bikeways Policy

The McHenry County Bicycle Plan lists a number of "bicycle planning implementation policies," including the elimination of hazards to bicycle travel and the construction and enhancement of facilities.

Special Bike Projects

McHenry County has implemented the Miller Road Bike Path and Lawrence Road's bike crossing and RR crossing.

[147] Survey response and interview, 2002.

Will County Highway Department[148]

Pedestrian activities

Plan

The county has no stand-alone pedestrian plan. The transportation plan has mention of "multimodal" (pedestrian/bike) transportation, but makes no recommendations on any non-motorized modes besides expanding sidewalk access. The county intends to produce an update in the next five years that deals directly with pedestrian and bicycling accommodations.

Sidewalk Policy

The transportation plan mentions expanding the sidewalk network. At this juncture, sidewalk cost-sharing is done on a case-by-case basis.

Intersection Policy

Will County deals with pedestrian accommodations at intersections on a case-by-case basis.

Special ped projects

Will County has not undertaken any special pedestrian projects in the last five years.

Bicycling activities

Plan

The county has no stand-alone bicycling plan. The transportation plan has mention of "multimodal" (pedestrian/bike) transportation, but makes no recommendations on any non-motorized modes besides expanding sidewalk access. The county intends to produce an update in the next five years that deals directly with pedestrian and bicycling accommodations.

Bikeways Policy

Will County has no written policy related to bikeways.

Special Bike Projects

Will County has not undertaken any special bicycling projects in the last five years.

[148] Interview, 2002.

Municipal Policies and Activities

A detailed study of all of the policies and activities of the 272 municipalities in northeastern Illinois was beyond the scope of *Soles and Spokes Plan.* However, within the scope of the *Soles and Spokes Municipal Survey*, we gained an overview of municipal activities within northeastern Illinois. Table 42 shows the municipal population with municipalities indicating that they have various programs, services and policies, weighted by population.

As shown by Table 42, the most common northeastern Illinois municipal bicycle and pedestrian activities with positive survey responses, weighted by population, are:

- school crossing guards;
- a requirement that developers build sidewalks with new development and redevelopment;
- sidewalk reconstruction/replacement programs;
- planned bicycle facilities; and
- planned sidewalks or paths.

Least common activities, indicated by positive survey response and weighted by population, are:

- bicycle detection at traffic signals;
- child bicycle helmet ordinance or regulation;
- intention to adopt/update ADA Transition Plan in the near future;
- pedestrian transportation plans; and
- pedestrian safety education.

Among different sorts of activities, we can see the most common and least common positive survey responses indicating activities by or in the respondent municipality:

Pedestrian planning activities:

- most common: planned sidewalks or paths,
- least common: having a pedestrian transportation plan.

Pedestrian design and construction activities:

- most common: a requirement that developers build sidewalks with new development and redevelopment;
- least common: an electronic sidewalk inventory.

Pedestrian education and promotion:

- most common: school crossing guards;
- least common: pedestrian safety education activities.

Bicycle Planning Activities:

- most common: planned bicycle facilities;
- least common: comprehensive plan including bicycle elements.

Bicycle Implementation Activities:

- most common: off-street bicycle facilities;
- least common: on-street facilities and marked routes.

Bicycle education and promotion:

- most common: bicycle parking;
- least common: bicycle detection at traffic signals.

Transit-oriented activities:

- most common: bicycle parking at rail stations
- least common: improved walking access to transit.

Table 42
Percent of Municipal Population
In Municipalities with Various Pedestrian and Bike Programs
Northeastern Illinois, 2002, in Reverse Order

Program or Activity	Chicago	Suburban Cook	Collar Counties	Total
School crossing guards	100%	75%	70%	83%
Requirement that developers build sidewalks with new development or redevelopment	100%	71%	72%	82%
Sidewalk Reconstruction/Replacement Program	100%	74%	68%	82%
Planned bicycle facilities	100%	57%	62%	75%
Planned sidewalks or paths	100%	59%	60%	75%
Process to accommodate pedestrian crossings in roadway design	100%	60%	58%	75%
Pedestrian phase in traffic signals or pedestrian-activated signals	100%	64%	53%	74%
Sidewalk Construction Program	100%	60%	53%	73%
Bicycle Parking	100%	64%	47%	73%
Existing off-street bicycle routes	100%	51%	56%	71%
Bike parking at transit stations	100%	51%	41%	67%
Bus passenger shelters	100%	50%	32%	64%
Bicycle safety education	100%	47%	31%	63%
Park or recreation plan including pedestrian elements	100%	34%	38%	61%
Park or recreation plan with bicycle elements	100%	33%	37%	60%
Bicycle Transportation Plan	100%	29%	37%	59%
Process to accommodate bicycles in roadway design	100%	30%	32%	58%
Adopted strategies, policies, or goals and objectives for bicycle transportation	100%	30%	31%	57%
Promotion of bicycle travel	100%	35%	23%	56%
Electronic map of bicycle facilities	100%	29%	30%	56%
Transportation plan including bicycle elements	100%	27%	28%	55%
Existing on-street marked routes	100%	18%	34%	54%
Transportation plan including pedestrian elements	100%	24%	28%	54%
Existing on-street bicycle facilities	100%	16%	35%	54%
Improved biking access to transit	100%	18%	31%	53%
Program to promote walking	100%	19%	16%	49%
Improved walking access to transit	0%	50%	39%	28%
Comprehensive including bicycles	0%	39%	49%	27%
Comprehensive plan including pedestrian elements	0%	36%	50%	26%
Enforcement of pedestrian right-of-way laws by police	0%	38%	36%	23%
Adopted strategies, policies, or goals and objectives for pedestrian transportation	0%	27%	37%	20%
Adopted transition plan to comply with Title II of ADA	0%	32%	29%	19%
Electronic Sidewalk Inventory	0%	23%	28%	16%
Pedestrian safety education	0%	23%	21%	14%
Pedestrian transportation plan	0%	8%	31%	12%
Intention to adopt/update ADA Transition plan in near future	0%	20%	12%	10%
Child bicycle helmet ordinance or regulation	0%	14%	9%	7%
Bicycle detection at traffic signals	0%	1%	2%	1%

Prepared by the Chicago Area Transportation Study, February, 2004. Source: *Soles and Spokes Municipal Survey*. Results based on percent of municipalities responding that they have such programs, weighted by the municipality's population.

We have discussed some planning activities in previous sections. Below we discuss specifics of other types of programs, implemented by all levels of government.

Safety Programs

Communities in northeastern Illinois offer a variety of pedestrian and bicycle safety programs. The goal of pedestrian and bicycle safety programs is to reduce injuries to people of all ages from crashes on streets, paths, and intersections and sidewalks (see the first section of the Task 2 report for information on injuries). Of respondents to the *Soles and Spokes Municipal Survey*, 87 of the 186 respondents (47%) said they had a bicycling safety program. 39 of the 186 respondents (21%) said they had a pedestrian safety program. *Soles and Spokes* contacted these municipalities by both phone and email. From these contacts and people to whom we were referred, we assembled a list of programs from around the region.

For this analysis, bicycle and pedestrian safety programs have been categorized into four areas:

- Youth programs
- Adult programs
- Motorist programs
- Enforcement programs

A summary of the results in each area are presented here. The full survey results are found in Appendix J. This appendix presents a table listing these categories, followed by the names of the specific programs and where they take place. Also provided are contact persons for these programs, followed by a phone number and/or email address and a short statement on the activity in the program. Where possible or applicable, the inventory lists information on the annual cost of the program, the funding source, and the annual clients.

Youth Programs

Of the 270 municipalities in the region, our inventory found 30 (11%) with youth safety programs. These programs have been divided into school programs, park or day camp programs, bicycle rodeos, Officer Friendly programs, and "other" programs.

School Programs

Police departments administer 14 of the 18 school programs we found. These programs usually take the form of officers making presentations in classrooms. Many school programs are structured to reach a certain age group every year. For example, the Wilmette Police Department currently concentrates on the 2nd grade, and every year, comes into schools and talks to children about staying safe while walking and biking.

Park or Day Camp Programs

Our inventory found 7 municipalities with pedestrian and bicycle safety instruction as a part of park or day camp programs. The Chicago Park District has a significant number of summer programs. These are usually referred to as "bike days", "wheels days" or "bike parades". Sometimes, kids are encouraged to bring along whatever kind of "wheels" they have, whether it's a bicycle, rollerblades, or skateboard. A wide variety of activities take place at these events, depending upon who is administering the program. Obstacle courses are a popular activity, as

are the bike parades, which usually occur in conjunction with helmet or bicycle decoration with stickers and streamers.

We found five municipalities with a "Safety Town" or "Safety Village", a park area with scaled down roads and intersections for practicing pedestrian and bicycling safety. For example, Elk Grove Village has a "Safety Village" complete with lanes, stop signs, stoplights, crosswalks, and miniature housing. During the spring and summer, children go there on class trips to learn the basics of staying safe on their bicycles.

Bike rodeos

"Bike rodeos" are a popular type of program. Our inventory found 15 municipalities with such programs. Bike rodeos typically include a presentation by a police officer, a bicycle inspection, bicycle registration, and an obstacle course. At the 15th District Bicycle Rodeo on the west side of Chicago, the police department supplied 150 helmets for giveaway, assembled an obstacle course, and had Mayor Daley's Bicycling Ambassadors fit the helmets and provide safety information and literature.

Officer Friendly programs

In addition to bike rodeos, there are other special events operated by police departments, which are categorized in this inventory as "Officer Friendly" programs. We found 7 municipalities participating in Officer Friendly programs, which range from "Bike with a Cop" rides to giveaways of redeemable certificates as a way to encourage helmet use and good safety skills. In the village of Grayslake, the police give out $15 gift certificates for new helmets, with two local bike shops taking part in the promotion.

Written Materials

The Illinois Department of Transportation distributes "Kids on Bikes in Illinois." It is posted at http://www.dot.state.il.us/bikemap/kidsonbikes/kidsbike.pdf.

Adult Programs

Our inventory found 5 municipalities with adult safety programs. There are several publications targeted to adult cyclists. *Safe Bicycling in Chicago* and *Safe Bicycling in Illinois* are produced by the City of Chicago Department of Transportation and the Illinois Department of Transportation and are the most widely distributed.[149]

Three municipalities offer instructional classes addressing bike handling and how best to avoid crashes. In Chicago, Mayor Daley's Bicycling Ambassadors have conducted a Lakefront Path campaign on how to safely share the trail.

We found no municipal safety education programs for senior citizens, disabled or other adult pedestrians, although in Chicago, Mayor Daley's Bicycling Ambassadors have targeted seniors as being in need of further training. During the summer of 2002, the Ambassadors gave a safety and encouragement presentation to the Metro Seniors in Action group. In 2003, they visited six senior centers, including a presentation to a "packed room" at the Copernicus Center.[150]

[149] These documents are available online at http://www.dot.state.il.us/bikemap/safekids/safebike.pdf.

[150] Chicagoland Bicycle Federation. *Mayor Daley's Bicycling Ambassadors 2003 Report.* Prepared for the City of Chicago, Department of Transportation. P. 19. Total estimated attendance at the six events was 272 (p. 28).

Pedestrian and Bicycle Safety Education for Motorists

Another component to bicycling and pedestrian safety programs is education of automobile owners and professional drivers of taxis, buses and trucks. Typically, this kind of education occurs as a module in a driver's education or professional driving safety course.

Drivers' education teachers in Illinois normally teach from the "Rules of the Road", although the material tends to vary from class to class. The Secretary of State is updating its "Rules of the Road" publication and license exams to include subject matter related to sharing the road.

Enforcement Programs for Pedestrian and Bicycle Safety

There are several communities in the region where the police actively monitor and ticket motorists who endanger bicyclists by blocking bike lanes. In Chicago, the Department of Revenue has begun an enforcement effort with the goal of making streets safer for bicyclists. The DOR's "Parking Enforcement Aides" can issue citations ($100) to motorists parked in bike lanes.

There are also communities where bicyclists are counseled or ticketed for endangering the welfare of themselves or those around them. Schaumburg has a "Bicycle Safety Patrol" program where verbal "warnings" and at times, citations, are written to bicyclists who fail to follow the rules of the road. In Schaumburg, the bicycle safety patrol is educated about crash types and ways to avoid them.

Several communities were identified that had an ordinance of some kind related to helmets for children.[151] The intention of these types of programs is to decrease the number of injuries related to crashes.

At this point, there is no indication that any communities in the region are actively monitoring and quantifying crash types. In addition, we did not find any enforcement programs that raise police officer awareness of pedestrian vulnerability to motorists. Efforts to raise officer awareness to the danger to bikes of motorist behavior is limited to bike lane enforcement.

Model programs

Several pedestrian and bicycle safety programs make excellent model programs because of their originality and effectiveness.

Saint Charles

The City of Saint Charles offers a variety of interesting programs that help deliver the message of pedestrian and bicycle safety. One of these programs is called Safety Town. Safety Town is a

[151] The ordinance for Skokie reads as follows: "(d) Helmets. Every person under the age of sixteen (16) years shall wear a protective helmet that meets the standards promulgated by either; the American National Standards Institute, the American Society for Testing or the Snell Memorial Foundation, Inc., whenever that person is upon a public highway, sidewalk, bicycle path or other public right-of-way within the corporate limits of the Village and is riding or being carried on any bicycle or any carrier attached to or pulled by a bicycle."

The *Soles and Spokes Municipal Survey* also identified the following communities with ordinances or regulations requiring bicycle helmets for children on bikes: Barrington, Blue Island, Country Club Hills, Crystal Lake, Deerfield, Evergreen Park, Fox Lake, Grayslake, Hainesville, Highland Park, Hoffman Estates, Inverness, La Grange, La Grange Park, Lansing, Lynwood, Melrose Park, Niles, Northfield, River Forest, Steger, Streamwood, University Park, and Vernon Hills

two week program for preschool/kindergarten age kids that covers many aspects of pedestrian and bicycle safety. Typically they cover traffic signs, hand signals, helmet use, crossing at the corner, looking both ways etc. Safety Town is funded by a grant by the American Legion.

The St. Charles Police Department also sponsors a Bicycle Helmet Safety Program. This program consists of officers handing coupons for free ice cream to kids for wearing their helmets when they are spotted around town. The ice cream is donated by Colonial, a local restaurant.

The St. Charles Police Department DARE officers have also done bicycle rodeos on a limited basis for schools that ask for it. The rodeos are usually done in conjunction with a big end-of-the-year bike trip that the class takes.

Lemont

Lemont also runs a "Safety Village" for children, with a mini walking area and stop signs. The Village was built through donations, the land was donated by Metropolitan Water Reclamation District and Lemont leases the land for $1.00 per year. The Lemont Safety Village program is notable for its efforts to galvanize support for its construction. The Lemont Women's Club and Lemont Jaycees held fundraisers to collect money for the construction of the Safety Village. The Village also established a budget line item to assist in construction costs of the project, and Lemont now owns the building and is responsible for maintenance and operating costs.

Analysis and Conclusions

We found no comprehensive school-based pedestrian or bicycle safety program that insures that all students are presented bicycle and pedestrian safety information at some time during elementary or middle school. We found no current pedestrian safety education programs for senior citizens, disabled or other adults.

We found that most law enforcement agencies have no pedestrian and bicycle safety program. There appears to be no regular training or certification on pedestrian or bicycle safety for instructors, educators, and police officers.

We found no programs in the region – either civilian safety education or driver or law enforcement training – that base their curriculum and enforcement countermeasures on an analysis of crash data. There are no programs that measure crashes over time to determine program effectiveness.

One of the primary problems with safety programs is assessing effectiveness. Pedestrian and bicycling crash and injury data can be difficult to track accurately. There are significant gaps in terms of reporting such incidents to the police, and most police departments do not organize and clarify this data well enough to demonstrate trends. If this information were available on a local level, it might be possible to ascertain the effectiveness of safety programs by drawing connections between local implementation of safety measure to reduce specific crash types and actual reductions in those types of crashes.

The Chicagoland Bicycle Federation is currently in the midst of developing a bicycling crash and injury database for Chicago, which might comprise data from police reports, hospital reports, and independent surveys of bicyclists in the city. CBF hopes to break down such data not only by age, sex, date and time, but also by location or street intersection, weather and driving

conditions, and type of crash. An insistence on detail will help educators and police departments better understand the prime causes of crashes in their region, and may help tailor their efforts with safety education. No such effort is underway for pedestrian safety.

Children tend to be targeted most intensely for safety programs. Once children reach high school, the amount of safety education drops off significantly. There appears to be a significant gap in the efforts by police departments, safety educators, pedestrian and bicycling clubs and other associations to effectively reach adults.

National standards and curricula exist for teaching pedestrian or bicycling safety. The U.S. Department of Transportation publishes the *National Strategies for Advancing Bicycling Safety*, designed to be a road map for educators and policy makers as they undertake efforts to increase safe bicycling.[152] Other existing curricula include the League of American Bicyclists' "Bike Ed."[153] However, some widespread education strategies, particularly for pedestrians, may be inappropriate. For example, the admonition to "look left, look right, then left again" is not only problematic when intersection danger frequently comes from behind and from odd angles, but may be ignored anyway.[154]

Thus, based on limited research, it appears that there may be gaps in the materials, methods, effectiveness, availability, and efficiency of bicycle and pedestrian safety education in northeastern Illinois. Additional research and experimentation seem to be called for to answer questions about these issues.

Encouragement Programs

This section will describe and analyze programs that primarily encourage greater levels of bicycling and walking. Some encouragement programs also have safety education elements similar to the programs described in the previous section. The goal of encouragement programs is to give people the motivation to choose pedestrian and bicycle modes as a means of transportation in daily life.

Programs have been divided into youth and adult categories.

Youth Programs

There are two primary types of programs in the region that encourage youth to bike or walk. The two types of encouragement programs we have identified are school-based and low-income programs.

[152] This document is posted at http://www.nhtsa.dot.gov/people/injury/pedbimot/bike/bicycle_safety/.

[153] http://www.bikeleague.org/educenter/education.htm.

[154] Generally, see http://www.nncc.org/Health/look.left.right.html. A very good study was conducted by MacGregor, Smiley and Dunk of the University of Waterloo and Human Factors North, "Identifying Gaps in Child Pedestrian Safety: Comparing What Children Do to What Parents Teach." *Transportation Research Record 1674.* Transportation Research Board. Paper 99-0724. pp 32-40. They showed that the visual scan necessary to avoid danger was rarely taught to and very rarely practiced by children.

School-based Programs

Chicago offers a safety and encouragement program called "Safe Routes to School". The Chicagoland Bicycle Federation administers the program to parent groups, teachers, students, community leaders and government agencies. The program identifies the conditions preventing students from walking and bicycling into school, surveys students, presents safety information, maps out safe routes, and encourages communities to bike and walk together in so-called "riding and walking school buses".

In May of 2002, the Chicago Area Transportation Study offered a "Safe Routes to School" workshop to planners, engineers, school officials, parents, students, and advocates. The goal was to discuss traffic calming measures, initiatives, and programs that might help increase the number of children walking or bicycling to school.

The inventory found fourteen municipalities participating in "Walk to School Day". Evergreen Park involves eight different schools in their program. Besides building a sense of community among children, parents, teachers, and civic leaders, "Walk to School Day" programs can have the effect of encouraging communities to keep themselves "walkable", and consider adoption of policy that ensures the upkeep of pedestrian accommodations like sidewalks and crosswalks. The Village of Hinsdale's day was very popular with residents. Coincident with the October, 2002 event, new policy was enacted in Hinsdale to construct nearly seven miles of new sidewalks specifically providing access to schools and parks.

Low-income Programs

The inventory found several programs that encourage low-income youth to bicycle. The program at Urban Bikes, a bicycle shop on the north side of Chicago, offers neighborhood youth an opportunity to "work for parts" and learn maintenance skills. Blackstone Bicycle Works on Chicago's south side offers a similar type of program. Joliet Bicycle Club uses funds they raise from their group ride events to donate bikes & helmets to 25 underprivileged children in the area. South Elgin's "Trips for Kids" program and XXX Racing's "Juniors Program" focus on the goals of promoting recreational and transportation cycling to disadvantaged youth.

Adult Programs

Adult encouragement programs are categorized into:

- maintenance instruction
- health-based programs
- cycling clubs
- events
- commuter encouragement

Maintenance Instruction

The inventory found three programs that educate bicycle riders on how to properly maintain their bicycles. The Windy City Cycling Club is a primarily gay and lesbian bicycle club that, along with bicycle rides and social events, teaches maintenance to students of its "Bike Academy," and offers lessons on changing flats, and adjusting brakes and gears. Each class is offered once a year, free of charge, usually to about 20-30 students. The goal of this type of program is to increase ridership through giving people the tools to maintain their own bicycles.

Health-Based Programs

The inventory found eight health-based encouragement programs. These are usually organized walks or rides that encourage people to get outside, exercise, and consider walking or bicycling more as a means of transportation. The "High Steppers" Walking Club in Park Forest is one example.

Cycling Clubs

Cycling clubs are another kind of encouragement program, offering scheduled group riding events and sometimes clinics on bike maintenance or safety concerns. Sixteen municipalities in the region have an active cycling club. These clubs range anywhere from 10 to 100 members and offer as many as 50 club rides per year. Sometimes these clubs go a step further by reaching out beyond members to encourage cycling. As mentioned previously, the Joliet Bicycle Club uses proceeds from group rides to provide bikes & helmets for local children.

Events

The inventory found 1 daily, 2 monthly and 1 seasonal bicycle encouragement events. Chicago's "Bike Winter," organized by local advocates and grassroots activists, holds a series of events to promote winter bike riding, and gives people the opportunity to socialize with other cyclists and learn winter cycling skills. The City of Chicago's "Bike Month" offers rides, classes, "Books and Bikes" library events for children, and seminars on topics such as commuting to work. Arlington Heights also has a "Bike Month" and "Bike Commuter Appreciation Day".

Commuter Encouragement

Commuter encouragement programs educate and encourage people to find alternative ways of commuting to work. These range from "bike and ride" programs in conjunction with public transportation (CTA's Bike to Transit and Bikes on Trains program) to "Bike Pools" where members of a community join up and ride into work together. The inventory found six different specific commuter encouragement programs, which include programs like Naperville's Commuter Bicycle Lockers and CBF Bike School's Biking to Work or School class.

Model Program

In Chicago, Mayor Daley's Bicycling Ambassadors have as one of their primary goals the creation of more livable neighborhoods through helping more people to bicycle. The audience for this campaign consists of people of all ages from across the city. The primary messages are: learning how to carry things on your bike, choosing the safest routes, and using the Chicago Bike Map. The Ambassadors teach people how to commute to work, shop by bike, and use their bicycles more as a means of transportation and exercise.

Mayor Daley's Bicycling Ambassadors give presentations and attend events in the city, talking to people about the benefits of using bicycles more. They sometimes talk to the public at area grocery stores and encourage people how to shop by bike by demonstrating different mechanisms for carrying things. They successfully reach and encourage nearly 1000 adults and children over the course of a season.

Analysis and Conclusions

The goal of encouragement programs is to increase the number of people who choose to walk or bicycle in their daily life. However, it is difficult to determine how effective these programs are

in reaching their goals, since these encouragement programs are not structured to correlate with existing data. General census data can help describe how many people tend to walk or use their bicycles for commuting to work, but it fails to describe other specific trip types, recreational or utilitarian. Thus, it does not capture all the trips which were potentially influenced by encouragement programs.

