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.