Census data does not provide information about motives for choosing a particular mode, so it is difficult to assess, for example, whether programs that encourage year-round cycling are addressing a key decision factor in mode choice. Further, although the census data offers commuting numbers, this data arises from only a particular time of year (late March), and does not tally bicycling or walking as a trip if done in conjunction with another mode (i.e. train or bus). The National Personal Transportation Study (NPTS), MCIC (Metro Chicago Information Center), and CATS have all compiled surveys which deal with more specific questions, but much of the data is hampered by weaknesses in sample size, or the kind and specificity of the questions. These data gaps suggest that the region should consider a new travel survey with continuous collection and information about not only behavior, but the exposure to information about travel decisions and perceived availability of travel choices.

Nevertheless, we have seen that there are a number of encouragement programs throughout the region. Further study and experimentation to monitor extent and effectiveness of various programs is warranted.

Non-motorized Access to Transit

Non-motorized access to transit has long been recognized in the Northeastern Illinois region as an essential piece of the regional transportation picture. The relationship between transit and non-motorized transportation is mutually beneficial and supportive. When many transit riders use non-motorized access and egress from transit vehicles, transit cost-effectiveness is enhanced by reduced parking costs. Non-motorized access and egress also enhance transit marketability by not requiring the additional user expense for parking and vehicle operation.

At the same time, the availability of transit enhances the walking and bicycling environment by providing an alternative to walking and bicycling when they are not feasible, again with less expense than car ownership and operating costs. The availability of transit expands the range of travel opportunities for those who seek to reduce their reliance on automobiles.
All three transit agencies in northeastern Illinois region and Amtrak provide some level of pedestrian and bicycle accommodation. Highway agencies and municipalities also provide facilities for non-motorized travelers leading to bus routes and train stations, encouraging transit use. Summary data regarding the relationship between non-motorized transportation and transit was presented in Section 2 of this report. Very detailed data is presented in the RTA's report *Non-Motorized Access to Transit* (1996). The following sections present a brief history and description of activities facilitating and promoting non-motorized access to transit.

Chicago Transit Authority

The Chicago Transit Authority is the nation's second largest public transit system, serving Chicago and 40 suburbs. Each weekday, the CTA provides 1.5 million rides across a network of seven rail lines and 148 bus routes. Service is provided at 144 rail stations and more than 12,000

posted bus stops[155] The CTA's operating environment centers on Chicago and near suburbs with very high sidewalk coverage rates (see Figure 34 in Section 3 of this report). The Chicago Transit Authority also provides bicycle parking and bicycle access to transit vehicles throughout their system. A marketing campaign has been implemented to promote these programs to CTA customers. This campaign consists of advertising cards in trains, buses and stations and a Bike and Ride brochure (available on-line[156] and in print at CTA rail stations). These programs have also been marketed in publications such as the Chicagoland Bicycle Federation's *BikeTraffic* and the City of Chicago's *Bike Month* brochure.

The CTA's current and future pedestrian and bicycle access planning covers bicycle parking, bicycle access to trains, wayfinding and improved pedestrian access to stations from the surrounding infrastructure.

Bike to Transit Program

The CTA's bicycle parking initiative originated in 1995 when the Chicago Department of Transportation (CDOT) arranged for the installation of bicycle parking racks at many CTA rail stations; this approach continues to this date as CDOT installs bicycle racks on City sidewalks outside CTA stations and at a limited number of major bus stops. The Bike to Transit Program was formally established in 2001. Intern staff was retained and protocols for inter-agency coordination between CDOT and CTA were established. As part of this joint CTA/CDOT partnership, CDOT provided bicycle parking consulting services and free bicycle racks. In order to achieve the program's goal of providing safe, secure and weather-protected bicycle parking, these racks where installed inside 20 CTA transit stations as "Phase I" of a pilot program. Phase II of this program involved installation of wall-mounted bicycle racks indoors at three transit stations. Usage of all bicycle parking racks at CTA transit stations has been documented with yearly counts. To date no formal initiative has been established to assess the need for bicycle parking at bus terminals and hubs. However, because of the apparent success of the indoor parking program, the CTA and CDOT continue to install indoor bike racks throughout the system. At the time of writing, 58 rail stations have indoor bike parking, including several that were installed by the CTA as part of rail reconstruction projects. The next phase of this program is the *Bike-to-Transit Project* another joint CTA/CDOT project which involves the use of CDOT-secured Congestion Mitigation and Air Quality (CMAQ) funding to design and install improved secure indoor bicycle parking at up to 5 CTA rail transit stations.

To date, CDOT and CTA have recorded minimal operating problems as a result of the provision of bicycle parking. Outside station houses, the primary problem has been coordinating removal and reinstallation of racks during station house or track construction. Within stations, careful placement of bicycle racks has alleviated concerns with pedestrian and disabled passenger conflicts with parked bicycles. Signage placed at indoor racks clearly communicates both rack use and bicycle parking policies to CTA customers and staff.

In 2002, CTA began exploring another potential phase for its bike parking projects: installation of attended "bicycle station" facilities that would provide not only bike parking but a range of other services, such as bike repair, bike rental and transit system information. CTA conducted a public meeting to which potential stakeholder groups and operators were invited in order to

[155] http://www.transitchicago.com/welcome/overview.html

[156] http://www.transitchicago.com/downloads/brochures/biketran.pdf

assess community interest in the project. The CTA is awaiting successful implementation of the Bike-to-Transit Project, which will construct high-capacity, self-service parking facilities with no operating expenses beyond maintenance costs. Because of the operating subsidies required for full-service, staffed facilities, the CTA will only consider such projects after demonstrated success of the Bike-to-Transit Project.

Bike and Ride Program

Bikes on Trains

The CTA Bikes on Trains initiative began as a limited pilot program in the summer of 1999. For three months, riders were allowed to bring their bikes on any CTA train on weekends between the hours of midnight Friday and midnight Sunday, with certain holiday restrictions. The following year, the program was repeated with the same days and hours of service. In 2001, following the successful implementation of weekend service, bicycle access was expanded to seven days, excluding rush hours, defined at that time as 6 a.m. to 10 a.m. and 2 p.m. to 8 p.m. In 2002, the program was improved by limited the rush hour exclusion to 7 a.m. to 9 a.m. and 4 p.m. to 6 p.m. CTA has attempted to collect user data for this program through Customer Assistants with limited success.

Bikes on Buses Program

The CTA Bikes on Buses program began with pilot installation of bicycle racks on the front of the North Avenue and 63rd St. bus lines. Because existing market research has indicated that the largest regional demand for bike access to transit vehicles was for recreational use, the CTA chose two bus routes that accessed the City's Lakefront Path, a popular cycling destination. Since then, the CTA has installed front-mounted bicycle racks on the entire bus fleet.

Pedestrian Access Initiatives

The Chicago Transit Authority has a stated commitment to improving the safety and convenience of intermodal connections such as walking to transit. The CTA approached this goal through both minor station improvements to complete facility reconstruction. Two examples of programs through which CTA pursues pedestrian improvements are discussed below.

Americans with Disabilities Act Transition Plan

The Chicago Transit Authority has an ADA transition plan that addresses disabled – and by extension all pedestrian – access to its transit services. Adopted in 1992, the plan recommends improvements to CTA property only. It identifies 43 key stations to be brought into ADA compliance. As of this writing, 41 stations have been completed.

The CTA will continue to implement their ADA transition plan until completion. In addition, CTA planning conducts ongoing studies of system-wide obstacles to safe pedestrian access, such as mid-block crossings. These studies consider the inter-agency coordination challenges involved with improving the pedestrian environment surrounding CTA access.

Front Door Program

The CTA *Front Door Program* proposes improvements to train station entrances and their immediate surroundings and enhancements at station bus connections. Current program contracts include the installation of alternative approaches to stations with limited access, such as median expressway stations, and provision of mid-block crosswalks to link sidewalks and bus stops

opposite the station with the entrance. The project also provides for improvements such as station canopies and sheltered waiting areas for convenient pedestrian access to bus services.

Pace Suburban Bus Service

Pace provides bus transit service for Chicago's suburbs. Pace offers 248 fixed-route buses and nearly 500 vanpool routes throughout DuPage, Kane, Lake, McHenry, Will and suburban Cook counties, a service area 15 times the size of the City of Chicago. Pace's bicycle and pedestrian programs and activities have included installing bicycle racks on the front of all buses and providing transit shelters for pedestrians. Pace's programs are administered along with other planning duties by agency staff.

Pace engages in a proactive planning process that aims to improve the pedestrian and bicycle environment surrounding all its transit stop locations. This process has been articulated primarily in two planning documents, the *Pace Vision 2020* plan and the *Pace Development Guidelines*. Both documents provide for improved bicycle and pedestrian access to Pace services, so that an improved "first mile" and "last mile" of a Pace trip help attract users to the Pace system.

Both of these planning documents encourage significant improvements and specific development types in Pace's service area in order to enable bicycle access. Among the recommended improvements are bicycle parking at and bikeway access to transit centers and bus stops. Pace encourages the coordination of bikeways with local transportation agencies to provide access to their services. Further, Pace Development Guidelines encourage the type of residential, retail, office and industrial development that is bicycle-friendly: high-density areas with networks of connected streets and conveniently placed bicycle parking. Finally, by recommending mixed-use and transit-oriented development, Pace encourages the type of development that insures the short trip lengths favored by non-motorized modes.

Bicycle Access Initiatives

Pace is strongly committed to the intermodal connection between bicycles and buses. Aside from its proactive planning activities (see following section) Pace achieves this goal through its Bike Racks on Buses Program. In order to expand the catchment area of their fixed-route bus stops, Pace undertook a two-year program to install one bike rack on every fixed-route bus. The program was completed on April 1, 2002. Out of all the programs reported here, this one has perhaps the most rapid rise in usage after implementation. In August of 2002 – four months after implementation – Pace counted 2,641 users.

Pedestrian Access Initiatives

Pace, recognizing that walking is the largest mode of access to their services, has a stated goal of improving pedestrian access to its transit stops and hubs. To achieve this goal, Pace engages in proactive planning efforts, which will be discussed in a later section. Pace coordinates installation of pedestrian amenities such as bus passenger shelters, with partner communities. Pace has a program in place to furnish and install free-standing passenger shelters for communities that request them.

Many of the above planning activities also promote pedestrian access to Pace services. As mentioned above, dense, mixed-use and transit-oriented development produce short trip lengths especially favorable for walking. The primary infrastructure goals promoted by these documents are development of connected sidewalk networks and safe street crossings that access transit

centers and bus stops, provision of paved bus stop pads and passenger shelters and encouragement of site planning that favors safe pedestrian access.

Pace's planning process includes the offer of a no-cost development review for any private or public developer. Interested parties can submit development plans in order to have them evaluated for transit-friendliness and how well they serve future residents, workers and visitors by providing access to Pace services.

Metra Commuter Rail

The 495-mile Metra commuter rail system operates 11 different rail lines serving 230 stations in the counties of Cook, DuPage, Lake, Will, McHenry and Kane. Metra's bicycle and pedestrian activities have included bicycle parking, testing bike access to trains and providing for ADA-related station improvements and are administered along with other planning duties by Metra staff.

Bicycle Access Initiatives

Metra provides bicycle parking at a large number of their rail stations. From 2001 to 2003, Metra tested the applicability of bicycle access to its trains.

Bicycle Parking

Metra fully supports secure bicycle parking at all stations. If there is interest in the community and if there is physical capacity at the station, Metra accommodates bicycle parking when rehabilitating stations. Bicycle racks (usually) and BikeLids® (locking enclosures that swing over the bike, covering it from the elements), have been installed by Metra at train stations in these cases. Metra has installed signage along with the BikeLids®, providing policies of use. These signs attempt to prevent abuse of the BikeLids® by warning users that their bikes may be removed if left overnight. Metra also works with communities who request additional bicycle parking at their host station when Metra is not rehabilitating a station. Factors, including ridership, station size, bicycle access, physical capacity of a station, and financial feasibility are all considered with these requests. It is possible that communities add parking at stations without Metra's assistance.

Bicycles on Trains

Metra allows collapsed folding bicycles to be carried onto Metra trains. Metra began testing bicycle access to their train system in 2001 during the months of August and September, offering accommodation on each of Metra's full-service diesel trains with weekend service. Each Saturday during those months one train outbound and one train inbound would offer limited service to bicyclists, providing boarding and detraining opportunities at only one station in each fare zone. The program was reservation-based and required users to board the ADA-equipped cars and remain with their bicycles, separate from other passengers. Metra partnered with the Chicagoland Bicycle Federation (CBF) to provide marketing and reservation services. Metra's test program continued in 2002 and 2003 during the summer. The program operated on eight designated Saturdays on two lines, offering bicycle access for four Saturdays on each of the lines. While the number of lines involved in the program was reduced, the boarding hours in each direction were expanded, including three trains in each direction on each of the designated Saturdays. In addition, on-line registration was added. No bikes-on-trains pilot program was initiated for 2004.

Pedestrian Access Initiatives

Metra has a stated commitment to improving pedestrian access to their transit stations. Metra's primary strategies for achieving this are through implementation of their ADA transition plan and ADA-related improvements as a part of their station rehabilitation program.

Key Station Accessibility Plan and Station Rehabilitation Program

Metra's *Key Station Accessibility Plan* was completed in 1992. To comply with the Americans with Disabilities Act, Metra identified 73 stations – serving 71% of all Metra riders – that required ADA-accessibility improvements. Seventy-two out of the 73 stations have been completed. The one station to be completed, the Jefferson Park Station on Metra's Union Pacific Northwest Line, is expected to be completed in 2005.

As of late 2002, Metra had 127 fully accessible stations and 34 partially accessible stations, the total of which represents 90% of Metra's customer base. Whenever Metra improves a station to provide for ADA accessibility, conditions for able-bodied pedestrians are also improved.

In addition to their ADA transition plan, Metra also rehabilitates 10-15 stations per year. Metra's stated goal is to make pedestrian improvements related to ADA compliance whenever permitted by the scope of the station improvement project.

It is important to note that all of these improvements are limited to Metra station property.

Planning Information and Assistance to Local Communities

Metra has long recognized the relationship between local development and transit ridership in station areas. Metra regularly provides information to communities about mutually supportive development activities in station areas. As part of this effort, Metra has developed the following brochures, each based on an extensive report laying out in detail the information supporting the recommendations:

- Metra and Northeastern Illinois Planning Commission. 1991. *Land Use in Commuter Rail Station Areas: Guidelines for Communities: Summary Recommendations and General Land-Use Patterns to Integrate Commuter Rail Stations with Surrounding Communities.*
- Metra. 1994. *Local Economic Benefits of Commuter Rail Stations for Communities and Businesses.* Prepared for Metra by Camiros and Valerie S. Kretchmer Associates, Inc.
- Metra. 2000. *Residential Development near Commuter Rail Stations: Strategies and Recommendations for Communities and Real Estate Professionals.* Prepared for Metra by S.B. Friedman & Co., et al.

Regional Transportation Authority

In the last eight years the RTA has conducted two primary planning studies related to non-motorized access to transit. The first is the 1995 *Bicycles on Transit – Peer Review Analysis.* The second is the 1996 *Non-Motorized Access to Transit* study.

Bicycles on Transit – Peer Review Analysis

This document compares the level of bicycle accommodation on local transit vehicles with those of a sample of peer properties in 1995. Examined in the study are Metra, CTA and Pace. While some results of the study are obsolete due to recent changes on the part of regional transit agencies, a number of key points still bear mentioning.

At the time of the study, none of Northeastern Illinois' transit providers allowed bicycles on their vehicles. Since the publication of this study, the CTA has come to resemble the sample of urban rail peer properties, which provided bicycle accommodation. By contrast, none of the sample of the CTA's bus peers provided access to their vehicles, predominantly because of perceived lack of demand and service delays associated with loading and unloading bikes. CTA has since implemented a pilot program for bikes on buses. Good results led to the extension of the program to its entire bus fleet (except buses marked for near-term retirement).

Likewise, at the time of the study, only one of the sample of Pace's peers offered bike racks on buses. Pace was the first regional transit agency in northeastern Illinois to experiment with on-vehicle bicycle accommodation in a pilot program. Successful results led Pace to expand the pilot bike racks on buses program to the entire fleet, with remarkable success.

Finally, at the time of the report the entire sample of Metra's peer properties allowed bicycles on trains during off-peak hours.[157] This service was provided in spite of the perception on the part of operations departments that loading and unloading bikes would cause service delays – a problem which never materialized. As of this writing, Metra's efforts in this area have taken the form of three pilot programs with limited hours on specified Saturdays only.

Finally, service changes by local transit providers suggest that the results of the 1995 peer review are obsolete. A second peer review may be valuable to update the region's transit agency progress relative to peers and to determine whether any lessons elsewhere are applicable to improving programs in northeastern Illinois.

Non-Motorized Access to Transit

This study was conducted by RTA as a means of determining the potential ridership increase benefit from investing in improvements to non-motorized access to transit. The study involved administering two survey instruments and the development of a model to predict demand for the different modes of access to transit. The study concluded that the greatest impact for diverting travelers from automobile trips would be to improve walking and bicycling conditions at Metra stations. The report further urged that cost effective solutions such as bicycle parking, bikeways, connective sidewalks, crosswalks and wayfinding would be the most beneficial improvements for non-motorized access.

Given the development of county and municipal bike plans in the areas surrounding many Metra stations, the results of this survey may no longer be entirely valid. A follow-up study employing the same methodology might help to prioritize areas still in need of facilities improvements.

[157] For commuter rail, the sample included Massachusetts Bay Transportation Authority (Boston), Long Island Railroad (New York), Metro-North Commuter Railroad (New York), New Jersey Transit (New York), and Southeastern Pennsylvania Transportation Authority (Philadelphia). A broader sample would have yielded somewhat different results. The South Shore Line (Gary/South Bend), Virginia Railway Express (Alexandria), Maryland Railroad Commuter (MARC, Baltimore/Washington) prohibit bicycles (except folding bicycles). Metrolink (Los Angeles), Tri-Rail (Palm Beach/Fort Lauderdale/Miami), Sound Transit (Seattle/Tacoma), Caltrain (San Francisco/San Jose), Altamont Commuter Express (Stockton/San Jose) and Coaster (San Diego) permit bicycles on board. The Alaska Railroad (Anchorage) and Shore Line East (New Haven/New York) allow bicycles on some routes or parts of routes. Sources: agency Web sites, printed material.

Improving Non-motorized Access to Commuter Stations in DuPage County

This study was an outgrowth of the 1996 RTA study and was intended primarily as a resource provided by the county to communities to assist them in improving non-motorized access to transit stations. The report contains a detailed inventory and analysis of the conditions for walking and bicycling around each transit station in the county and makes recommendations as to specific bicycle route and sidewalk improvements that would benefit non-motorized access. Of particular interest is the inventory of barriers such as pinch points under Metra viaducts.

APPENDIX A

2001 NATIONAL HOUSEHOLD TRAVEL SURVEY

TRIP PURPOSE FROM AND TO DATA

FOR NON-MOTORIZED TRIPS AND ALL TRIPS

2001 NATIONAL HOUSEHOLD TRAVEL SURVEY: TRIP PURPOSE FROM AND TO

Numbers reflect estimated daily average number of trips in Chicago CMSA (Illinois Part) for a 7-day week.

FOR WALKING AND BICYCLING TRIPS:

Note: Small Sample; Data indicates relative scale only, particularly non-home based trips. See **"Discussion of sample and suggested appropriate use of the data**" that follows on the next page.

From \/ TO>	Home	Work	Work-related	School/ Religion	Medical/ Dental	Shopping	Family and Personal	Social and Recreation	Eat Meal	Serve Passen-ger	Other, Skipped, or Not Ascertained	Total
Home	-	33,268	-	36,582	2,191	102,391	31,506	268,309	24,228	23,600	-	522,074
Work	27,970	-	5,089	-	-	6,545	-	17,377	33,209	-	-	90,190
Work-related	-	13,725	6,344	-	-	-	-	-	-	-	-	20,069
School	34,756	-	-	-	-	-	-	-	-	-	-	34,756
Medical/ Dental	2,191	-	-	-	-	-	-	-	-	-	-	2,191
Shopping	81,707	12,165	-	-	-	3,142	-	14,913	-	-	-	111,927
Family and Personal	22,667	-	-	-	-	-	-	5,382	-	-	-	28,048
Social and Recreation	231,549	2,978	8,636	7,628	-	6,366	1,910	87,718	16,421	-	-	363,205
Eat Meal	33,954	33,209	-	-	-	-	-	11,592	4,897	8,126	-	91,778
Serve Passenger	34,333	-	-	-	-	-	-	-	8,960	-	-	43,293
Other, Skipped, or Not Ascertained	-	-	-	-	-	13,444	-	-	4,063	-	26,413	43,920
Total	**469,126**	**95,344**	**20,069**	**44,210**	**2,191**	**131,888**	**33,416**	**405,290**	**91,778**	**31,726**	**26,413**	**1,351,450**

FOR ALL TRIPS

From \/ TO>	Home	Work	Work-related	School/ Religion	Medical/ Dental	Shopping	Family and Personal	Social and Recreation	Eat Meal	Serve Passen-ger	Other, Skipped, or Not Ascertained	Total
Home	22,069	616,330	10,108	362,814	78,900	810,773	185,856	755,616	316,896	485,975	4,252	3,649,588
Work	590,764	4,234	99,346	14,461	-	85,859	20,458	37,005	126,206	81,280	-	1,059,613
Work-related	32,818	81,250	69,660	-	-	10,108	-	-	-	-	-	193,837
School	324,034	7,549	-	2,131	2,368	40,683	29,880	20,990	16,197	30,445	-	474,277
Medical/ Dental	43,609	-	-	-	9,766	21,858	2,504	9,766	8,633	-	-	96,137
Shopping	879,993	67,727	2,979	39,755	-	343,824	22,226	52,334	119,102	56,871	8,211	1,593,023
Family and Personal	161,180	3,246	3,107	27,482	552	17,574	2,504	5,382	17,961	38,130	-	277,117
Social and Recreation	716,343	18,860	8,636	16,640	-	54,283	2,501	171,061	88,360	15,611	13,444	1,105,738
Eat Meal	427,801	175,395	-	15,948	-	60,904	2,326	29,521	21,199	45,555	-	778,649
Serve Passenger	421,812	98,621	-	-	4,550	112,739	14,230	42,638	59,275	50,416	-	804,281
Other, Skipped, or Not Ascertained	34,301	-	-	4,063	-	36,078	2,326	33,287	4,819	-	96,498	211,372
Total	**3,654,723**	**1,073,212**	**193,837**	**483,293**	**96,137**	**1,594,684**	**284,810**	**1,157,602**	**778,649**	**804,281**	**122,404**	**10,243,632**

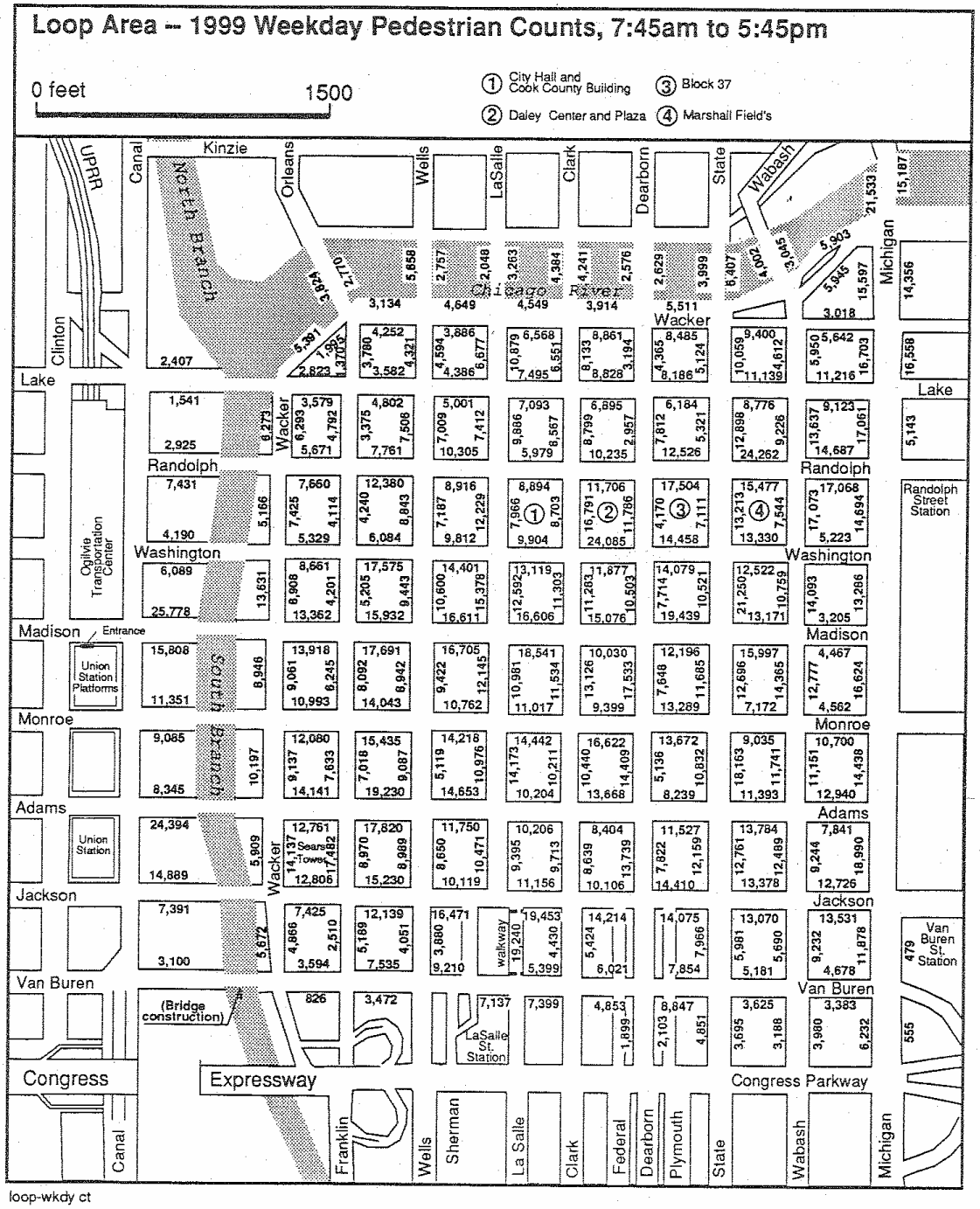
Prepared by Chicago Area Transportation Study, September, 2003. Trips reflect daily average trips by trip purpose to and from for a 7-day week in the part of the Chicago CMSA within Illinois. Trip data was collected for all ages. Source: Bureau of Transportation Statistics, US Department of Transportation. 2003. [Center for Transportation Analysis, Oak Ridge National Laboratory]. Analysis by CATS. Raw data is posted at http://nhts.ornl.gov/2001/html_files/download_directory.shtml. **Discussion of sample and suggested appropriate use of the data:** *This data is provided here because this analysis is not available elsewhere, but plays an important role in the text.* Data is based on a sample of 244 ped/bike trips and 1,881 total trips. Since bike-ped trips are expanded to fill a matrix with 121 values, this sample is insufficient to accurately reflect low relatively low values in the bike/ped table. Data *can* be used to make statements about relative scale, e.g., "walking and biking from home to and from social and recreation activities and between social and recreation activities is common," or "trip chaining by foot or bike between medical/dental purposes and meal purposes is not common." However, it would be an **inappropriate** use of this data to suggest that "No one walks or bikes between school / religious purposes and eating purposes." It is also **inappropriate** to quote a number from the bike-ped table, e.g., "131,888 people walk or bike to shopping destinations on a daily basis in northeastern Illinois.

APPENDIX B

CHICAGO CENTRAL AREA PEDESTRIAN COUNTS

1999

Figure 1.


Loop Area -- 1999 Weekday Pedestrian Counts, 7:45am to 5:45pm
0 feet
1500
1 City Hall and Cook County Building
2 Daley Center and Plaza
3 Block 37
4 Marshall Field's
UPRR
Canal
Kinzie
North Branch
Orleans
Wells
LaSalle
Clark
Dearborn
State
Wabash
Michigan
Chicago River
Clinton
Lake
Wacker
Randolph
Washington
Madison
Monroe
Adams
Jackson
Van Buren
Congress
Expressway
Ogilvie Transportation Center
Union Station Platforms
Union Station
South Branch
Sears Tower
(Bridge construction)
LaSalle St. Station
walkway
Randolph Street Station
Van Buren St. Station
Franklin
Wells
Sherman
La Salle
Clark
Federal
Dearborn
Plymouth
State
Wabash
Michigan
Congress Parkway
loop-wkdy ct

1999 North Michigan Avenue Weekday and Saturday Counts

Numbers in parentheses are from the 1999 Saturday counts

1. One Magnificent Mile
2. Drake Hotel
3. 900 North Michigan Ave
4. John Hancock Building
5. Borders
6. Water Tower Place
7. Water Tower
8. Neiman Marcus
9. Chicago Place
10. St. Clair Building
11. Terra Museum
12. Chicago Marriott Hotel
13. Nordstrom (future)
14. Tribune Tower
15. Wrigley Building
16. Equitable Building

Block-face ID

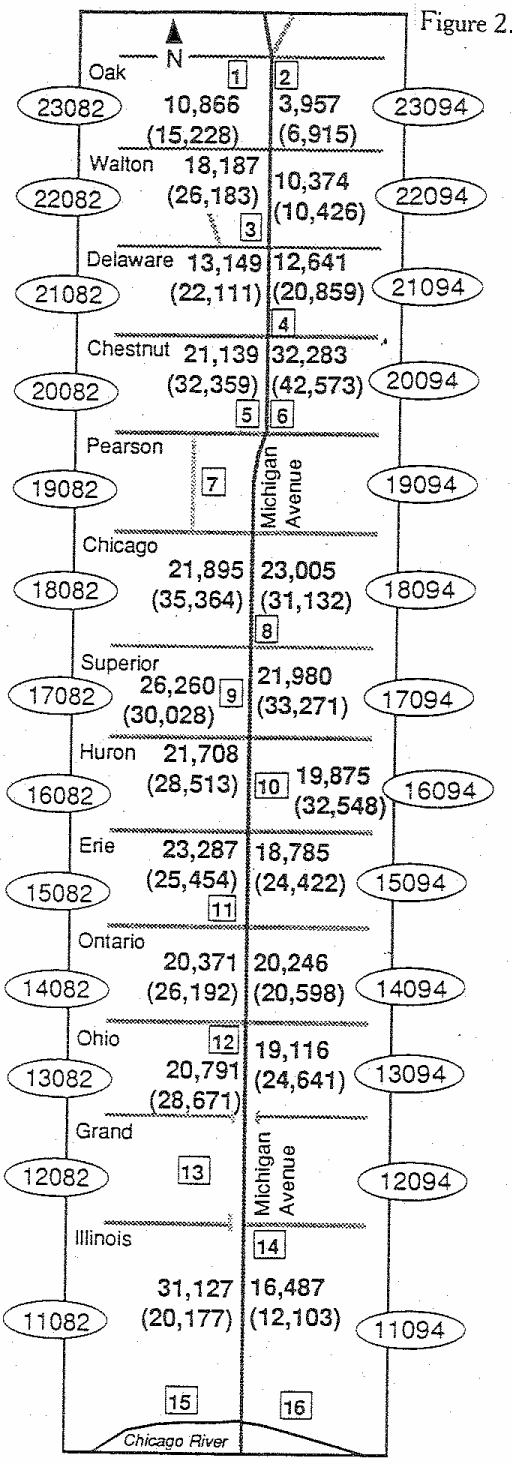
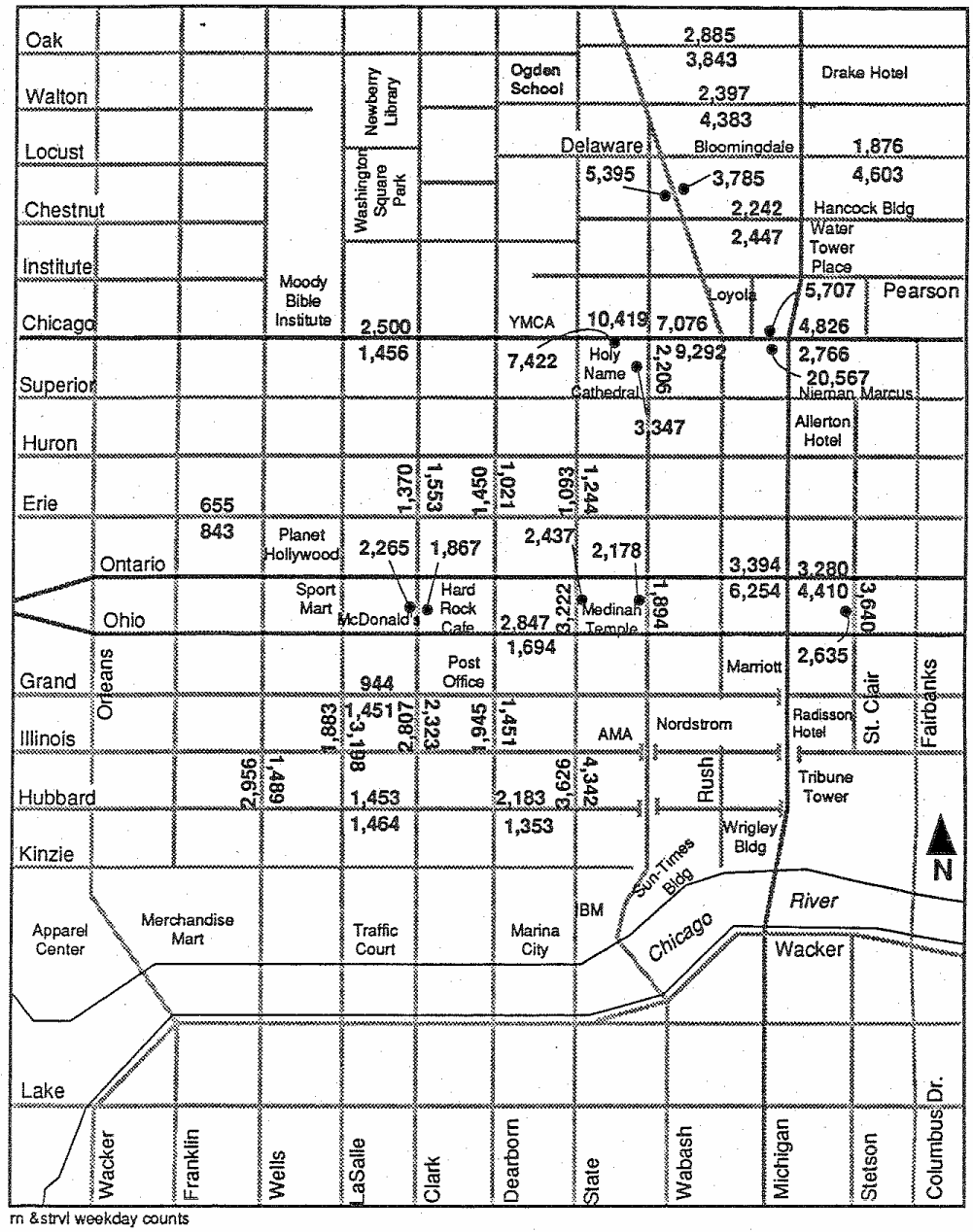


Figure 2.

Figure 3.

River North and Streeterville Weekday Counts (7:45am to 5:45pm)



rn &strvl weekday counts

APPENDIX C

ANALYSIS OF CHANGES IN DEVELOPMENT DENSITY

1987-1997

DRAFT ANALYSIS OF POPULATION DENSITY ON NON-FARM ACREAGE, NORTHEASTERN ILLINOIS, 1987 - 1997.

COUNTY	COOK	DUPAGE	KANE	LAKE	MCHENRY	WILL	TOTAL
AREA (THOUSANDS OF ACRES)	612.48	215.04	335.36	301.44	391.04	543.36	2398.72
FARM ACRES (THOUSANDS), 1987	46.9	25.4	228	82.3	265.9	328.7	977.2
NON-FARM ACRES (THOUSANDS), 1987	565.58	189.64	107.36	219.14	125.14	214.66	1421.52
POPULATION, 1987	5,172,398	741,405	298,651	482,608	165,577	339,236	7,199,875
POPULATION PER THOUSAND NON-FARM ACRES, 1987	**9,145.3**	**3,909.5**	**2,781.8**	**2,202.3**	**1,323.1**	**1,580.3**	**5,064.9**
FARM ACRES (THOUSANDS), 1992	41	18	204	73	249	326	911
NON-FARM ACRES (THOUSANDS), 1992	571.48	197.04	131.36	228.44	142.04	217.36	1487.72
POPULATION, 1992	5,199,839	815,497	332,476	543,244	201,137	376,477	7,468,670
POPULATION PER THOUSAND NON-FARM ACRES, 1992	**9,098.9**	**4,138.7**	**2,531.0**	**2,378.1**	**1,416.1**	**1,732.0**	**5,020.2**
FARM ACRES (THOUSANDS), 1997	39	17	210	51	242	294	853
NON-FARM ACRES (THOUSANDS), 1997	573.48	198.04	125.36	250.44	149.04	249.36	1545.72
POPULATION, 1997	5,322,117	874,404	376,725	609,714	242,449	450,816	7,876,225
POPULATION PER THOUSAND NON-FARM ACRES, 1997	**9,280.4**	**4,415.3**	**3,005.1**	**2,434.6**	**1,626.7**	**1,807.9**	**5,095.5**
RATIO OF 1997 TO 1992	1.020	1.067	1.187	1.024	1.149	1.044	1.015
RATIO OF 1997 TO 1987	1.015	1.129	1.080	1.105	1.229	1.144	1.006

Prepared by the Chicago Area Transportation Study, Plan Development Division. September, 2003

SOURCES:

Farmland Acreage: U.S. Department of Agriculture, National Agricultural Statistics Service. Census of Agriculture. Compiled from Data Queries of 1987, 1992, 1997. Query at http://govinfo.kerr.orst.edu/php/agri/index.php linked from http://www.nass.usda.gov/census/
County Acreage: Chicago Area Transportation Study

Population Estimates: **1992, 1997**: U.S. Census Bureau Population Estimates for NIPC Area Counties, 1990-2002 http://www.nipc.cog.il.us/county2002.html **1987**: U.S. Census Bureau Historical County Estimates Files, Population Estimates of the U.S., States, and Counties posted at http://eire.census.gov/popest/archives/1990.php

Note 1:
Changes in the proportion of regional population by county influences regional rates calculated above:

YEAR	COOK	DUPAGE	KANE	LAKE	MCHENRY	WILL	
1987	0.718	0.103	0.041	0.067	0.023	0.047	1.000
1992	0.696	0.109	0.045	0.073	0.027	0.050	1.000
1997	0.676	0.111	0.048	0.077	0.031	0.057	1.000

Note 2:

2002 Census of Agriculture information is expected in February, 2004. See http://www.nass.usda.gov/census/census02/preliminary/2002censusdates.htm

Note 3:

Data is based on retrospective estimates and survey data and is subject to errror. Definitional change occurred between 1992 and 1997. Preliminary analyses show little effect of the change, involving nurseries and tree farms, in northeastern Illinois.

APPENDIX D

RESEARCH SUPPORTING USE OF PEDESTRIAN AND BICYCLE LEVEL OF SERVICE MODELS

Real-Time Human Perceptions
Toward a Bicycle Level of Service

BRUCE W. LANDIS, VENKAT R. VATTIKUTI, AND MICHAEL T. BRANNICK

The primary focus of this study by Sprinkle Consulting Engineers, Inc. is to develop a bicycle-quality, or level-of-service, model for applications in U.S. metropolitan areas. Although there are several model forms being used throughout the United States that attempt to quantify road suitability or the quality of service afforded bicyclists traveling the street and roadway networks of urbanized areas, to date there have been no statistically calibrated models published. The statistically calibrated level-of-service model described here is based on real-time perceptions from bicyclists traveling in actual urban traffic and roadway conditions. The study's participants represented a cross section of age, gender, experience level, and geographic origin of the population of cyclists that use the metropolitan road networks in the United States. The test course is representative of the collector and arterial street systems of North American urban areas. Although further hypothesis testing is being conducted and additional studies are planned to test the need for disaggregate models for central business district streets with high turnover parking, truck routes, and two-lane high-speed rural highways, the general bicycle level-of-service model reported here is highly reliable, has a high correlation coefficient ($R^2 = 0.73$), and is transferable to the vast majority of United States metropolitan areas. The study reveals that pavement-surface conditions and striping of bicycle lanes are important factors in the quality of service.

As reported in Landis (*1*), there exist very few, if any, calibrated and transferable models that estimate bicyclists' perceptions of the quality of service in the on-road cycling environments in U.S. metropolitan areas today. There are many applications for such a calibrated and transferable model. These applications range from annual end-user applications, such as setting priorities for construction projects and bicycle route suitability mapping using supply-side performance measures, to the less frequent travel-demand forecast modeling and logit model refining for alternatives testing in corridor studies.

Currently, the largest of the application needs for a bicycle quality-of-service model is in assessing roads and streets as a criterion for setting bicycle-facility investment priorities and developing a bicycle-suitability network map. Perhaps the most widespread application demand for a statistically valid, mainstream evaluative tool such as a bicycle-quality, or level-of-service, model is for setting priorities for bicycle-facility construction projects. Currently in the United States, the choice between bicycle-facility projects is often made in the absence of an objective supply-side evaluation of the existing roadway facilities. Because competition is fierce among the various transportation modes for project construction funding, a reliable, quantitative supply-side evaluation is needed for bicycle-mode projects.

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In the closely related and rapidly growing area of bicycle suitability mapping, the current practice in many areas of the United States is subjectively to evaluate roads to determine their compatibility for bicycle travel. However, consistent evaluation of the roads among the map updates is not possible without involving the same people in every update year. As a result, either inconsistency or inaccuracy results. A statistically calibrated, mathematically based model is thus needed. Such an objective evaluation tool will eliminate a large portion of the uncertainty in suitability mapping and will provide the transportation system users with technically accurate information.

Although less often needed, one of the pressing needs for a quality-of-service model is to overcome one of the current barriers in developing a sequential bicycle travel-demand simulation or forecasting model for urban-area utilitarian bicycling. This barrier is resident in both the trip distribution and assignment steps of the classic four-step transportation system model. Unlike the relatively straightforward trip distribution and assignment algorithms for motorized vehicles, which include only a few impedance factors such as travel distance (or travel time) and (if selected) vehicle-flow capacity constraint, route selection by bicyclists in the United States is influenced by many additional factors (although it is not usually influenced by bicycle flow-capacity constraints). Stated-preference survey work by Axhausen and Smith (*2*), the hypothetical-route choice model by Bovy and Bradley (*3*), and the environmental-preference survey of experienced recreational cyclists by Antonakos (*4*) suggest that bicycle-route selection for utilitarian trip purposes in an urban setting is influenced by several additional factors, which include the perceived hazard of sharing the roadway with motor vehicles and the roadway surface condition, grade, and scenery (possibly for some trip purposes). It is apparent that the first two factors can be combined into a single mathematical function and that the resulting quality-of-service function can be used as a travel impedance in both the trip-distribution and assignment algorithms of system-level travel-simulation models. Thus refined, this mathematical function, or quality-of-service model, can remove one of the barriers to the development of urban-area travel-demand models.

BACKGROUND

There are numerous local governments, metropolitan planning organizations, and state departments of transportation throughout the United States that are applying various methods to describe the quality of service to bicyclists provided by their collector and arterial systems. The majority are basing their methods on either the separate or combined works of Landis, Sorton, Epperson, and Davis (*1,5–7*). Despite having different names for their models, these researchers and other practitioners are generally headed toward developing a model, or group of models, that describe the quality of service afforded bicyclists in the shared-roadway environment. For the most

part, they all take the approach of quantifying the bicyclists' perception of the magnitude of the hazards (stress, or conversely comfort) of traveling within the shared-roadway environment. Although offering different levels of precision and number of variables, the model forms published by the researchers have one important thing in common: the lack of basis in a statistically robust number of observations (*1*) for model calibration.

The perception of hazard, or alternatively safety or users comfort, within the shared-roadway environment is a performance measure (*8*). Although it has not yet been proved in the United States that the perceptions of safety by transportation system users correlate with actual safety, this perception is a reasonable measure of the quality of service for the bicycle mode of travel and is in keeping with the general guidelines according to the *Highway Capacity Manual* (*9*). As with performance or quality measures for motor-vehicle facilities, gradations in this quality of service are in levels of service. Thus defined, the bicycle level of service (BLOS) is not a measure of vehicular flow or capacity as is the convention for other travel modes. Although methods do exist for quantifying bicycle flow and capacity, such performance measures are generally not relevant for mixed-mode collectors and arterials in the United States, at least in the foreseeable future.

The BLOS is based solely on human responses to measurable roadway and traffic stimuli, similar to the comfort and convenience-type performance measures for other transportation modes. Although motor-vehicle system performance measures are usually based on single parameters such as time (average vehicle delay in seconds for intersections) or speed (average travel speed for road links), their gradations are solely based upon on operators' expectations of performance, that is, human perceptions. For example, the lower-bound level of service of signalized intersections is considered failure F or 60 sec of delay based upon a consensus on the motorists' tolerance threshold of travel delay. Although, the BLOS score is a mathematical function of human perceptions of stimuli, that is, a nondimensional value, it can be described in a similar manner using measurable physical attributes of motor vehicle traffic and roadway conditions. As demonstrated here, this has been done with a high degree of statistical reliability.

DESIGN OF RESEARCH

The common expression of bicyclists concerning how well a particular street or road accommodates their travel is from a perspective of safety. "It's very dangerous" or "it's fairly safe" is the way cyclists articulate their perceptions. Accordingly, this study placed its participants in actual urban traffic and roadway conditions to obtain feedback on real-time perceptions. Although a virtual reality, or simulation, study was first considered by the researchers, due to its advantage of safety to the participants, it was not pursued because of its potential inability to include all response stimuli (i.e., operator and vehicle response factors) present in the on-road bicycling environment.

Participants

The nearly 150 bicyclists who completed the course represented a good cross section of age, gender, experience level, and geographic origin. Figure 1 shows the distribution of age. Due to the potential hazards of riding in urban-area motor vehicle traffic, children younger than age 13 were not allowed to participate in the study. The gender split of the study group was 47 percent female and 53 percent male. The researchers also sought participant diversity in both geographic origins and cycling experience, or skill level. Accordingly, the study test course was located in Tampa, Florida, a metropolitan area with significant in-migration. Nearly half of the study participants had lived in areas other than the Tampa Bay region for the majority of their adult life.

There was a considerable range of cycling experience among the participants. There was a significant number who did very little bicycling and there were some who bicycle virtually every day. Figure 2 shows a histogram of the average annual bicycle distance traveled by the sample population. Nearly 25 percent of the participants ride less than 322 km (200 mi) per year. Despite considerable effort in soliciting participation from nonexperienced Group B cyclists (*10*), the higher response was from the segment of the population who currently bicycle the most often, the club-level riders.

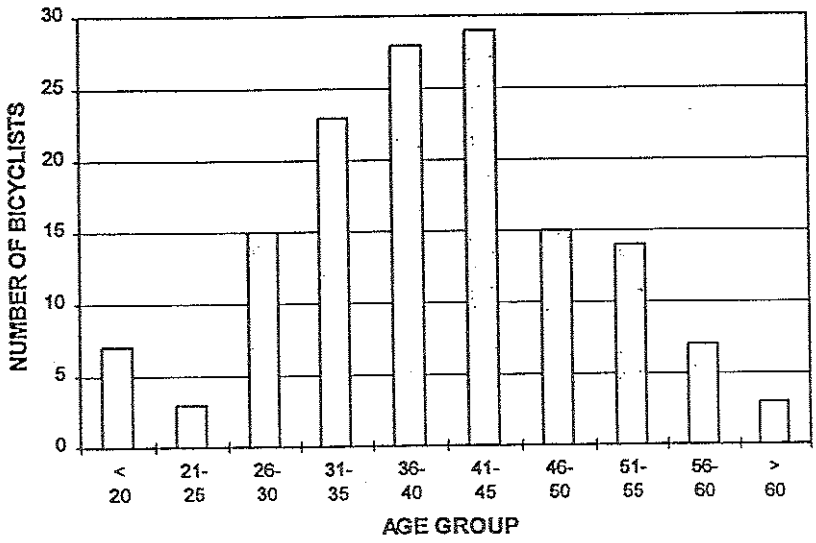

FIGURE 1 Age distribution of participants.

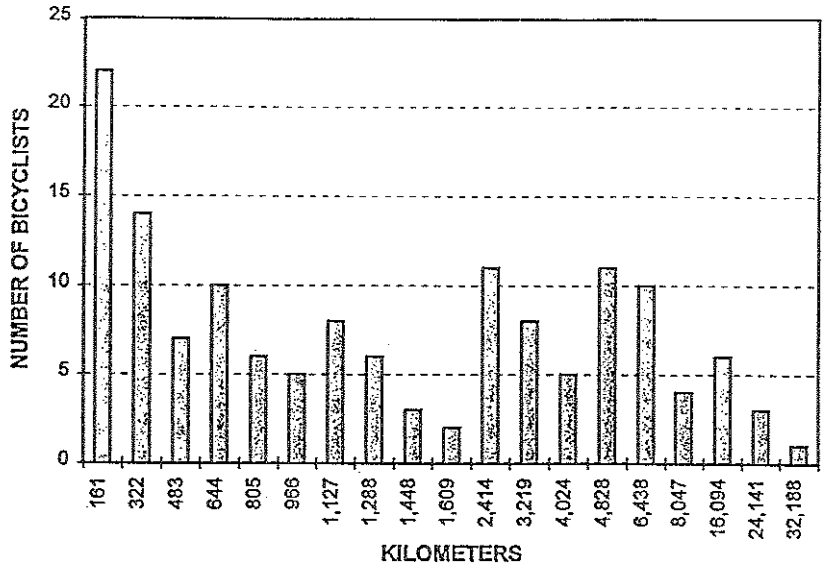

FIGURE 2 Distribution of annual bicycle kilometers traveled by participants.

Urban-Area Course

The course included representative traffic and roadway conditions and land development forms present in the urbanized areas of the United States. Approximately 27 km (17 mi) in length, the looped course consisted of 30 road segments with near equal lengths, but varying traffic and roadway conditions. Although the majority of the segments were collectors and arterials, several segments were local streets. During the course run by the participants, traffic volumes ranged from a low of 550 average daily traffic (ADT) to a high of 36,000 ADT, with a mean of 12,000 ADT. The percentage of heavy vehicles (as defined in the *Highway Capacity Manual* [9]) ranged from 0 to 2 percent. Posted speeds ranged from 40 to 80 km/hr (25 to 50 mi/hr) with a mode of 72 km/hr (45 mi/hr). The motor vehicle traffic lane configurations included divided, undivided, and continuous left-turn median lanes. The number of lanes ranged from two (undivided) to six (divided). The course included both curb and guttered as well as open shoulder cross-sectioned roadbeds.

There were a myriad of lane widths, bicycle-facility types, and striping conditions (and combinations thereof) present on the course. The width of outside motor vehicle through-lanes ranged from 3.05 to 4.88 m (10 to 16 ft). Striped bike lanes and paved shoulders ranged from nonexistent to 1.83-m (6-ft) wide. Pavement surface conditions ranged from poor to very good [FHWA Highway Performance Monitoring System (*11*) surface quality PAVECON ratings from 2 to 5]. Neither rumble strips nor outside lane reflectors were present on the course.

The course ran through the entire spectrum of land development forms and street network patterns found in U.S. metropolitan areas. Retail commercial development forms ranged from regional shopping malls (with several high-volume driveways) to small convenience strip centers (with numerous curb cuts). Modern community- and neighborhood-scaled centers were prevalent; 1950s and 1960s small retail-neighborhood centers with limited on-street parking were also represented. Some segments had office buildings fronting them, others were fronted with hospitals and medical complexes. Some segments passed by modern sports stadiums and museums. Several segments passed by elementary schools, a college, and a large state university. Other land uses included churches, convenience stores, sit-down and fast-food restaurants with drive-throughs, professional and personal care businesses, laundromats, car repair shops, a salvage yard, fire stations, city public works departments, golf courses, a national-scale theme park, a neighborhood park, a natural forest, and light industrial areas. The age of the development forms ranged from the 1940s to the present day.

In the residential areas, there was also an extensive variety of development forms directly adjoining the course. Residential dwellings included high-rise apartment and condominium units housing people from students to the managed-care elderly. Mid- and low-rise apartments were present, as were townhomes and other forms of attached dwelling units. Some course segments had single-family homes directly fronting them and intersecting traditional grid-pattern local streets. Others had entrance-drive connections from curvilinear street-form (planned-development) residential subdivisions. The age of the residential land forms ranged from the 1940s to the present day. Neighborhoods represented a balanced mix of upper, middle, and low household income levels. In summary, the majority of the nearly 1,000 land uses documented in the ITE trip generation manual (*12*) directly adjoined the study course.

Participant Response

Participants in the study were solicited using a broad-based, area-wide, multimedia approach that included newspaper notices and articles, radio announcements, direct mailings by numerous organizations and businesses, and brochure-registration form distribution. Displays with registration forms were deployed at retail sports outlets, colleges and universities, public schools, museums, government office lobbies, major employers, and bicycle shops. The real-time data collection activity of the study was promoted as an event entitled the Fun Ride for Science, with prize drawings and gifts as incentives for participation. The need to ensure a large number of volunteer bicyclists (*1*) mandated a weekend testing period. To ensure that uniform motor vehicle traffic volumes were

experienced by all participants, the event was run during a single time block. The course run (the event) was scheduled for the morning of one of the busiest (from a traffic-volume standpoint) Saturdays of the year, April 27.

Approximately 150 people participated in the event. They first completed registration forms that included a battery of questions to generate individual profiles of the participants. Although the participants were being briefed on course configuration, instructions for completing the response cards, and logistical matters, course proctors were deployed. Consisting of staff from the Hillsborough County (Tampa) metropolitan planning organization, the Center for Urban Transportation Research, and Sprinkle Consulting Engineers Inc., over 20 proctors were strategically located throughout the course. The proctors ensured temporally spaced starts, individual riding, independent response scoring among the participants, and current completed response cards (participants were encouraged to reflect on their accumulating experience and hence re-grade as they proceeded through the course).

Similar to the separation between link and intersection analyses in highway capacity and level-of-service determinations, the study's purpose was to evaluate the quality, or level of service, of the roadway links, not the intersections. Accordingly, the participants were instructed to disregard the conditions at the termini of the segments. They were instructed to exclude from their consideration the aesthetics of the segments. They were to include only conditions within, or directly adjoining, their right-of-way. The participants evaluated on a 6-point (A to F) scale how well they were served (how safe or how comfortable they felt) as they traveled each segment. Level A was considered the most safe or comfortable (or least hazardous); Level F was considered the most unsafe or most uncomfortable (or most hazardous).

ANALYSIS OF DATA AND INITIAL HYPOTHESIS TESTING

Considerable data on both the participants and the course attributes were collected to permit extensive hypotheses testing. Although further hypothesis testing is ongoing, two tests have been performed in addition to the initial model development. First, a standard pooled error statistical comparison was made between the mean bicycle quality-of-service scores for females versus that of males. The means, standard errors, and sample size were, respectively, 3.33, 0.83, and 68 for female cyclists and 3.17, 0.72, and 77 for male cyclists. The computed t-test (1.23) was not significant at $\alpha = 0.05$. The second initial hypothesis test was for perception differences associated with bicycle experience level. Using annual bicycle kilometers (miles) traveled [BKT (BMT)] as a measure of experience, incremental standard pooled error tests were conducted beginning at the tails of the BKT (BMT) frequency histogram (Figure 2) and working toward the middle of the distribution until a statistically significant difference was encountered. Not surprisingly, a quality-of-service score difference was encountered between the riders who traveled less than 322 km (200 mi) per year and those with more than 322 annual BKT (200 annual BMT). What was surprising was that for the less-experienced riders, their average perception of the hazards of bicycling in a shared-roadway environment was less than that for the more experienced riders (2.75, a high C, versus 3.14, a middle C). Although further testing of perception differences among groups or subgroups is currently underway, the initial results suggest that once they are traveling on a road segment (i.e., after overcoming any impediment to traveling on an on-street network), the less-experienced bicyclists are not perhaps as aware of the potential hazards of traveling in a shared-roadway environment.

MODEL DEVELOPMENT

This study sought to mathematically express, for road or street links, the roadway and traffic conditions that affect bicyclists' perceptions of the quality of service, or level of accommodation. The following process in developing the preliminary model was applied: (*a*) identify which variables are relevant, (*b*) test for the best configuration of each variable (or combinations thereof), and (*c*) establish the coefficients for the variables (or combinations thereof) that result in the best-fit regression model.

The perceived quality of service (BLOS) in a shared-roadway environment was first hypothesized as a function of a set of variables, which takes the general form:

$$BLOS = f(X_1, X_2, X_3, X_4 \ldots) \tag{1}$$

Building upon the works of Landis, Sorton, Epperson, and Davis (*1,5–7*), a comprehensive Pearson correlation analysis of the extensive array of roadway and traffic variables with respect to BLOS was employed. Subsequently, the following relevant variables were selected for consideration in the second step of the model-development process, per-lane traffic volume, traffic speed, traffic mix, cross-traffic generation (traffic flow turbulence), pavement surface condition, and available roadway width for bicycling. The variables that were dropped from further consideration because of their poor correlation with the dependent variable (BLOS) or their colinearity with the more strongly correlated variables listed above included presence of curbing, controlled intersections (average through-movement green time to cycle-length ratio was 0.69), and number of directional lanes. Accordingly, Equation 1 can be rewritten as:

$$BLOS = f(V, S, M, X, P, W) \tag{2}$$

where

V = per-lane motor vehicle traffic volume,
S = speed of motor vehicles,
M = traffic mix,
X = potential cross-traffic generation,
P = pavement surface condition, and
W = width for bicycling.

Using a linear regression analysis technique, the model form would be:

$$BLOS = b + a_1(V) + a_2(S) + a_3(M) + a_4(X) + a_5(P) + a_6(W) \tag{3}$$

Because testing of variations in the construction of some variables was planned prior to any transformations or combination of variables, it would be more accurate to describe Equation 3 as:

$$BLOS = b + a_1[f(V)] + a_2[f(S)] + a_3[f(M)] + a_4[f(X)] + a_5[f(P)] + a_6[f(W)] \tag{4}$$

The stepwise regression analysis was conducted using the approximately 4,300 observations from the real-time course runs by the

study participants. Numerous variable transformations and combinations were tested. Table 1 shows just three of the many model forms that were tested and the coefficients and *t*-tests. Model A does not include a potential cross-traffic variable, and it has only the total outside lane width as the "width for bicycling" variable. Model B also does not have the potential cross-traffic variable, but it does have a more comprehensive construction of the "width for bicycling" variable. The correlation coefficient (R^2) of the best-fit model (Model C) is 0.73. (See Figure 3 for a plot of predicted versus mean observed BLOS values and Figure 4 for the residuals plot.) The coefficients are all statistically significant at more than the 95 percent level except for the curb-cut, on-street parking (cross-traffic) term. Thus, the following model was developed for the total population of bicyclists and roads and streets in U.S. metropolitan areas:

$$BLOS = a_1 \ln(Vol_{15}/L) + a_2 \ln[SPD_p(1 + \%HV)] + a_3 \ln(COM15 * NCA) + a_4(PC_5)^{-2} + a_5(W_e)^2 + C \quad (5)$$

where

$BLOS$ = perceived hazard of the shared-roadway environment,
Vol_{15} = volume of directional traffic in 15-min time period,
L = total number of through lanes,
SPD_p = posted speed limit (a surrogate for average running speed),
HV = percentage of heavy vehicles (as defined in the *Highway Capacity Manual*),
$COM15$ = trip generation intensity of the land use adjoining the road segment (stratified to a commercial trip generation of 15, multiplied by the percentage of the segment with adjoining commercial land development),
NCA = effective frequency per mile of noncontrolled vehicular access (e.g., driveways and on-street parking spaces),
PC_5 = FHWA's 5-point pavement surface condition rating, and
W_e = average effective width of outside through lane ($W_e = W_t + W_t - \Sigma W_r$, where W_t = total width of outside lane (and shoulder) pavement, W_t = width of paving between the outside lane stripe and the edge of pavement, and W_r = effective width (reduction) due to encroachments in the outside lane.

(W_r has not been statistically calibrated during this first phase of the study.)

The cross-traffic *COM15NCA* term has been retained (in Model C) for institutional reasons. Although the course had an excellent variety and range of the roadway and traffic variables typically encountered by cyclists in metropolitan areas, only two segments had substantial high turnover on-street parking. Thus, it is postulated that the transverse turbulence created by on-street parking activity (i.e., motor vehicle and pedestrian ingress-egress to the parking spaces) may be a factor in the bicyclists' perception of safety. Although it is estimated that fewer than 1 percent of the total mileage of U.S. metropolitan areas' collector and arterial roadways have high turnover on-street parking, it may be beneficial to some urban areas to use BLOS Model C with this factor.

TABLE 1 Model Coefficients and Statistics

	Coefficients			T-Statistics		
Model Terms: form	Model A	Model B	Model C	Model A	Model B	Model C
Outside Lane Volume:						
$\ln(Vol_{15}/L)$	0.649	0.607	0.589	6.351	7.256	6.657
Motor Vehicle and Speed:						
$\ln(SPD_p(1+HV))$	0.436	0.901	0.826	1.185	2.825	2.419
Access from Adjoining Land Use:						
Potential cross-traffic generation:						
ln(COM15NCA)	—	—	0.019	—	—	0.647
Pavement Surface Condition:						
("Pavecon" rating)$^{-2}$	5.457	6.510	6.406	2.970	4.052	4.014
Width of Outside MV Lane and (any) paved shoulder:						
$(Wt)^2$	-0.009	—	—	-5.896	—	—
$(We)^2$	—	-0.005	-0.005	—	-8.680	-8.147
Constant	0.146	-1.833	-1.579	0.130	-1.841	-1.468
Model Correlation (R^2)	0.61	0.73	0.73			

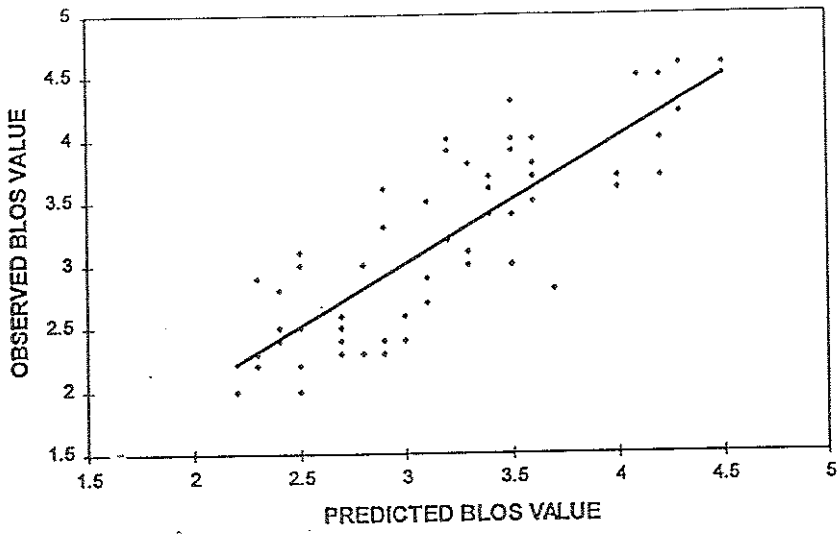

FIGURE 3 Regression plot of predicted and observed BLOS values.

FINDINGS AND APPLICATIONS

Bicycle Lane Striping: Does It Really Matter?

One of the secondary goals of this initial stage of the research was to determine the effect of striping in conjunction with a bicycle lane or a paved shoulder. It was expected and confirmed that extra pavement width to accommodate bicycle travel affects the roadway's quality of service to bicyclists. However, preliminary analysis of the data indicated that there might also be a relationship between the presence of a stripe separating the areas designated for the two travel modes and the perception of a safer condition.

For example, 30th Street had two segments in the course that were similar in virtually all aspects (including paved width) except that one had a striped bike lane and the other an unstriped, wide outside curb lane. However, the difference between their average quality-of-service scores was nearly 50 percent (2.45 and 3.65, respectively) even though the segment with the striped lane had nearly double the traffic volume of the other. Other segments with striped bike lanes or paved shoulders were perceived as being better (i.e., safer or less hazardous) than those without, all other traffic and roadway geometrics being the same.

Accordingly, a variable width of striped bicycling cross section (W_l) was introduced (Model B of Table 1) and transformations were tested within its range. The final form resulted in the variable W_l being a factor in the effective width W_e term, and its inclusion substantially increased the Model's correlation coefficient (R^2) from 0.61 to 0.73. As an example, Table 2 shows the effect of various lane widths and striping configurations using a 3.66-m (12-ft) lane width as a baseline. Notice that for a 4.88-m (16-ft) wide outside lane, the BLOS score decreases only 13 percent. However, with striping added, the quality of service is improved by 31 percent.

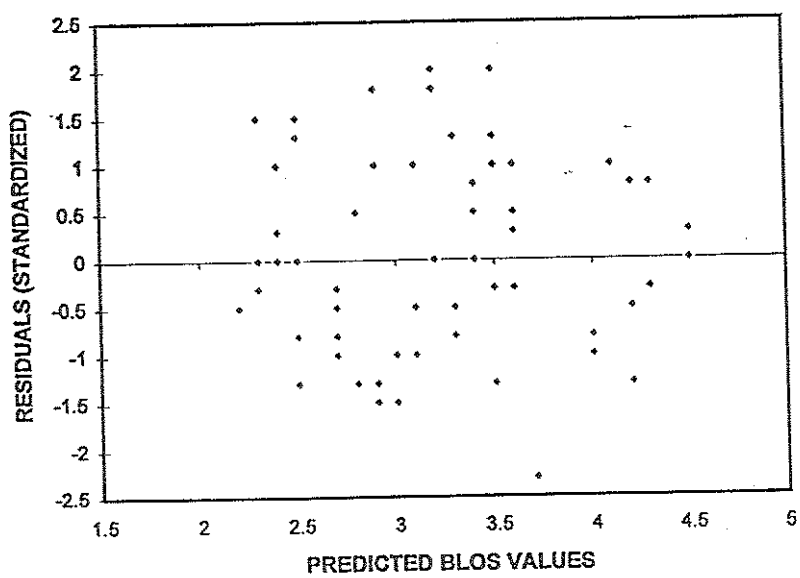

FIGURE 4 Residual plot of predicted and standardized residuals.

TABLE 2 Sensitivity Analysis for Lane Width, Striping, and Pavement Condition

$BLOS = a_1\ln(Vol_{15}) + a_2\ln(S(1+HV)) + a_3\ln(COM15NCA) + a_4PC_5^{-2} - a_5W_e^2 - C$

a_1: 0.589 a_2: 0.826 a_3: 0.019 a_4: 6.406 a_5: 0.005 C: 1.579

Baseline inputs:

ADT	=	12,000 vpd	% HV	=	1
L	=	2 lanes	PC	=	4 (good condition pavement)
W_e	=	3.66 m (12 ft)	%COM	=	40 (Trip Rate = 15)
S	=	64.4 kmph (40 mph)	CCF	=	26 per km (42 per mile)

	BLOS	% Change
Baseline BLOS Score (BLOS)	4.1	N/A
Lane Width and Lane striping changes		
W_t = 3.05 m (10 ft)	4.4	5% increase
W_t = 3.36 m (11 ft)	4.3	3% increase
W_t = 3.66 m (12 ft) -- (baseline average)	4.1	no change
W_t = 3.97 m (13 ft)	4.0	3% reduction
W_t = 4.27 m (14 ft)	3.9	6% reduction
W_t = 4.58 m (15 ft) (W_l = 0.92 m (3 ft))	3.7 (3.2)	9% (22%) reduction
W_t = 4.88 m (16 ft) (W_l = 1.22 m (4 ft))	3.6 (2.9)	13% (31%) reduction
W_t = 5.19 m (17 ft) (W_l = 1.53 m (5 ft))	3.4 (2.5)	17% (41%) reduction
W_t = 5.49 m (18 ft) (W_l = 2.14 m (6 ft))	3.2 (2.0)	21% (52%) reduction[a]
Pavement Surface Conditions		
PC_5 = 1 Very Poor	10.2	145% increase[a]
PC_5 = 2 Poor	5.3	29% increase
PC_5 = 3 Fair	4.5	7% reduction
PC_5 = 4 -- Good - (baseline average)	4.5	no change
PC_5 = 5 Very Good	4.0	3% reduction

[a]Outside the variable's range present on the Course
1 Km = 0.62 miles
1 meter = 3.28 feet

Pavement Condition: Does It Have An Effect?

Although identified as being statistically significant in the stated-preference survey work by Axhausen and Smith (*2*), the hypothetical route-choice models of Bovy and Bradley (*3*), and the environmental-preference survey of experienced recreational cyclists by Antonakos (*4*), pavement condition is frequently dismissed by some practitioners as being insignificant. However, the response to real-time stimuli captured in this study does confirm that pavement condition plays an important role in bicyclists' assessment of the shared-roadway environment. This study proves conclusively that there is a statistically significant inverse mathematical relationship between pavement condition and the dependent variable BLOS (see Table 1). Poor surface conditions tended to strongly affect the level of service; good surface conditions played a lesser role (Table 2). This finding suggests that virtual reality or other environment simulation techniques used for estimating bicyclists' perceptions of the on-road environment would, in some cases, miss a significant factor in actual roadway conditions. Epperson (*6*) was wrong in suggesting that a video simulation (alone) could be used to calibrate a quality, or level-of-service model. The data clearly reveal that only through placing bicyclists in actual conditions, with real-time consequences of their interactions with motor vehicle traffic and their bicycle's response to the roadway pavement surface condition, can a bicycle quality-of-service model be ascertained with confidence. Videocamera simulation may prove to be an option, provided that it is calibrated with real-time observations. It might be used with caution to estimate perceptions in extreme traffic conditions where study bicyclists might refuse to participate (e.g., high-speed facilities with high-truck volumes).

Applications

The participants in this study represent a broad cross section of the U.S. population of bicyclists, and the course's segments are typical of the collectors and arterials prevalent in the urban and suburban areas of the United States. The initial result of this research is the development of a highly reliable, statistically calibrated model suitable for application in the vast majority of U.S. metropolitan areas. For individual validation, Table 3 may be used as a basis for stratifying the BLOS scores into bicycle level-of-service classes. Even as further hypothesis testing of the data set is under way, additional studies are being planned to test the need for separate models for central business district streets with high turnover parking, truck route segments, and two-lane high-speed rural highways.

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TABLE 3 Level of Service Categories

Level-of-Service	BLOS Score
A	≤ 1.5
B	> 1.5 and ≤ 2.5
C	> 2.5 and ≤ 3.5
D	> 3.5 and ≤ 4.5
E	> 4.5 and ≤ 5.5
F	> 5.5

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Modeling the Roadside Walking Environment

Pedestrian Level of Service

Bruce W. Landis, Venkat R. Vattikuti, Russell M. Ottenberg, Douglas S. McLeod, and Martin Guttenplan

A method is needed to objectively quantify pedestrians' perception of safety and comfort in the roadside environment. This quantification, or mathematical relationship, would provide a measure of how well roadways accommodate pedestrian travel. Essentially, it would provide a measure of pedestrian level of service (LOS) within a roadway environment. Such a measure of walking conditions would greatly aid in roadway cross-sectional design and would help evaluate and prioritize the needs of existing roadways for sidewalk retrofit construction. Furthermore, the measure can be used to evaluate traffic-calming strategies and streetscape designs for their effectiveness in improving the pedestrian environment. Such a measure would make it possible to merge pedestrian facility programming into the mainstream of transportation planning, design, and construction. To meet the need for such a method, as well as to fulfill a state mandate to establish levels of service standards for all transportation modes, the Florida Department of Transportation sponsored the development of the Pedestrian LOS Model. The model was developed through a stepwise multivariable regression analysis of 1,250 observations from an event that placed 75 people on a roadway walking course in the Pensacola, Florida, metropolitan area. The Pedestrian LOS Model incorporates the statistically significant roadway and traffic variables that describe pedestrians' perception of safety or comfort in the roadway environment between intersections. It is similar in approach to methods used to assess automobile operators' level of service established in the *Highway Capacity Manual.*

In recent years there have been initiatives in metropolitan areas throughout the United States to create more livable communities in which walking and bicycling are encouraged and accepted as legitimate forms of transportation. Characteristic of these efforts is the reintroduction of bicycle lanes and sidewalks to the streetscapes, complete with street furniture, landscaping, pedestrian-scaled lighting, and other features making the public right-of-way more inviting for people to travel by bicycle or on foot. The transportation planning and engineering community has recently been attempting to provide analysis and design methods to help create more "livable" streets and roadway environments.

Historically, compared with the level of research done for motorized transportation, there has been relatively little study and analysis of the factors that affect the quality of the walking environment. Evaluating the performance of a roadway section for the walking mode is far more complex in comparison with that of the motor vehicle mode. Whereas operators of motor vehicles are largely insulated in their travel environment and hence are influenced by relatively few factors, the pedestrian is relatively unprotected and is subject to a host of environmental conditions.

In general, planners and engineers have not yet come to consensus on which roadway environment features have statistically reliable significance to pedestrians. There have been several recent initiatives by planners to develop "walkability audits"; however, these measures generally include the myriad features of the entire roadway corridor environment (including conditions at intersections) and they have not yet been statistically tested or widely applied. There is consensus that pedestrians' sense of safety and comfort within a roadway corridor is based on a complex assortment of factors including the following:

- Personal safety (i.e., the threat of crashes),
- Personal security (i.e., the threat of assault),
- Architectural interest,
- Pathway or sidewalk shade,
- Pedestrian-scale lighting and amenities,
- Presence of other pedestrians, and
- Conditions at intersections.

The complexity of the issue, however, should not deter attempts to model pedestrians' response to the roadway environment, even if it is for one aspect or component of a roadway corridor. Elected representatives, public officials, and transportation planners and engineers need to be able to determine a roadway's performance with regard to accommodating pedestrian travel. Roadway designers need solid guidance on how to better design pedestrian environments: how far sidewalks should be placed from moving traffic, what types of buffering or protective barriers are needed and when they should be used, and how wide the sidewalk should be.

The purpose of this study, therefore, is to focus on, and identify those factors in the right-of-way that significantly influence the pedestrian's feeling of safety and comfort. The collection of these factors into a mathematical expression, tested for statistical reliability, provides a measure of the roadway segment's level of service (LOS) to pedestrians. This measure evaluates the conditions along roadway segments between intersections. A key application of this measure is to help planners and roadway engineers make informed decisions when designing or choosing the appropriate cross section for any given roadway—a cross section that meets pedestrians' basic need to feel safe and comfortable while walking. As such, the measure presented in this paper is one piece of the puzzle, albeit an impor-

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tant one—many other factors influence a pedestrian's (enjoyment of the) walking experience. These factors should be studied further to improve the body of knowledge on this subject.

The researchers of this study acknowledge that intersection conditions have a significant bearing on the pedestrians' total roadway corridor experience, and must also be studied. Further, they believe that a measure(s) must be developed to be combined with this roadway segment performance measure. In fact the research sponsor, the Florida Department of Transportation (DOT), is using this research team to develop intersection performance measure(s) as Phase II of this study. FHWA is beginning a similar study initiative.

MEASURES OF THE PEDESTRIAN ENVIRONMENT

Dan Burden, a leading national advocate for more walkable communities and transportation systems, spoke for many when he said pedestrians in the roadside environment are subjected to a multitude of factors significantly affecting their feeling of safety, comfort, and convenience. These factors may be classified under three general performance measures describing the roadside pedestrian environment: (*a*) sidewalk capacity, (*b*) quality of the walking environment, and (*c*) pedestrian's perception of safety (or comfort) with respect to motor vehicle traffic. These three measures are briefly outlined below.

The first performance measure, sidewalk capacity, was developed in the early 1970s by Fruin (*1*). His method, as formalized in the *Highway Capacity Manual* (*2*), is the only established method of quantifying sidewalk capacity. However, this performance measure is limited in its applicability. It evaluates only conditions for an existing (or a planned) sidewalk and then only from the perspective of "walking space" or effective sidewalk width available to the pedestrian. Additionally, it cannot be used to evaluate and prioritize roadways for sidewalk retrofit construction, a widespread need in the United States today. This is an important limitation. It is estimated that typically less than 20 percent of the collector and arterial networks of U.S. metropolitan areas have sidewalks. Furthermore, it is estimated that less than approximately 3 percent of roadways have pedestrian activity levels that can be effectively measured by Fruin's capacity method.

Currently, there is no established approach for the second measure, that of the quality, or enjoyment aspect, of the walking environment. Several researchers and a number of planners have proposed qualitative measures of the total quality of the walking experience. Their approaches include numerous qualitative assessments relating to the pedestrian's enjoyment of the walking experience (e.g., convenience of the walking experience and the perception of personal security). Works by Sarkar (*3, 4*), Khisty (*5*), Dixon (*6*), Crider (*7*), and others are examples of methods that include a mixed combination of some factors of all three performance measures. However, most of these methods require the presence of a sidewalk to be applicable. And although the qualitative measure of a pedestrian's enjoyment of the walking experience is important to provide a complete picture of the walking environment and to design an "inviting" sidewalk, it is a separate measure of effectiveness and must be developed and calibrated, if possible, separately from the sidewalk capacity or safety perception measures.

The third measure, the perceived safety or comfort (with respect to the presence of motor vehicle traffic) has not, until now, been quantified as a stand-alone performance measure. The common expression of pedestrians concerning how well a particular street or road accommodates their travel is from a perspective of safety or comfort. "It's a dangerous place to walk" or "it's fairly safe and comfortable" is the way they express their views of the roadway. This measure is the subject of our research, hence this paper. Considering only the roadway environment (i.e., excluding intersection conditions), the factors thought to significantly affect pedestrians' sense of safety or comfort include the following:

- Presence of a sidewalk,
- Lateral separation from motor vehicle traffic,
- Barriers and buffers between pedestrians and motor vehicle traffic,
- Motor vehicle volume and composition,
- Effects of motor vehicle traffic speed, and
- Driveway frequency and access volume.

The perception of safety or comfort is a qualitative measure of effectiveness recognized by the *1994 Highway Capacity Manual*. The manual states, "The concept of level-of-service uses qualitative measures that characterize operational conditions within traffic the stream and their perception by (the facility users) . . . descriptions of individual levels of service characterize these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience for the facility type." With respect to measures of effectiveness, the manual states, "For each type of facility, levels of service are defined on the basis of one or more operational parameters that best describe operating quality for the facility type" (*2*, p. 1–5). This is the direction of our (measure of effectiveness) effort to model the roadway walking environment.

Therefore, a calibrated, transferable model is needed to objectively reflect the perceived safety or comfort of pedestrians along a roadway segment using measurable traffic and roadway variables. In response to this need, the Pedestrian LOS Model outlined herein has been developed. The model is objective, transferable, and applicable at the roadway segment and, ultimately, when combined with an intersection LOS measure, it is applicable at the facility corridor and network levels. It evaluates roadside walking conditions whether there is a sidewalk or not. It can also demonstrate the impact of adding or improving sidewalks. It uses common, measurable traffic and roadway variables for economy of data collection, accuracy, and reliable and repetitive application. The model is designed to evaluate a roadway segment; it does not include intersections and their complex conditions, which are the subject of separate research initiatives.

DESIGN OF RESEARCH

This research initiative by Florida DOT placed people in actual traffic and roadway conditions to obtain real-time feedback. Although a virtual reality, or simulation approach, was briefly considered by researchers because of its advantage of safety to the participants, it was not pursued because it was not possible to include or replicate all response stimuli of the roadway environment. Accordingly, a special event was created to place a significant number of people on a walking course consisting of typical roadways in a typical U.S. metropolitan area. The purpose was to obtain their real-time response to the roadway environment stimuli and to create and test a mathematical relationship of measurable factors to reflect the study participants' reactions. It should be noted that the research was designed to elicit responses from participants walking individually, not in pairs or groups. The following sections outline this approach.

Participants

Nearly 75 people participated in the first (i.e., the course-walking) portion of the study. The participants represented a broad cross section of age, gender, experience level, and geographic origin. Participants' ages ranged from 13 to 69. Because of the potential hazards of walking in urban-area motor vehicle traffic, children younger than age 13 were not permitted to participate. The gender split of the study group was 47 percent female and 53 percent male. The researchers and sponsor sought participant diversity in both geographic origin and walking experience. Accordingly, the study test course was located in Pensacola, Florida—a metropolitan area with significant in-migration. The average participant had lived in areas other than the Pensacola Bay region for most [approximately 73 percent] of their lives.

There was a considerable range of walking experience among the participants. A significant number made relatively few walking trips (hence, mileage), and some reported that they walked extensively virtually every day of the week. Average distances walked per week ranged from a low of 1.6 km (1 mi) to a high of 79 km (49 mi).

Walking Course

A walking course was designed to subject participants to a variety of traffic and roadway conditions. It included road segments with traffic and roadway conditions typical of U.S. metropolitan areas. Approximately 8 km (5 mi) in length, the looped course consisted of 24 road segments (48 directional segments) with near equal lengths, but with varying traffic and roadway conditions. Although most of the segments were collector and arterial roads, some were local streets. During the walking event stage of the study, traffic volumes ranged from a low average daily traffic (ADT) of 200 to a high ADT of 18,500. The percentage of heavy vehicles [as defined in the *Highway Capacity Manual* (*2*)] ranged from 0 to 3 percent. Traffic running speeds ranged from 25 to 125 km/hr (15 to 75 mph). The roadway cross sections included two to four lanes in forms of one-way, undivided, divided, and continuous left-turn median lane configurations. The walking course included both curb and guttered as well as open shoulder cross-sectioned roadbeds. Some segments had striped shoulders, and some included designated bicycle lanes.

There were a variety of typical metropolitan area roadside conditions in the course. For example, some segments were urban in character with mixed combinations of on-street parking, landscaped buffers, street trees, and buildings adjoining the sidewalks, with structures and awnings covering the sidewalks. Some segments were more suburban or rural in nature with roadside characteristics ranging from no sidewalks to sidewalks directly adjoining the travel lanes, to sidewalks with intervening buffers of widths ranging from 0 to 7.6 m (25 ft).

The walking course passed through a spectrum of land development forms and street network patterns found in U.S. metropolitan areas. Retail commercial development forms ranged from large retail shopping centers to small convenience strip centers. Some segments had office buildings or other professional service establishments fronting them. Other land uses included churches, auto dealerships, banks, sit-down and fast-food restaurants with drive-throughs, professional and personal care businesses, car repair shops, and light industrial areas.

In the residential portions an array of development forms directly adjoined the course. Residential dwellings included apartment and condominium units and other forms of attached dwelling units. Some course segments had single-family homes directly fronting them. Portions of the course passed through traditional grid street patterns; other parts ran through curvilinear street forms. Neighborhoods represented a mix of income levels.

Participant Response

The real-time data collection activity of the study was promoted as an event titled the FunWalk for Science, with prize drawings and gifts as incentives for participation. Volunteer participants were recruited using a broad-based, areawide multimedia approach that included newspaper notices and articles, radio announcements, and direct mailings by and to numerous organizations and businesses. Displays with brochure-registration forms were deployed at area retail sports outlets, health clubs, colleges, government office lobbies, major employers, and bicycle shops.

The need for a large number of volunteer walkers mandated a weekend testing period. Accordingly, the FunWalk for Science was scheduled for the morning of one of the busier (from a traffic-volume standpoint) Saturdays of the year in Pensacola, March 18. To ensure that all participants experienced uniform motor vehicle traffic volumes, the event was run during a single time block in the midmorning. Participants first updated or completed registration forms that included a variety of demographic questions. They were then briefed in groups as to the purpose and rules of walking the course. Following the briefings, walkers were sent to two starters who released them onto the course individually at 1-min intervals, in opposite directions. Although the participants were briefed on the course configuration and had instructions for completing the response cards, course proctors were deployed at strategic points throughout the course. The proctors consisted of staff from the West Florida Regional Planning Council, Florida DOT, the University of Florida, SCI, Inc., and a number of regional bicycle and pedestrian coordinators from throughout Florida. The proctors ensured that temporal spacing between walkers was maintained and that participants were independently completing the response cards as they walked each segment. Participants were encouraged to reflect on their accumulating experience and regrade any previously walked segments as they proceeded through the course.

The study's purpose was to evaluate the quality, or LOS, of the roadway segments, not the intersections. Accordingly, participants were instructed to disregard the conditions at intersections and their immediate approaches. They were also encouraged to exclude from their consideration the surrounding aesthetics. They were to include only conditions in, or directly adjoining, the right-of-way. The participants evaluated on a 6-point (A to F) scale how safe and comfortable they felt as they traveled each segment. Level A was considered the most safe and comfortable (or least hazardous). Level F was considered the least safe and comfortable (or most hazardous).

REDUCTION AND ANALYSIS OF DATA

The study design yielded approximately 1,700 initial observations coincident with a myriad of traffic and roadway conditions throughout the walking course. The resulting data were compiled into both spreadsheet and Statistical Analysis Software (SAS) program databases for extensive analyses. Response outliers and trends were identified resulting in 1,250 observations and 21 roadway sections

(42 directional segments) available for further analysis of the specific effect of traffic and roadway variables.

An interesting response trend was identified, ultimately determined to be that of response (or scoring) fatigue. A slight diminishing scoring trend was evident. Course length was not a factor (the average total duration of the participant's course experience was approximately 2 h) due to the clearly constant slope of the response trend. Presentation order of the segments was not a source of the trend either, because the course presented a variety of traffic, roadway, and urban forms in a random distribution. Because the participants walked the course in two direction groups, averaging the responses allowed for removal of the fatigue trend, thus Pearson Correlations among the traffic and roadway variables and stepwise regression of the dependent variable were possible using the nonbiased (averaged) responses for correlation.

MODEL DEVELOPMENT

Several Pearson Correlation analyses were run using the SAS program on a variety of traffic and roadway variables. Not surprisingly, several variables exhibited some colinearity. However, the colinearity was not enough to preclude the inclusion of some colinear variables into the model because of notable exceptions. For example, although in some cases the presence and width of sidewalks and buffers cor-related with increasing speed, in many cases they did not, reflecting that the current practice of roadside design (or provision of sidewalks and buffers) is not consistent with providing a uniform level of pedestrian safety and comfort throughout transportation systems.

A "long list" of potential primary independent variables influencing pedestrians' sense of safety or comfort within the roadway was generated and then tested (along with numerous other potential factors) in the stepwise regression portion of the model's development. The long list was generated based on the following: (*a*) results of the Pearson Correlation analyses; (*b*) variables (and model terms) identified by group consensus and confirmed during the development of the earlier Roadside Pedestrian Conditions Model [developed for the Tampa metro area's Hillsborough County Metropolitan Planning Organization Pedestrian Plan (*8*)], which is currently the basis for several major metropolitan area pedestrian plans; and (*c*) extensive iterative testing of segment groupings with common levels of independent variables (wherein additional variables were identified that potentially could further explain the variation of the dependent variable—the pedestrians' ratings of safety and comfort). The resulting long list of primary factors included, but was not limited to the following:

1. Lateral separation elements between pedestrians and motor vehicle traffic, including
   - Presence of sidewalk,
   - Width of sidewalk,
   - Buffers between sidewalk and motor vehicle travel lanes,
   - Presence of barriers within the buffer area,
   - Presence of on-street parking,
   - Width of outside travel lane, and
   - Presence and width of shoulder or bike lane;
2. Motor vehicle traffic volume;
3. Effect of (motor vehicle) speed;
4. Motor vehicle mix (i.e., percentage of trucks); and
5. Driveway access frequency and volume.

The factors listed above were considered the most probable primary factors affecting pedestrians' sense of safety. As such, they are the basis for the preliminary structure and testing of the Pedestrian LOS Model represented in the following mathematical expression:

$$\begin{aligned}\text{Pedestrian LOS} = {} & a_1 f(\text{lateral separation factors}) \\ & + a_2 f(\text{traffic volume}) \\ & + a_3 f(\text{speed, vehicle type}) \\ & + a_4 f(\text{driveway access frequency} \\ & \text{and volume}) + a_n f(x_n) + \cdots + C \end{aligned} \quad (1)$$

Researchers conducted stepwise regression analyses using the 1,250 real-time observations. Numerous variable transformations and combinations of the factors were tested. Table 1 shows the best model form and its terms, coefficients, and T-statistics. The correlation coefficient (R^2) of the best-fit model is 0.85 based on the averaged observations from the 42 directional segments (see Figure 1 for a plot of predicted pedestrian LOS versus mean observed values). The coefficients are statistically significant at the 95 percent level. Thus, the following model was developed:

$$\begin{aligned}\text{Pedestrian LOS} = {} & -1.2021 \ln\left(W_{ol} + W_l + f_p \times \%OSP + f_b \right. \\ & \left. \times W_b + f_{sw} \times W_s\right) + 0.253 \ln(Vol_{15}/L) \\ & + 0.0005\, SPD^2 + 5.3876 \end{aligned} \quad (2)$$

where

W_{ol} = width of outside lane (feet),
W_l = width of shoulder or bike lane (feet),
f_p = on-street parking effect coefficient (= 0.20),
$\%OSP$ = percent of segment with on-street parking,
f_b = buffer area barrier coefficient (= 5.37 for trees spaced 20 feet on center),
W_b = buffer width (distance between edge of pavement and sidewalk, feet),
W_s = width of sidewalk (feet),
Vol_{15} = average traffic during a 15-min period,
L = total number of (through) lanes (for road or street),
SPD = average running speed of motor vehicle traffic (mph), and
f_{sw} = sidewalk presence coefficient
$= 6 - 0.3W_s$. (3)

TABLE 1 Model Coefficients and Statistics

Model Terms	Coefficients	T-statistics
Lateral Separation Elements: $\ln(LS)$	- 1.2021	- 10.072
Motor Vehicle Volume: $\ln(Vol_{15}/L)$	0.253	3.106
Speed Term: SPD^2	0.0005	2.763
Constant	5.3876	11.094
Model Correlation (R^2)	0.85	

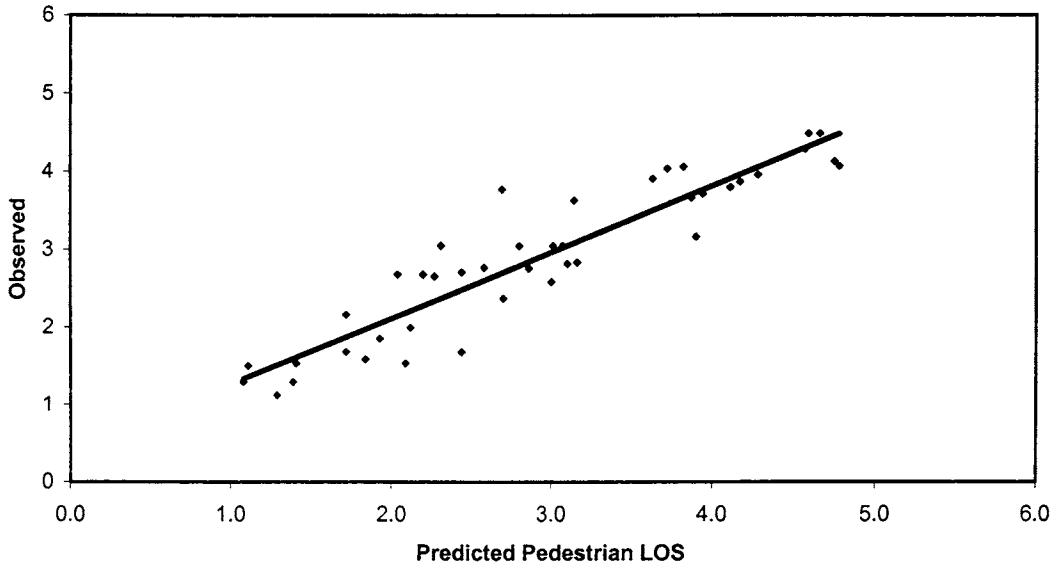

FIGURE 1 Residual plot of predicted and standardized residuals.

The Pedestrian LOS Model equation was created with a statistical significance at the 95 percent level. The factor "driveway access frequency and volume," although included in the stepwise regression analyses, was not found to be statistically significant at that level.

Table 2 may be used as a basis for stratifying the model's numerical result into a pedestrian LOS class when it is applied to a particular roadway segment. It should be noted that this stratification was predetermined because the responses gained in the study were based on the standard U.S. educational system's letter grade structure (with the exception of Grade "E").

DISCUSSION OF MODEL TERMS

Terms of the calibrated model were developed and refined through extensive variables transformation testing and regression. The following briefly outlines some of the aspects of the terms and how the dependent variable responds to them.

Presence of a Sidewalk and Lateral Separation

Having a safe, separate place to walk alongside the roadway is fundamental to pedestrians' sense of safety and comfort in the roadway environment. This sense of safety or comfort is strongly influenced by the presence of a sidewalk. Furthermore, as the calibrated model confirms, the value of a sidewalk varies according to its location and buffering (i.e., the lateral separation) relative to the motor vehicle traffic. In general, as the lateral separation increases, the pedestrian's comfort or sense of safety also increases (see Figure 2). Additionally, when a barrier such as on-street parking, line of trees, or roadside swale is present in the buffer area between motor vehicle traffic and the pedestrian, the pedestrians' sense of protection, hence safety, is improved (see Figure 3). Finally, the frequency of parked cars, trees, or an increase in the depth of the intervening roadside swale would further improve the sense of safety.

TABLE 2 Level of Service Categories

Level-of-Service	Model Score
A	≤ 1.5
B	> 1.5 and ≤ 2.5
C	> 2.5 and ≤ 3.5
D	> 3.5 and ≤ 4.5
E	> 4.5 and ≤ 5.5
F	> 5.5

The mathematical expression that reflects these elements of lateral separation, barriers, buffers, and presence of a sidewalk follows:

$$LS = W_{ol} + W_l + f_p \times \%OSP + f_b \times W_b + f_{sw} \times W_s \quad (4)$$

Examples of how the lateral separation elements are used to quantify some typical roadway cross sections follow.

Figure 4 shows a curbed cross section with no vertical barriers in the horizontal buffer area between the travel lane and sidewalk. Note that there is no on-street parking, therefore the %*OSP* term equals 0. Thus for this scenario, the lateral separation term is given by the following:

$$LS = W_{ol} + W_l + f_b \times W_b + f_{sw} \times W_s \quad (5)$$

In the case in which there is on-street parking, as illustrated in Figure 5, its effect as a barrier is quantified as in Equation 6. Note that there is no striped shoulder or landscape buffer, therefore the W_l and

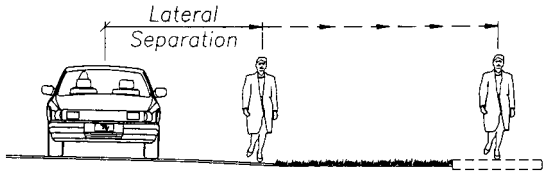

FIGURE 2 Effect of lateral separation.

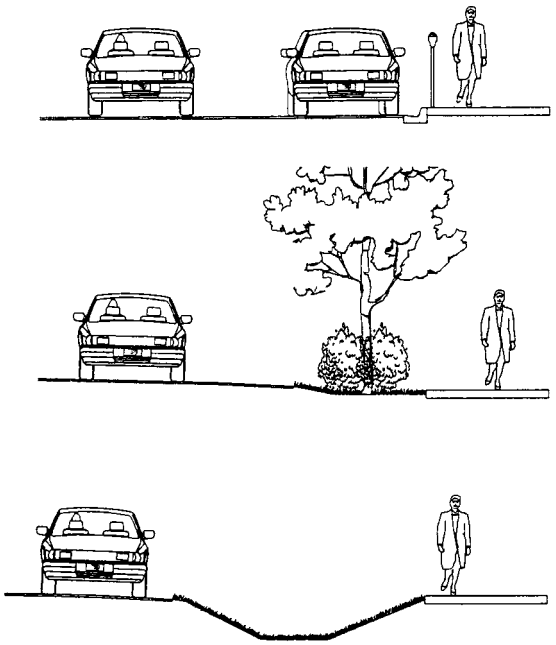

FIGURE 3 Typical barriers within the roadside buffer.

W_b terms equal 0. Thus, the lateral separation term is simplified to the following:

$$LS = W_{ol} + f_p \times \%OSP + f_{sw} \times W_s \quad (6)$$

This section introduced the elements of lateral separation and their mathematical expression. The next sections describe the other two statistically significant terms of the Pedestrian LOS Model.

Motor Vehicle Volume

The frequency of motor vehicles passing pedestrians, represented by the outside lane volume, was also found to be a significant factor. As passing frequency increases, the pedestrians' feeling of safety decreases. The effect of traffic volume is calculated by the following:

$$\text{Traffic volume} = \frac{Vol_{15}}{L} \quad (7)$$

The equation above assumes a 50/50 directional distribution. In cases in which the directional distribution is other than 50/50, Equation 8 (below) should be used. The difference between the two is that Equation 8 uses a directional factor and instead of using L (total number of through lanes), it uses L_d (total number of directional through lanes).

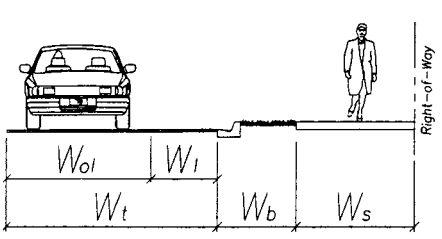

FIGURE 4 Buffers and sidewalk.

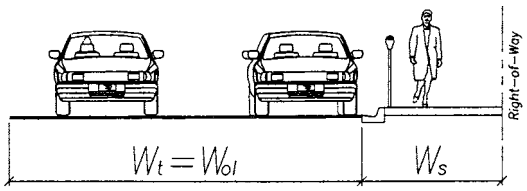

FIGURE 5 Lateral separation with on-street parking.

$$\text{Traffic volume} = \frac{Vol_{15}}{L_d} \times D \quad (8)$$

where

L_d = total number of directional (through) lanes (for road or street), and
D = directional factor

This effect on the walkers in the study was found to be statistically significant. Transformations of this variable and subsequent stepwise regressions revealed that at lower traffic volumes, changes in the independent variable produced significant changes in the dependent variable. At higher volumes, however, there was less sensitivity; hence, the natural log mathematical form of this term.

Effect of Speed

Similarly, the speed of motor vehicle traffic was confirmed as significantly affecting pedestrians' sense of safety. As speed increases, pedestrian discomfort increases. It was determined that the dependent variable had an exponential relationship with the average running speed of the motor vehicle traffic, somewhat similar to that relationship discovered during the development of the Bicycle Level of Service Model (*9*), which has been incorporated into Florida's multimodal level of service analysis guidelines (*10*).

Driveway Access Frequency and Volume

Along a roadway segment, uncontrolled vehicular access to adjoining properties (i.e., driveway cuts) was thought to reduce pedestrian sense of safety. This transverse feature represents a similar "turbulence" or hazard to the pedestrian as to motor vehicle operators. Accordingly, as the number of driveways increases, a corresponding decrease in the perceived safety to the pedestrian was expected. Affecting this perception of safety is the volume of vehicles accessing the driveways. However, stepwise regression analyses revealed that this effect was not statistically significant at the 95 percent confidence level.

FINDINGS AND APPLICATIONS

The result of this initial research sponsored by Florida DOT is the development of a reliable, statistically calibrated pedestrian level of service model suitable for application not only in Florida metropolitan areas, but also throughout North America. The Pedestrian LOS Model provides a measure of a roadway segment's performance with respect to pedestrians' primary perception of safety or comfort; as

such it serves as the basis for Florida DOT's statewide multimodal (particularly for the pedestrian mode) LOS evaluation techniques. However, it can also be used to greatly influence roadway cross-sectional design and can help in the evaluation and prioritizing of the needs of existing roadways for sidewalk retrofit construction, applications for which the model's precursor, the Roadside Pedestrian Conditions Model, has been successfully used. For example, transportation planners and engineers can now establish a target pedestrian LOS and use the model to test alternative roadway cross-section designs by iteratively changing the independent variables to find the best combination of factors to achieve the desired LOS. The model thus provides roadway designers with solid guidance on how to better design pedestrian environments: how far sidewalks should be placed from traffic; what types of buffering or protective barriers are needed and when; how wide the sidewalk should be; and so on. Finally, the Pedestrian LOS Model, when coupled with the capacity (Fruin) measure and a quality performance measure (i.e., a walkability audit, in the case of an existing sidewalk, to assess the enjoyment and convenience of the walking experience) "completes the picture" of the roadside walking environment.

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APPENDIX E

UTILITY OF BICYCLE LEVEL OF SERVICE AND PEDESTRIAN LEVEL OF SERVICE MEASUREMENT AS AN ANALYSIS AND POLICY TOOL

Potential Uses of PLOS and BLOS

As illustrated in the text, the PLOS and BLOS measures can be used to provide a snapshot of existing walking and bicycling conditions in the region. In addition, they can serve as effective bicycle and pedestrian planning tools for a variety of projects. For example:

- A bicycle map can be produced for the public to assist them in route selection.
- The most appropriate routes for inclusion in the community bicycle network can be identified.
- "Weak links" in the walking and bicycling network can be determined, and sites needing improvement can be prioritized.
- Alternate treatments for improving bike and pedestrian conditions can be evaluated during the roadway design process – providing flexibility to the road engineer.

BLOS and PLOS as Policy Tools

In an increasing number of states around the country, these measures have been adopted not only as a planning tool – but also as a policy tool. Incorporating non-motorized level of service goals brings objectivity to the policy commitment of routinely accommodating all users in all roadway designs. Transportation plans from the federal to local levels often cite the need to accommodate non-motorized travel. However, without formalized implementation targets and policies, the goal is easily ignored. BLOS and PLOS can be used to facilitate implementation. Below are three possible levels of increasing policy commitment:

Raise awareness

Require that all (non-expressway) roadway project proposals include BLOS and PLOS ratings for both existing conditions and the completed project. This will increase awareness of the impact of a road design on non-motorized travel. This could be applied to all projects listed in capital programs, proposals for funding, and to projects within a specific agency. A web-based calculator – on the CATS website, for example – would make this a very simple task.

Provide incentive

CATS, the Councils of Mayors, and other agencies that choose projects for funding use a selection methodology that incorporates various goals. An incentive can be devised for agencies to better accommodate bicyclists and pedestrians by including BLOS and PLOS in these criteria or formulas. Credit can be given according to how a project changes conditions – "before" versus "after" scores – and to what level will be obtained – "after." These terms could be weighted by demand-side criteria.

Policy requirement

Finally, a policy can be adopted to require a certain level of accommodation, as measured by BLOS and PLOS. As an example, one could require that new construction and road projects requiring right-of-way acquisition be constructed to (at least) a BLOS and PLOS grade "C". For roads in areas of higher demand, one could require a "B". For all other road projects, one could require that the ratings either stay the same or improve, but NOT be worsened.

APPENDIX F

Agency Plan Representation in the Bicycle Inventory System

Catalogue of Bicycle and Pedestrian Plans in Possession

Northeastern Illinois, August, 2004
Including CATS BIS Geodatabase Status

The Bicycle Inventory System (BIS) includes information from a number of agencies. The agencies that have provided bicycle facility information to CATS over the past several years are listed below. The status of these plans in the BIS as of December, 2003 is shown below. The status includes whether we have an electronic representation of the existing and planned facilities to include in our inventory, whether the plan is represented by its own line-work, and whether the data structure matches that set out in the BIS.

Agency	Inventory or Plan Name	Inventory or Plan Date	Have Line-work	Unique Feature	Data Structure
State, County, and Regional Agencies					
Central Council of Mayors	West Central Bikeway Plan	1996	✓	✓	✓
Chicago	Bicycle Facilities Development Plan (with Executive Summary)	1997			
Chicago	Streets for Cycling Plan	2000	✓	✓	✓
Chicago	Chicago Trails Plan (Draft)	2004	✓	✓	✓
Chicago	Bike 2000 Plan	1992	N.A.		
Cook County, Forest Preserve District of[158]	• Forest Preserve Opportunity Map (from Land Acquisition Plan (2000) • Recreational Facilities Map (1996) Trail Brochures: • Arie Crown Forest Bicycle Trail (no date, October, 2000) • Busse Woods Bicycle Trail (no date, received October, 2000) • Deer Grove Bicycle Trail (no date, received October, 2000) • I&M Canal Bicycle Trail (1993) • North Branch Bicycle Trail (1993) • Palos and Sag Valley Trail System (1996) • Salt Creek Bicycle Trail (no date, received October, 2000) • Thorn Creek Bicycle Trail (no date, received October, 2000) • Tinley Creek Bicycle Trail (no date, received October, 2000) • Trail Plan at Deer Grove (1996)	Various	✓		
DuPage County Department of Economic Development and Transportation Planning	Proposed Improvement Plan for the Existing DuPage County Trail System [Illinois Prairie Path and Great Western Trail]	2003	N.A.		

[158] This agency is not represented on the CATS Policy or Work Program Committees.

Agency	Inventory or Plan Name	Inventory or Plan Date	Have Line-work	Unique Feature	Data Structure
DuPage County [Division of Transportation]	DuPage County Trail Maintenance Policy Draft	2003	N.A.		
DuPage County Regional Planning Commission	DuPage County 2002 Regional Bikeway Plan Map [Existing and Proposed Bikeways in DuPage County]	2002	✓	✓	✓
DuPage County Regional Planning Commission	DuPage County 2001 Existing and Proposed Bikeways Map	2001 (superseded)	N.A.		
DuPage County Regional Planning Commission	DuPage County Regional Bikeway Plan [and Map]	1996 (superseded)	N.A.		
DuPage County Regional Planning Commission	DuPage County Bikeway Plan Map	1984 (superseded)	N.A.		
DuPage County, Forest Preserve District of	Salt Creek Greenway Master Plan	2001	✓		
Illinois Prairie Trail Authority[159]	Regional Off-road Trail Plan for Northeastern Illinois	2000	✓		
Illinois Prairie Trail Authority[160]	Year 2000 Regional Greenways and Trails Implementation Program	1997	N.A.		
Kane County	Kane County 2030 Transportation Plan	2004	N.A.		
Kane County Regional Planning Commission	Kane County 2030 Land Resource Management Plan	2004	N.A.		
Kane County	Kane County Bicycle Map	2003	N.A.		
Kane County, Kane County Council of Mayors, Forest Preserve District of Kane County	Kane County Bicycle and Pedestrian Plan	2002	✓	✓	✓
Kane County	Kane County Transportation Plan	(1996) (Superseded)	N.A.		
Lake County Council of Mayors	Lake Council Contribution to Bicycle/Pedestrian Component of 2020 RTP	1996	N.A.		

[159] This agency is not represented on the CATS Policy or Work Program Committees.

[160] This agency is not represented on the CATS Policy or Work Program Committees.

Agency	Inventory or Plan Name	Inventory or Plan Date	Have Line-work	Unique Feature	Data Structure
Lake County	Year 2020 Transportation Priority Plan - Lake County Illinois [Highways - Transit - Bikeways]	2002	✓	✓	
Lake County Forest Preserves[161]	Trail Brochures: • Buffalo Creek Forest Preserve (1996) • Cuba Marsh Forest Preserve (1997) • Grant Woods Forest Preserve (1996) • Greenbelt Forest Preserve (No date, Received 1999) • Half Day and Wright Woods (1994) • Lakewood/Stockholm Lake (No date) • Lyons Woods Forest Preserve (1996) • McDonald Forest Preserve (No date, Received 1999) • Old School Forest Preserve (1996) • Van Patten Woods with Sterling Lake (1997)	Various	✓		
McHenry County Council of Mayors	McHenry County Subregional Bicycle Plan - with Suggested Bicycle Facility Network[162]	1996			
National Park Service[163]	Illinois and Michigan Canal National Heritage Corridor	No Date	N.A.		
National Park Service[164]	Midewin National Tallgrass Prairie - Transportation and Trails Corridors	2001	✓		
North Central Council of Mayors	North Central 2001 Bikeway Plan Map	2001	✓	✓	✓
North Central Council of Mayors	North Central Bikeway Plan	1996 (Superseded)	N.A.		
Northeastern Illinois Planning Commission	Northeastern Illinois Regional Greenways and Trails Implementation Program	1997	✓	✓	
Northeastern Illinois Planning Commission	Northeastern Illinois Greenways Plan	1992 (Superseded)	N.A.		
Northwest Municipal Conference	Northwest Municipal Conference Bicycle Facilities Plan	No Date (1996?)	✓		
Northwestern Indiana Regional Planning Commission	Regional Bikeways Plan for Northwest Indiana	1994			
South Suburban Mayors and Managers Association	South Suburban Bikeway Plan	2001	✓	✓	✓

[161] This agency is not represented on the CATS Policy or Work Program Committees.

[162] Projects depicted are for illustrative purposes only. Individual projects have not been endorsed by the McHenry County Council of Mayors. Hence they are not distributed in the Bicycle Inventory System.

[163] This agency is not represented on the CATS Policy or Work Program Committees.

[164] This agency is not represented on the CATS Policy or Work Program Committees.

Agency	Inventory or Plan Name	Inventory or Plan Date	Have Line-work	Unique Feature	Data Structure
South Suburban Mayors and Managers Association	South Suburban Bikeway Plan	1996 (Superseded)	N.A.		
Southwest Council of Mayors	Southwest Suburban Bikeway Plan	2001	✓		✓
Southwest Council of Mayors	Southwest Suburban Bikeway Plan	1996 (Superseded)	N.A.		
Will County (Forest Preserve District of)[165]	Trail and Forest Preserve Information: • Hammel Woods (no date, rec'd 2004) • Hickory Creek Bikeway – West Branch (no date, rec'd 2004) • Hickory Creek Preserve – LaPorte Rd Access (No date, rec'd 2004) • I&M Canal Trails (No date, rec'd 2004) • Joliet Junction Trail Conceptual Development and Management Plan (2000) • Lake Renwick Heron Rookery [no bike facilities] (no date, rec'd 2004) • Messenger Woods [no bike facilities] (no date, rec'd 2004) • Monee Reservoir [no bike facilities] (no date, rec'd 2004) • Rock Run Greenway - Black Road Access (No date, 2003?) • Spring Creek Preserve - Homer Trails (No date, 2003?) • Theodore Marsh (No date, rec'd 2004)	Various	✓		
Will County (Land Use Department)	Land Resource Management Plan (Figures 2 Trails Concept and 3 Open Spaces and County-wide Trail Systems	2002	✓	✓	
Will County (Land Use Department)	Bikeway Plan	1995 (Superseded ?)	N.A.		
Municipalities *Note: Municipal plans are sought on an as-needed basis in response to requests from agencies for bike planning information. Municipal plans are sought if (1) the municipal plan was adopted after the municipality's subregional plan, (2) a subregional plan has not been adopted, or (3) the subregional plan specifically excludes local routes and trails, which information may be beneficial to have in the context of routine accommodation. Some municipalities have provided a copy of their bicycle plans to CATS beyond these requests above. In that case, the municipal data sets are checked against the regional data sets on an as-needed basis in response to agency requests.*					
Algonquin	Park Master Plan	2002			
Bartlett	Bike Path Map	2001			
Bartlett	Bike Path Map	1999 (superseded)			

[165] This agency is not represented on the CATS Policy or Work Program Committees.

Agency	Inventory or Plan Name	Inventory or Plan Date	Have Line-work	Unique Feature	Data Structure
Buffalo Grove	Bike Path Map	1998			
Downers Grove	Village Bikeway Plan (Note: Linework is included in DuPage County Bicycle Plan)	2000			
Frankfort	Bike Trail Master Plan	1998			
Highland Park	Greenways Plan	1995			
Hinsdale	Hinsdale Parks and Bicycle Route	? [a/o 2004]			
Lemont	Lemont Bicycle and Pedestrian Plan	2003			
Lincolnshire	Hiking, Biking, and Recreational Path System	2003			
Lockport	Bicycle Pedestrian System Master Plan	2003			
Minooka	Parks, Open Space, and Bicycle Plan (element of Comprehensive Plan)	1999			
Naperville	Comprehensive Transportation Plan [includes Bicycle Plan].	2002			
Naperville	Amendment to Bicycle Plan	2000			
Naperville	Bicycle and Pedestrian Plan	1997 (superseded)			
New Lenox	Open Space and Greenway Plan	1998			
Northbrook	Village of Northbrook Bicycle Plan and Map	2003			
Orland Park	Primary Bikeways (element of the comprehensive plan)	1999			
Oswego	Oswegoland Park District Trail Guide	2004			
Plainfield	Plainfield Area Bicycle Plan	1998			
Rolling Meadows	2002 Bikeway Plan	2002			
Roselle	Linking Neighbors: Roselle/Bloomingdale Community Trail Bridge at Lake Street with Rec Routes regional map [extending from Pratt Wayne Woods/Illinois Prairie Path to Busse Woods].	2003			
Roselle	Village of Roselle Bike Path Map [North DuPage Recreational Routes	2001			
Saint Charles	Bikeway Plan	2003 (Print Date)			
Saint Charles	River Corridor Master Plan	2002			
Schaumburg	Schaumburg Bikeways Plan, with Schaumburg Bikeways Map	1999			
Schaumburg	Schaumburg Bikeways Plan, with Schaumburg Bikeways Map	1993 (Superseded)			
Skokie	Bicycle Facility Plan	2003			
Wood Dale	Proposed Wood Dale Bike Path Location Map	1999			
Woodridge	Woodridge Bikeway Study	1996			
Yorkville	Bicycle/Pedestrian Trail System [Standards and Design]	2000			

Compilation of Survey Results - Bicycle Facility Plans

Northeastern Illinois, Fall, 2002
Soles and Spokes Municipal Survey

The Bicycle Inventory System (BIS) is not a comprehensive data set of local bicycle facility plans. Local facility plans are retrieved on an as-needed basis as part of project studies. The information below is used in project studies to determine whether local planning efforts are underway or have been completed that need to be polled when providing bicycle facility information to highway agencies.

Municipality	District	Received Survey	Bicycle Plan (and year, if applicable [optional])	Comprehen-sive Plan Including Bicycle Elements	Transport-ation Plan Including Bicycle Elements	Park or Recreation Plan with Bicycle Elements	Planned Bicycle Facilities
Alsip	Suburban Cook	FALSE					
Antioch	Collar Counties	TRUE	N	Y	?	N	N
Addison	Collar Counties	TRUE	N	N	N	N	N
Algonquin	Collar Counties	TRUE	Y, 2002	Y, 2002	Y, 2002	Y, 2002	Y
Arlington Heights	Suburban Cook	TRUE	N	N	N	?	Y
Aurora	Collar Counties	FALSE					
Bannockburn	Collar Counties	FALSE					
Barrington	Collar Counties	TRUE	Y	Y	Y	N	Y
Barrington Hills	Collar Counties	FALSE					
Bartlett	Suburban Cook	TRUE	Y	Y	N	Y	Y
Batavia	Collar Counties	TRUE	N	Y	N	Blank	Y
Beach Park	Collar Counties	TRUE	N	N	N	N	N
Bedford Park	Suburban Cook	TRUE	N	N	N	?	N
Beecher	Collar Counties	TRUE	N	Y	N	Y	Y
Bellwood	Suburban Cook	FALSE					
Bensenville	Collar Counties	TRUE	N	N	N	Y	Y
Berkeley	Suburban Cook	FALSE					
Berwyn	Suburban Cook	TRUE	Y	Blank	Blank	Blank	Y
Bloomingdale	Collar Counties	TRUE	Y	Y	N	Y	Y
Blue Island	Suburban Cook	TRUE	N	N	N	Y	N
Bolingbrook	Collar Counties	TRUE	Y	Y	N	Y	Y
Braidwood	Collar Counties	FALSE					
Bridgeview	Suburban Cook	TRUE	N	N	N	N	N
Broadview	Suburban Cook	FALSE					
Brookfield	Suburban Cook	TRUE	N	N	N	Y, 1998	Y
Buffalo Grove	Suburban Cook	TRUE	Y, 2001	Y	Y	Y, 2001	Y
Bull Valley	Collar Counties	TRUE	N	N	N	N	N
Burbank	Suburban Cook	TRUE	N	N	N	Blank	N
Burlington	Collar Counties	FALSE					
Burnham	Suburban Cook	TRUE	?	N	N	N	?
Burr Ridge	Collar Counties	TRUE	N	N	N	N	Y
Calumet City	Suburban Cook	TRUE	Y	Y	Blank	Y	Y
Calumet Park	Suburban Cook	FALSE					

Municipality	District	Received Survey	Bicycle Plan (and year, if applicable [optional])	Comprehen-sive Plan Including Bicycle Elements	Transport-ation Plan Including Bicycle Elements	Park or Recreation Plan with Bicycle Elements	Planned Bicycle Facilities
Carol Stream	Collar Counties	TRUE	N	N	N	N	N
Carpentersville	Collar Counties	TRUE	N	Y	N	N	N
Cary	Collar Counties	TRUE	Y, 2002	Y, 2003	N	?	Y
Channahon	Collar Counties	TRUE	Y, 1995	Y, 1996	N	N	Y
Chicago	Chicago	TRUE	Y, 2001	Blank	Y	Y	Y
Chicago Heights	Suburban Cook	TRUE	?	Y	?	?	Y
Chicago Ridge	Suburban Cook	TRUE	N	N	N	N	N
Cicero	Suburban Cook	FALSE					
Clarendon Hills	Collar Counties	TRUE	N	Y	N	?	Y
Country Club Hills	Suburban Cook	TRUE	N	?	N	Y	Y
Countryside	Suburban Cook	TRUE	N	N	N	N	N
Crest Hill	Collar Counties	FALSE					
Crestwood	Suburban Cook	TRUE	N	N	N	Y	N
Crete	Collar Counties	FALSE					
Crystal Lake	Collar Counties	TRUE	N	Y	Blank	N	Y
Darien	Collar Counties	TRUE	Y	Y	Y	Y	Y
Deerfield	Collar Counties	TRUE	Y	Y	N	Y	Y
Deer Park	Collar Counties	TRUE	Y	Y	Y	Blank	Y
Des Plaines	Suburban Cook	TRUE	N	N	N	N	N
Diamond	Collar Counties	TRUE	N	N	N	N	N
Dixmoor	Suburban Cook	FALSE					
Dolton	Suburban Cook	FALSE					
Downers Grove	Collar Counties	TRUE	Y	N	N	?	Y
East Dundee	Collar Counties	FALSE					
East Hazel Crest	Suburban Cook	FALSE					
Elburn	Collar Counties	TRUE	N	?	?	?	Y
Elgin	Collar Counties	TRUE	Y	Y	Y	Y	Y
Elk Grove Village	Suburban Cook	TRUE	Y, 1999	N	N	N	Y
Elmhurst	Collar Counties	FALSE					
Elmwood Park	Suburban Cook	TRUE	N	N	N	N	Y
Elwood	Collar Counties	TRUE	Y, 2002	Y, 2002	N	Y, 2002	Y
Evanston	Suburban Cook	TRUE	Y	Y	Y	Y	Y
Evergreen Park	Suburban Cook	TRUE	N	N	N	Y	Y
Flossmoor	Suburban Cook	FALSE					
Ford Heights	Suburban Cook	FALSE					
Forest Park	Suburban Cook	TRUE	N	Y, 2001	N	N	N
Forest View	Suburban Cook	TRUE	N	N	N	blank	N
Fox Lake	Collar Counties	TRUE	N	N	N	Y	Y
Fox River Grove	Collar Counties	TRUE	N	N	N	Y	N

Municipality	District	Received Survey	Bicycle Plan (and year, if applicable [optional])	Comprehen-sive Plan Including Bicycle Elements	Transport-ation Plan Including Bicycle Elements	Park or Recreation Plan with Bicycle Elements	Planned Bicycle Facilities
Fox River Valley Gardens	Collar Counties	FALSE					
Frankfort	Collar Counties	TRUE	Y, 2003	Y, 2003	Y, 1998	?	Y
Franklin Park	Suburban Cook	TRUE	N	Y	Y	Y	Y
Geneva	Collar Counties	FALSE					
Gilberts	Collar Counties	TRUE	N	Y	Y	Y	Y
Glencoe	Suburban Cook	TRUE	N	Y, 1996	N	Y, 1996	Y
Glendale Heights	Collar Counties	TRUE	Y	N	Y	Y	Y
Glen Ellyn	Collar Counties	FALSE					
Glenview	Suburban Cook	TRUE	N	Y	Y	Y	Y
Glenwood	Suburban Cook	FALSE					
Godley	Collar Counties	TRUE	N	N	N	Y	Y
Golf	Suburban Cook	TRUE	N	N	N	?	N
Grayslake	Collar Counties	TRUE	N	Y, 1989	Y, 1998	?	Y
Green Oaks	Collar Counties	FALSE					
Greenwood	Collar Counties	FALSE					
Gurnee	Collar Counties	TRUE	Y	N	Y	N	Y
Hainesville	Collar Counties	TRUE	N	N	N	Y	Y
Hampshire	Collar Counties	TRUE	N	N	N	N	N
Hanover Park	Suburban Cook	TRUE	N	Y	?	?	Y
Harvard	Collar Counties	TRUE	N	N	N	Y	Y
Harvey	Suburban Cook	FALSE					
Harwood Heights	Suburban Cook	FALSE					
Hawthorn Woods	Collar Counties	TRUE	Y, 2003	Y, 2003	Y, 2003	Y	Y
Hazel Crest	Suburban Cook	FALSE					
Hebron	Collar Counties	FALSE					
Hickory Hills	Suburban Cook	TRUE	N	N	N	N	Y
Highland Park	Collar Counties	TRUE	Y, 1995	Y	Y	Y, 1994	Y
Highwood	Collar Counties	TRUE	N	N	?	?	Y
Hillside	Suburban Cook	TRUE	N	N	N	N	N
Hinsdale	Collar Counties	TRUE	N	N	N	Y	Y
Hodgkins	Suburban Cook	TRUE	N	N	N	N	N
Hoffman Estates	Suburban Cook	TRUE	N	Y	Y	?	Y
Holiday Hills	Collar Counties	FALSE					
Hometown	Suburban Cook	FALSE					
Homewood	Suburban Cook	TRUE	N	N	N	?	N
Huntley	Collar Counties	FALSE					
Indian Creek	Collar Counties	FALSE					
Indian Head Park	Suburban Cook	TRUE	N	N	N	N	N
Inverness	Collar Counties	TRUE	N	N	N	N	N
Island Lake	Collar Counties	FALSE					
Itasca	Collar Counties	TRUE	N	N	N	Y	Y

Municipality	District	Received Survey	Bicycle Plan (and year, if applicable [optional])	Comprehen-sive Plan Including Bicycle Elements	Transport-ation Plan Including Bicycle Elements	Park or Recreation Plan with Bicycle Elements	Planned Bicycle Facilities
Johnsburg	Collar Counties	FALSE					
Joliet	Collar Counties	FALSE					
Justice	Suburban Cook	FALSE					
Kenilworth	Suburban Cook	TRUE	N	N	N	N	N
Kildeer	Collar Counties	TRUE	N	N	N	N	N
La Grange	Suburban Cook	TRUE	N	N	N	N	Y
La Grange Park	Suburban Cook	TRUE	N	Y	N	N	N
Lake Barrington	Collar Counties	TRUE	N	N	N	N	N
Lake Bluff	Collar Counties	TRUE	Blank	?	Y	Y	Blank
Lake Forest	Collar Counties	FALSE					
Lake in the Hills	Collar Counties	FALSE					
Lakemoor	Collar Counties	FALSE					
Lake Villa	Collar Counties	FALSE					
Lakewood	Collar Counties	TRUE	N	Y	N	Y	Y
Lake Zurich	Collar Counties	TRUE	Y, 2001	Y	N	Y	Y
Lansing	Suburban Cook	TRUE	Y	Y	N	Y	Y
Lemont	Suburban Cook	TRUE	N	Y	N	N	Y
Libertyville	Collar Counties	FALSE					
Lily Lake	Collar Counties	TRUE	N	N	N	N	N
Lincolnshire	Collar Counties	TRUE	Y	Y	N	Y	Y
Lincolnwood	Suburban Cook	TRUE	N	Blank	N	Y	Y
Lindenhurst	Collar Counties	TRUE	Blank	Y	Blank	Blank	Blank
Lisle	Collar Counties	TRUE	N	N	N	?	Y
Lockport	Collar Counties	FALSE					
Lombard	Collar Counties	TRUE	N	N	N	N	Y
Long Grove	Collar Counties	TRUE	N	Y	Y	Y	Y
Lynwood	Suburban Cook	TRUE	?	?	?	Y	N
Lyons	Suburban Cook	TRUE	N	N	N	N	Y
McCook	Suburban Cook	FALSE					
McCullom Lake	Collar Counties	TRUE	N	N	N	N	N
McHenry	Collar Counties	TRUE	N	Y	N	Y	Y
Manhattan	Collar Counties	TRUE	N	N	N	Y	N
Maple Park	Collar Counties	FALSE					
Marengo	Collar Counties	TRUE	N	Y	N	N	Y
Markham	Suburban Cook	FALSE					
Matteson	Suburban Cook	FALSE					
Maywood	Suburban Cook	TRUE	N	?	N	Y	Blank
Melrose Park	Suburban Cook	TRUE	N	?	N	N	?
Merrionette Park	Suburban Cook	FALSE					
Mettawa	Collar Counties	FALSE					
Midlothian	Suburban Cook	TRUE	Y, 2001	Y, 2001	Y, 2001	N	Y
Minooka	Collar Counties	FALSE					
Mokena	Collar Counties	TRUE	Y	Y	N	N	Y

Municipality	District	Received Survey	Bicycle Plan (and year, if applicable [optional])	Comprehen-sive Plan Including Bicycle Elements	Transport-ation Plan Including Bicycle Elements	Park or Recreation Plan with Bicycle Elements	Planned Bicycle Facilities
Monee	Collar Counties	TRUE	N	Y	Y	Y	Y
Montgomery	Collar Counties	TRUE	Y, 2002	Y, 2002	N	Y, 2002	Y
Morton Grove	Collar Counties	TRUE	N	Y	N	N	Y
Mount Prospect	Suburban Cook	TRUE	Y, 1998	Y, 1998	Y	Y	Y
Mundelein	Collar Counties	TRUE	N	Y	N	N	Y
Naperville	Collar Counties	TRUE	Y	Y	Y	Y	Y
New Lenox	Collar Counties	TRUE	Y	Y	Y	?	Y
Niles	Suburban Cook	TRUE	N	Y	N	?	Y
Norridge	Suburban Cook	TRUE	N	N	N	?	N
North Aurora	Collar Counties	TRUE	Y	Y	Y	Y	Y
North Barrington	Collar Counties	FALSE					
Northbrook	Suburban Cook	TRUE	N	N	N	?	Y
North Chicago	Collar Counties	TRUE	N	Y	Y	?	Y
Northfield	Suburban Cook	TRUE	N	Y	N	N	Y
Northlake	Suburban Cook	TRUE	N	N	N	N	Y
North Riverside	Suburban Cook	FALSE					
Oak Brook	Collar Counties	TRUE	N	Y	N	Y	Y
Oakbrook Terrace	Collar Counties	FALSE					
Oak Forest	Suburban Cook	TRUE	N	N	N	N	N
Oak Lawn	Suburban Cook	TRUE	N	N	N	N	N
Oak Park	Suburban Cook	TRUE	N	N	N	?	Y
Oakwood Hills	Collar Counties	FALSE					
Old Mill Creek	Collar Counties	FALSE					
Olympia Fields	Suburban Cook	TRUE	Y, 2001	N	Y	N	Y
Orland Hills	Suburban Cook	TRUE	Y	Y	?	Y	Y
Orland Park	Suburban Cook	TRUE	Y, 1991	Y, 1991	Y, 1991	Y, 1991	Y
Oswego	Collar Counties	TRUE	N	Y	?	Y	Y
Palatine	Suburban Cook	FALSE					
Palos Heights	Suburban Cook	TRUE	N	N	N	N	Y
Palos Hills	Suburban Cook	FALSE					
Palos Park	Suburban Cook	FALSE					
Park City	Collar Counties	TRUE	N	N	N	Y	N
Park Forest	Suburban Cook	TRUE	N	Y	Y	Y, 2001	Y
Park Ridge	Suburban Cook	FALSE					
Peotone	Collar Counties	FALSE					
Phoenix	Suburban Cook	FALSE					
Pingree Grove	Collar Counties	TRUE	N	Blank	N	N	N
Plainfield	Collar Counties	TRUE	Y	Y	Y	Y	N
Posen	Suburban Cook	TRUE	N	N	N	Y	N
Prairie Grove	Collar Counties	FALSE					
Prospect Heights	Suburban Cook	TRUE	N	N	Y	Y	Y
Richmond	Collar Counties	FALSE					

Municipality	District	Received Survey	Bicycle Plan (and year, if applicable [optional])	Comprehen-sive Plan Including Bicycle Elements	Transport-ation Plan Including Bicycle Elements	Park or Recreation Plan with Bicycle Elements	Planned Bicycle Facilities
Richton Park	Suburban Cook	TRUE	N	Y	N	Y	N
Ringwood	Collar Counties	FALSE					
Riverdale	Suburban Cook	FALSE					
River Forest	Suburban Cook	TRUE	N	?	N	?	N
River Grove	Suburban Cook	TRUE	N	N	N	N	Y
Riverside	Suburban Cook	TRUE	N	N	N	N	N
Riverwoods	Collar Counties	TRUE	N	Y	Y	N	Y
Robbins	Suburban Cook	FALSE					
Rockdale	Collar Counties	FALSE					
Rolling Meadows	Suburban Cook	TRUE	Y	Y	Y	?	Y
Romeoville	Collar Counties	TRUE	Y, 2002	Y	Y	Y	Y
Roselle	Collar Counties	TRUE	Y, 1996	?	N	Y	Y
Rosemont	Suburban Cook	TRUE	N	N	N	N	N
Round Lake	Collar Counties	TRUE	N	N	N	N	N
Round Lake Beach	Collar Counties	FALSE					
Round Lake Heights	Collar Counties	TRUE	N	N	N	N	N
Round Lake Park	Collar Counties	TRUE	N	Y	Y	Y	N
Saint Charles	Collar Counties	TRUE	Y	Y	Y	Y	Y
Sauk Village	Suburban Cook	FALSE					
Schaumburg	Suburban Cook	TRUE	Y	Y	Y	Y	Y
Schiller Park	Suburban Cook	TRUE	N	N	N	N	N
Shorewood	Collar Counties	TRUE	Y	Y	N	Y	Y
Skokie	Suburban Cook	TRUE	Y, 2002	Y, 2002	Y, 2002	N	Y
Sleepy Hollow	Collar Counties	FALSE					
South Barrington	Suburban Cook	TRUE	N	N	N	N	N
South Chicago Height	Collar Counties	TRUE	N	N	N	N	N
South Elgin	Collar Counties	TRUE	N	Y, 2001	N	Y, 2002	Y
South Holland	Suburban Cook	TRUE	?	Y	?	Y	Y
Spring Grove	Collar Counties	TRUE	N	N	N	N	N
Steger	Suburban Cook	TRUE	N	N	N	N	Y
Stickney	Suburban Cook	TRUE	Y	N	N	Y	Y
Stone Park	Suburban Cook	FALSE					
Streamwood	Collar Counties	TRUE	Y	Y	Y	Y	Y
Sugar Grove	Collar Counties	TRUE	N	N	N	N	Y
Summit	Suburban Cook	TRUE	N	N	N	N	N
Symerton	Collar Counties	FALSE					
Third Lake	Collar Counties	TRUE	N	N	N	N	N
Thornton	Suburban Cook	TRUE	N	N	N	N	N
Tinley Park	Suburban Cook	FALSE					
Tower Lakes	Collar Counties	TRUE	N	Y	N	N	?
Trout Valley	Collar Counties	FALSE					
Union	Collar Counties	FALSE					

Municipality	District	Received Survey	Bicycle Plan (and year, if applicable [optional])	Comprehen-sive Plan Including Bicycle Elements	Transport-ation Plan Including Bicycle Elements	Park or Recreation Plan with Bicycle Elements	Planned Bicycle Facilities
University Park	Collar Counties	TRUE	Y	Y	Y	Y	N
Vernon Hills	Collar Counties	TRUE	N	?	?	?	Y
Villa Park	Collar Counties	TRUE	N	N	N	?	Y
Virgil	Collar Counties	TRUE	N	N	N	N	Y
Volo	Collar Counties	TRUE	N	N	N	N	N
Wadsworth	Collar Counties	TRUE	Y	Y	N	N	N
Warrenville	Collar Counties	TRUE	N	N	N	N	Y
Wauconda	Collar Counties	TRUE	N	N	N	Blank	N
Waukegan	Collar Counties	TRUE	N	N	N	N	Y
Wayne	Collar Counties	TRUE	Y	Y	Y	Y	Y
Westchester	Suburban Cook	FALSE					
West Chicago	Collar Counties	FALSE					
West Dundee	Collar Counties	TRUE	N	Y	N	N	Y
Western Springs	Suburban Cook	TRUE	N	N	N	N	N
Westmont	Collar Counties	TRUE	Y	Y	N	?	Y
Wheaton	Collar Counties	TRUE	N	Y	N	N	N
Wheeling	Suburban Cook	TRUE	Y	Y	Y	Y	Y
Willowbrook	Collar Counties	TRUE	Y, 1993	Y	Y	Y	Y
Willow Springs	Suburban Cook	TRUE	Y	Y	Y	N	Y
Wilmette	Suburban Cook	TRUE	Y	Y	Y	Y	Y
Wilmington	Collar Counties	TRUE	Y, 2003	Blank	Blank	Y, 2003	Y
Winfield	Collar Counties	FALSE					
Winnetka	Suburban Cook	TRUE	N	Y	N	?	Y
Winthrop Harbor	Collar Counties	FALSE					
Wonder Lake	Collar Counties	FALSE					
Wood Dale	Collar Counties	TRUE	Y	Y	N	N	Y
Woodridge	Collar Counties	TRUE	Y	Y	Y	Y	Y
Woodstock	Collar Counties	TRUE	N	Y	N	Y	Y
Worth	Suburban Cook	TRUE	N	N	N	N	Y
Yorkville	Collar Counties	TRUE	N	Y, 2003	N	N, 2003	Y
Zion	Collar Counties	TRUE	N	N	N	Y	Y

APPENDIX G

Chicago Bike Lane User Counts

Count Model Parameters and Evaluation

The SAS System 20:48 Thursday, January 1, 2004 14

The REG Procedure

Model: MODEL1
Dependent Variable: count

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	4081872	680312	84.31	<.0001
Error	515	4155419	8068.77490		
Corrected Total	521	8237291			

Root MSE 89.82636
R-Square 0.4955
Dependent Mean 70.69521
Adj R-Sq 0.4897
Coeff Var 127.06145

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	25.93211	8.82735	2.94	0.0035
Bkln	1	0.97635	0.09029	10.81	<.0001
lsd	1	566.45153	30.43285	18.61	<.0001
pmpeak	1	18.51221	8.57804	2.16	0.0314
sat	1	44.85071	10.02517	4.47	<.0001
midjn_midjl	1	34.41209	10.77827	3.19	0.0015
midjl_midaug	1	18.45427	9.26019	1.99	0.0468

Where

Count	Number of bicyclists counted by volunteers over 2-hour time frame
Intercept	Baseline count
Bkln	1 = presence of bike lane
lsd	1 = approach to Lake Shore Drive/Lakefront Path
pmpeak	1 = p.m. peak count
sat	1 = Saturday count
midjn_midjl	1 = count mid-june to mid=july
midjl_midaug	1 = count mid-july to mid-august

APPENDIX H

Detailed Programming Totals by Year and District

Table H-1
Transportation Awards for Bicycle and Pedestrian Projects
Northeastern Illinois, 1998-2002

District	1998	1999	2000	2001	2002	Total	Average
Chicago	2,226	$280	$394	$1,452	$625	$4,977	$995
Suburban Cook	8,272	1,041	4,608	3,520	3,417	20,858	4,172
DuPage	3,703	1,515	1,124	4,166	2,797	13,303	2,661
Kane	1,701	1,936	2,345	111	553	6,646	1,329
Lake	2,575	994	0	166	115	3,850	770
McHenry	0	0	0	472	39	511	102
Will	705	0	0	0	303	1,008	202
Total	19,181	5,765	$8,471	$9,889	$7,851	51,153	10,231

Source: CATS, Federal Fiscal Year 1998-2002 Regional Project Award and Obligation Reports for Northeastern Illinois (2002: draft). Amounts shown include local share. Awards include Illinois Transportation Enhancement Program (ITEP), Congestion Mitigation and Air Quality Improvement Program (CMAQ), Surface Transportation Program (STP), the Illinois Fund for Infrastructure, Roads, Schools, and Transit (Illinois FIRST), Motor Fuel Tax funds, and other local and state transportation funds.

Table H-2
IDNR Bicycle Trail Grant Program in Thousands of Dollars
Northeastern Illinois, 1990-2002 (as of February, 2002)

Status	Year	District							Total
		Chicago	Suburban Cook	DuPage	Kane	Lake	McHenry	Will	
Awarded	1990	-	$2,125	$876	$346	$1,633	-	$80	$5,090
	1991	$400	2,265	145	516	477	$550	71	4,424
	1992	-	2342	-	1,112	-	400	2,653	6,507
	1994	187	1,613	-	352	1,329	305	1,100	4,886
	1995	400	139	-	313	1,221	-	41	2,114
	1996	900	838	-	352	753	212	487	3,542
	1997	1,150	1,515	336	405	816	318	-	4,540
	1998	778	763	-	2,169	587	-	551	4,848
	1999	209	634	1,105	401	1,404	421	1,003	5,177
	2000	401	543	129	1,020	400	305	890	3,688
	2001	-	-	-	-	830	-	436	1,266
	2002	-	-	-	-	-	130	-	130
Awarded Total		4,425	12,807	2,591	6,986	9,450	2,641	7,312	46,212
Status	Year	District							Total
		Chicago	Suburban Cook	DuPage	Kane	Lake	McHenry	Will	
Programmed but Not Awarded	1997	-	-	-	-	-	-	606	606
	1998	-	249	50	-	820	-	872	1,991
	1999	-	-	-	-	336	-	-	336
	2000	-	98	-	-	-	-	-	98
	2001	2,296	-	2,700	4,176	3,413	-	1,087	13,672
	2002	471	700	4,209	186	-	-	506	6,072
Programmed Not Awarded Total		2,767	1,047	6,959	4,362	4,569	-	3,071	22,775
Grand Total		7,192	13,854	9,550	11,348	14,019	2,641	10,383	68,987

Note: Figures represent total project cost, including local share. In addition, non-IDNR funds in total project cost may be federal or state funds tabulated separately in this report. Funds are in thousands of dollars. Kane County numbers include funds for part of Kendall County. Raw data is from IDNR. Source: Chicago Area Transportation Study.

APPENDIX I

Enhanced Urban Arterial Development Costs Excluding ROW Acquisition

Enhanced Urban Arterial Development Costs

Planning Level Analysis

Element	Cost per Centerline Mile	Assumptions Regarding Element	Source
FIXED PAVEMENT ELEMENTS			
ROW Preparation	$ 115,349.12	Clearing, grubbing, rough grading	txdot 1005002
Excavation	42,501.89	3.51/cy; cy/mile = 4X12X5280X(8"+4")/12/(27) (27 cu ft/cu yd)	txdot 1100501
Reworking in situ Subbase (Add Cement)	54,489.60	1.5/sq yd new base	txdot 2750511
4 in granular subbase	69,544.87	17.23/cu yd	txdot 2470599
Compaction	10,000.00	LS	
Reinforced Joint Plane Concrete 8"	996,796.42	27.07/sq yd	txdot 3600503
Miscellaneous and Contingencies	322,170.47	25% of above pavement marking, signing, etc.	
Subtotal	**1,610,852.37**	2 lanes in each direction - design for 40k adt passenger vehicles only	
FREIGHT ELEMENTS			
Change to Reinforced Joint Plane Concrete 10"	52,310.02	for 40K pv + 2K SU + 2K MU. 28.88 per sq yd	tx dot 3600505
Excavation	10,625.47	Additional 2"	
Intersection Design Enhancements	50,000.00	12.5K per intersection X 4 intersection: recessed stop bars; signage, pavement marking.	
Miscellaneous and Contingencies	28,233.87		
Subtotal	**141,169.36**		

URBAN DRAINAGE		Note: Urban water and sanitary sewer services not in transportation costs. Nor are gas and electric services.	
Storm Sewer Reinforced Concrete Pipe 36 in.	431,217.07	63/ft;	tx dot 4640509
Tied Curb and Gutter	141,809.18	10.41/ft (excludes median curb/gutter, counted separately)	tx dot 5290522
Inlet/Catch Basin (Complete)	330,240.00	2K each; 128/mile. Stormwater Management	tx dot 4650508
Miscellaneous and Contingencies	190,364.27	25% of above	
Subtotal	**1,129,082.82**	meets overall check of a quarter to half of pavement cost	0.50
TRANSIT ELEMENTS			
Bus Rapid Transit Stations	2,000,000.00	2 million per station spaced every mile. 1 station. Consistent with Cermak BRT	Cermak BRT submittal; Pace Vision 2020
Miscellaneous and Contingencies	500,000.00	line haul bus stops and shelters, ped facilities	
Subtotal	**2,500,000.00**		
SIGNALS	**500,000.00**	2 per mile	
OTHER URBAN ELEMENTS, including bicycle and pedestrian treatments			
Bike Lane Markings	$ 20,000.00	Signage, thermoplastic long lines, 3M Stamark symbols.	CDOT Lettings 8/48 X pavement total (less curb and gutter and contingencies
Bike Lane Pavement	$ 214,780.02	4 feet per direction (per AASHTO, assuming c/g)	

				, the latter being counted below)
Sidewalks	$	290,400.00	Two 5' sidewalks (one on each side)	$5.5/ft^2
Curb Ramps and Landings	$	47,306.88	12 per intersection X 4 interesections per mile	txdot 58660501
Street Lighting	$	410,000.00	Typical	Lettings
Raised Center Median - Pedestrian Refuge/ Boulevard Treatment	$	220,226.69	18' Sodded + C/G	Txdot 10.41/ft cg 5290522USACE: $6.8/sy for sodding $110/tree at http://www.elmhurst.org/elmhurst/publicworks/faq.asp
Tree Planting	$	33,000.00	300 2" trees per mile, including 2 parkways and center median	
Pedestrian Signal, Pedestrian and Bicycle Signal Activation and Control	$	50,000.00	2 per mile	25K each
Parkway	$	219,413.33	Sodded, With Curb and Gutter. Two X 5'	USACE
Miscellaneous and Contingencies	$	362,858.03	25% of above	
Subtotal - Urban Treatments	**$**	**1,881,409.02**		
ITS				
Signal Interconnects:	$	360,000.00	Fully Interconnected; No Railroad Involvement	Lettings
Other Smart Corridor Elements	$	583,333.33	CCTV, VMS, HAR, etc. in support of IMS, CMS, PTMS	3.5 million for Cicero Smart Corridor 31st to 79th
Miscellaneous and Contingencies	$	235,833.33		
Subtotal-ITS Elements	**$**	**1,179,166.67**		
GRAND TOTAL	**$**	**8,906,227.94**	Note: 6 lanes =	9,604,939.31

Note: USACE adjustments: Chicago Factor 1.29; inflation discount from 2005 to 2001: 2138/2276

txdot: Average Low Bid Unit Price - Construction - Statewide. Posted on Txdot Expressway. Multiplied these costs by 1.29 to account for higher Chi const costs.

APPENDIX J

TABULAR SUMMARY OF SAFETY AND ENCOURAGEMENT PROGRAMS

Chicagoland Pedestrian and Bicycle education and encouragement programs

Category/name of program	Where	Contact	Phone	Activity	Annual cost	Funding source	Audience
Youth Safety- school bike							
Highland Park school bike safety	Highland Park	Officer Debbie Fishman	847/926-1123	bike ed- preschool through 8th grade			
Woodridge school bike safety	Woodridge	Officer Darlene Hurvath		Darlene goes into schools, gives safety presentation			
Lemont school bike safety	Lemont	Officer Jack Bluis	630-257-5877	5th grade- junior high			300
Chicago Police Protector Program	Chicago	Ray Ranne/Jim Caparelli (HQ)	312/745-5838	bike rodeos, safety presentations park districts/boy scout troops/schools			100
Sec of State Traffic Safety Unit	Chicago/Cook suburbs	Kathleen Widmer					
"Operation Lifesaver"	Beecher	Tim Mitchell (police dept)	708-946-2341	covers ped and bike safety 4th-6th grades in two schools			250
Mundelein school bike safety	Mundelein	Mundelein police					
Schaumberg school bike safety	Schaumberg	Officer Zwirowski	847-882-3534				
Elk Grove Village school bike safety	Elk Grove Village	Maura Condon					
Wood Dale school bike safety	Wood Dale	Sgt Stout		go into schools every year, teach safety			700
Wilmette school bike safety	Wilmette	Wilmette Police Dept		2nd graders right now, want to increase			
Thornton school bike safety	Thornton	Max Salmon	708-877-4456	police go in, every 2 years or so. Max is the Chairman of Planning & Transportation			
Youth Safety- school ped							
Schaumberg school ped safety	Schaumberg	Officer Zwirowski	847-882-3534	safe walking/crossing the street, traffic lights			
Naperville school ped safety	Naperville	Naperville Police Dept		teaching ped safety to pre-school and elementary children			
CBF Safe Routes to School Program (bike and ped)	Chicago	CBF	312-427-3325	train students, parents, and teachers about the benefits of walking & cycling			
Youth Safety- park or day camp							
Buffalo Grove Park District Safety Town	Buffalo Grove			bike rodeo, bike safety			
Safety Village- Highland Park Park District	Highland Park	Kathy Donahue		2 wk curriculum- one in summer, one in fall			
Safety Village - Lemont	Lemont	Officer Jack Bluis	630-257-5877	mini walking area, stop signs- teaches safety to kids- just opened- built through donations- land donated by NWRD (metro sanitary)- business			
Cycling Voyagers	Chicago	Andrew Dortsch				50 kids	
Itasca Boy Scouts/Police Dept bike rodeo	Itasca	Mike Shrader	630-773-1004				
"Safety Town"	Schaumburg						

MDBAs Day Camp Bicycle Safety Presentations	Chicago	Eve Jennings	312-427-3325	educate kids about bike safety, encourage, Chicago	roughly 25 parks across	
Elk Grove Safety Village	Elk Grove	Maura Condon				
Youth Safety- bike rodeo						
Bike rodeo (2 a year)	Arlington Heights					
Bike rodeo (2 a year)	Buffalo Grove	Steve Husak	847-808-2632			around 150 each
Bike rodeo (end of May, early June)	Oak Park	Sean O'Shay	708-358-5577			
Bike rodeo	Brookfield	Cathy Edwards		hosted in conjunction with St Farm Insurance		
MDBAs	Chicago	Eve Jennings	312-427-3325			
Bike rodeo	Beecher	Tim Mitchell	708-946-2341	takes place 1st or 2nd weekend of May		100
Bike rodeo	Chicago Heights	John Cresentki	756-6400	parking lot of rec center		
Bike rodeo	Stickney	Sgt Gary Dunoh	788-2131	gave away helmets	badge program	100
Bike rodeo	Mundelein	police dept		annual- helmets, bike safety checks		
Bike rodeo	Country Club Hills	Brian Sullivan-park district	708-799-8171	rodeo/inspection/helmets- takes place in Heritage Plaza	police dept/park district	
Bike rodeo	Schaumberg	Sandy Olson	847-348-7274	rodeo/bike registration/education- officers heavily involved		3 a year-500 kids total
Bike rodeo	Chicago Ridge	Eugene Siegel	708-425-7700			
Bike rodeo	Crestwood	Officer Thomas Scully	708-371-4800	usually done in school parking lot		50
Bike rodeo(s)	Streamwood	Streamwood Police Dept		several over the summer- bike inspection/safety talk/rodeo		400
Bike rodeo	Steger	Sgt Rossi	708-755-0220			
Bike rodeo	Wood Dale	Sgt Stout		rodeo/presentation/giveaways	donation from Chamber of Commerce	120
Youth Safety- officer friendly						
Bike With A Cop	Buffalo Grove	Steve Husak	847-808-2632	bike safety from officers. Ride around bike path woth officers		
Coupon Hand-Outs	Highland Park	Debbie	847/926-1123	police hand out redeemable coupons to kids exhibiting good bike safety		
Helmet Coupon Program	Grayslake	Kirk Smith		police give out $15 off coupons for bike helmets (2 participating stores)		
"Lunch With A Cop"	Chicago Ridge	Eugene Siegel	708-425-7700	bike safety tends to be a strong element in the Lunch with a Cop program		
Lombard Police Bicycle Safety Fair	Lombard					
DuPage County Sheriff's Safety Saturday	DuPage County					
"Operation Cool" certificates	Wood Dale	Sgt Stout		police hand out certificates to kids, redeemable for a free slurpy		

Youth Safety- crossing guard						
School crossing guard	Naperville					
Youth Safety- publication						
Kids on Bikes in Chicago	Chicago- Chi Bike Fed		312-427-3325		IDOT, Division of Traffic Safety	
Kids on Bikes in Illinois	Chicago- Chi Bike Fed		312-427-3325		IDOT, Division of Traffic Safety	
Youth Safety- other						
Cook County Hospital's helmet safety program		Sue Avila				
"Books and Bikes"- part of Bike Month Chicago	Chicago	Eve Jennings	312-427-3325	story time followed by bike safety presentation by MDBAs		
Youth Encouragement- low income bike						
Joliet bicycle club bike and helmet distribution	Joliet	Bob Kehoe	815-436-7701	club uses ride proceeds to donate bikes & helmets to 25 underprivileged kids	Joliet Bicycle Club	25
Urban Bikes work for parts program	Chicago	Tim Herlihey				10-May
Blackstone Bicycle Works work for parts program	Chicago					
XXX-Racing Team Clif Bar Juniors Program	Chicago	Vince Kamholtz Roberts		promotes recreational and transportation cycling to disadvantaged youth		
Trips for Kids	South Elgin	Laura Andersen		promotes outdoor rec & cycling to kids		
Youth Encouragement- walk to school day						
Walk to School Day	Hinsdale	Elizabeth Barrow		5 different schools involved		
Walk-to-school day	Naperville	Carmen Carruthers	630-305-5315			
Walk to school day	Berwyn	Mrs Kay Otter	708-795-2322			
Walk to school day	Clarendon Hills	Mrs Maryann Romanelli	630-323-0868	Prospect and Walker Schools		
Walk to school day	Melrose Park	Marisol Migilore				
Walk to school day	Shorewood	Junne Ulbrich	815-725-6210	Troy Crossroads School		
Walk to school day	Buffalo Grove	Dr Peter King	847-459-0022	Ivy Hall, Kildeer #96		
Walk to school day	Elmhurst	Ms Meg Sullivan	630-832-8065			
Walk to school day	LaGrange	Sara Adducci	708-579-5452	Ogden Ave School 102		
Walk to school day	Oak Park	Tracy Alesky	708-358-5494			
Walk to school day	Wheaton	Barb Williams	630-682-2080			

Walk to school day	Chicago			Hurley, Eberhart, Marquette, Morrill Elementary Schools		
Walk to school day	Evergreen Park	Beth Donahue	708-424-5816	8 different schools participating		
Walk to school day	Park Ridge					
Youth Encouragement-publications						
Chicago Kids Want To Walk and Bicycle To School	Chicago	Dave Glowacz	312-427-3325	encourages biking/walking to school/promotes CBF program	IDOT, Division of Traffic Safety	
Adult Safety- Bike Ed						
Folks on Spokes Road I class	Park Forest	Al Sturges	708-481-3429	course dealing with safety on roads and trails	free for members- $35 for non-members	
CCC & EBC "safety awareness / bike handling skills ride	Chicago & Evanston	Jim Kreps	312-960-8376			
CBF's Bike School's Handling & Traffic Cycling Class	Chicago	Dave Glowacz				10
Rehabiliatation Institute of Chicago's Think First Program	Chicago	Heidi Schneider	312/238-4995			
MDBA's Lakefront Path Education	Chicago	Eve Jennings	312-427-3325	educate folks about staying safe on the Lakefront Path		
Adult Safety-Publications/other media						
Safe Bicycling in Chicago	Chicago	Dave Glowacz	312-427-3325		IDOT	
Safe Bicycling in Illinois	Chicago	Dave Glowacz	312-427-3325		IDOT	
Passing Other Bikers	Chicago	Dave Glowacz	312-427-3325			
Bike Riders: Want Respect? Give Respect!	Chicago	Dave Glowacz	312-427-3325		IDOT	
Locking Your Bike	Chicago	Dave Glowacz	312-427-3325		IDOT	
Using the Bike Lane	Chicago	Dave Glowacz	312-427-3325		IDOT	
Bicycling in Oak Park (TV Channel 6)	Oak Park			local cable bicycle safety show		
The Wilmette "Communicator"-Bicycle Task Force Component	Wilmette	Nancy Chouffer	847-251-4840	village paper, someone on taskforce writes cycling safety-pertinent article every issue		
Illinois Bicycle Laws (reprint by LIB)	Chicagoland	Ed Barsotti	630-978-0583	excerpts from the Illinois Vehicle Code	printing by SRAM	
Adult Encouragement-Maintenance						
Cycling Sisters (more than maintenance)	Chicago	Gin Kilgore		maintenance, workshops, events for women cyclists		60-100
CBF Bike School's Bike Repair for Dummies	Chicago	Dave Glowacz				
Windy City Cycling	Chicago	Jefferson		maintenance- flats, adjusting brakes, gears, etc		50

Club Bike Academy		McCarley			
Adult Encouragement-commuter encouragement					
Car-free trail-riding	Chicagoland area	Eric Anderson	773-342-1493	grassroots program: organizes off-road rides using CTA, Metra, PACE	
CTA's Bikes on Trains/Buses Program (Bike & Ride)	Chicago				
Metra pilot bikes on trains program					
Commuter Bicycle Lockers	Naperville		630-420-6059	commuter bike lockers at the Rt 59 station (deposit and annual fee)	
CBF Bike School's Biking to Work or School class	Chicago	Dave Glowacz			300
Wicker Park Bike Pool	Chicago	John Greenfield		daily bike to work ride	
Adult Encouragement-events					
Bike Winter	Chicago			events/rides over the winter months	
Bike Chicago incl Bike to Work Day Rally	Chicago				
Arlington Heights bike month, bike commuter appreciation day	Arlington Heights				
Skokie Traffic Safety Commission Bike Safety Day	Skokie			bike rodeo, general bike safety	Skokie Park District/Police Dept
Adult Enc.- health based walk or bike					
Walking group	Oak Park	Katherine MacNamara	708-358-5484		
Walking club	South Holland			once a week walk for health	20
Annual Chicago Heights bike tour	Chicago Heights	Dominic Candeloro		15 mile bike tour of city with police officers	150
High Steppers walking club	Park Forest	John Joyce			
Mundelein Mainstreet family bike ride	Mundelein	John Maguire	847-970-9235	ride, bike safety checks, helmet use	
"Meet the community" coffee and walk (annual)	Lynwood				
Tour Von Schaumberg	Schaumberg			bike ride with Mayor Larson	
Harper School ride	Wilmette	Nancy Chouffer	847-853-7621	ride between schools-parents/kids/etc	
Adult Encouragement-publications/media					
CTA Bike & Ride	Chicago			how to use the CTA with your bike	
Chicago Bike Map	Chicago	Nick Jackson	312-427-3325	bike map	IDOT Division of Traffic Safety
Chicagoland Bicycle Map	Chicago			bike map	
Buffalo Grove Bike Path Map	Buffalo Grove	Greg Boysen	847-459-2547	bike map	
Woodridge bicycling TV promotion	Woodridge			advertises bike trails, projects	

Woodridge Bicycle Map	Woodridge				
Lemont town website- "Rate the Streets" (proposed)	Lemont				
"The Derailleur"	Chicago	Alex Wilson		official Xine of Critical Mass	
Shop by Bike	Chicago			shopping by bike	CMAQ
Grayslake Greenway Trails Map	Grayslake	Kirk Smith		$8,000	
School walk route map	Naperville				
Schaumburg Bike Map	Schaumburg				
Chicago's Lakefront- A Guide For Everyone	Chicago	Chicago Park District	312-742-PLAY	Lakefront Path Map/Safety Tips	Chi Park District/La Salle Bank Chi Marathon
The Grand Illinois Trail- User Guide	Chicagoland	Ed Barsotti- LIB		user guide to Grand Illinois Trail	
Tricks and Tips for Biking To Work	Chicago	Dave Glowacz	312-427-3325	commuting by bike	CBF
Where Should Bike Racks Be Installed in Chicago?	Chicago	John Greenfield		form for suggesting bike rack locales	
Get More Fun From Your Bike- CBF Bike School	Chicago	Dave Glowacz	312-427-3325	brochure detailing list of safety and encouragement classes offered by CBF	
Biking to Work or School	Chicago	Dave Glowacz	312-427-3325	IDOT Division of Traffic Safety	

Adult Encouragement- Cycling Clubs			
Arlington Heights Bicycle Association	Arlington Heights	Karen Zmrhl	cycling club
Bicycle Club of Lake County	Libertyville	John Serrano	cycling club
Bike Psychos	Oak Lawn	Mario Sprindys	cycling club
Chicago Area Tandem Society	Barrington	Tom Masters	cycling club
Chicago Cycling Club	Chicago	Steve Kramer	cycling club
Elmhurst Cycling Club	Elmhurst	Bob Sack	cycling club
Evanston Cycling Club	Evanston	Beverly Arends	cycling club
Folks on Spokes	Park Forest	Larry Lewis	cycling club
Fox Valley Bicycle Club	St Charles	Julie Szafraniec	cycling club
Joliet Bicycle Club	Joliet	Bob Kehoe	cycling club
McHenry Co. Bicycle Club	Crystal Lake	Richard Homan	cycling club
Mount Prospect Bike Club	Mount Prospect	Dan Currier	cycling club
Naperville Bicycle Club	Naperville	Kent Weber	cycling club
Oak Park Cycle Club	Oak Park	Alba Alexander	cycling club
Schaumburg Bicycle Club	Schaumburg	Bob Estrada	cycling club
Wheeling Wheelmen	Wheeling	Rich Drapeau	cycling club
Windy City Cycle Club	Chicago		Primarily gay and lesbian cycling club
XXX-Racing Team Athletico	Chicago	Randy Warren	

Adult Encouragement- other			
MDBA's Shop by Bike	Chicago		

campaign					
CBF Student Marketing Campaign	Chicago			outreach at colleges and universities across the region	
Windy City CC Mtn Biking Skills; Track Skills Clinic Class I and II; Winter Bike Skills Clinic	Chicago	Jefferson McCarley		mtn biking 101, off and on trail training; evening clinic about velodrome riding; how to prepare for winter riding	Primarily gay and lesbian cycling club
Circle Cycling Club	Chicago- UIC	Chris Gagnon		promotes cycling at UIC	
Working Bikes Cooperative	www.workingbikes.org			Since 2001, Working Bikes Cooperative shipped thousands of bicycles to Africa, Central America, and the Caribbean and gifted hundreds of bikes locally to Chicago individuals and groups.	
Motorist Sensitivity- taxi driver training					
Share the Road mod. of Har Wash. Coll. taxi-driver training	Chicago				
Motorist Sensitivity- bus driver traning					
Share the Road module of CTAs bus-driver training	Chicago	CTA			
Motorist Sensitivity- HS Driver's Ed					
CBF Sharing the Road with Bike Riders class	Chicago	Dave Glowacz			
Motorist Sensitivity- Outreach					
MDBAs motorist campaign	Chicago	Eve Jennings	312-427-3325	educate motorists to share road w/ cyclists, incl bike lane and community tours	
Motorist Sensitivity- Publications					
Tips for Motorists	Chicago			sharing the road with bike riders	IDOT
This Is Not A Parking Spot	Chicago			don't park in bike lanes	
Bike Lanes: FAQ	Chicago			bike lanes- general info	
Bike Rules of the Road		217-785-0440			
Enforcement- ticket cyclists for safety					
Sheridan Rd/Ardmore	Chicago	Sgt Sacks		ticketing bicyclists for riding on sidewalk	
Skokie youth helmet ordinance	Skokie	James Cox	(847) 933-8447	kids must wear helmets	
Schaumberg bicycle safety patrol program	Schaumberg	Sandy Olson	847-348-7274	police give "violations" to unsafe riders- usually verbal warnings	
Naperville Bicycle License Ordinance	Naperville	Naperville Police		$1.00 bicycle license every 3 years- helps police to recover stolen bikes	

Enforcement- ticket peds for safety		
Enforcement- ticket motorists for ped issues		
Enforcement- ticket motorists for bike issues		
Chicago Dept of Revenue's parking enforcement aides	Chicago	Savi Simmons
Chicago Police Dept	Chicago	Tom Kuroski
Enforcement- neighborhood speed enforcement		
Enforcement- publications		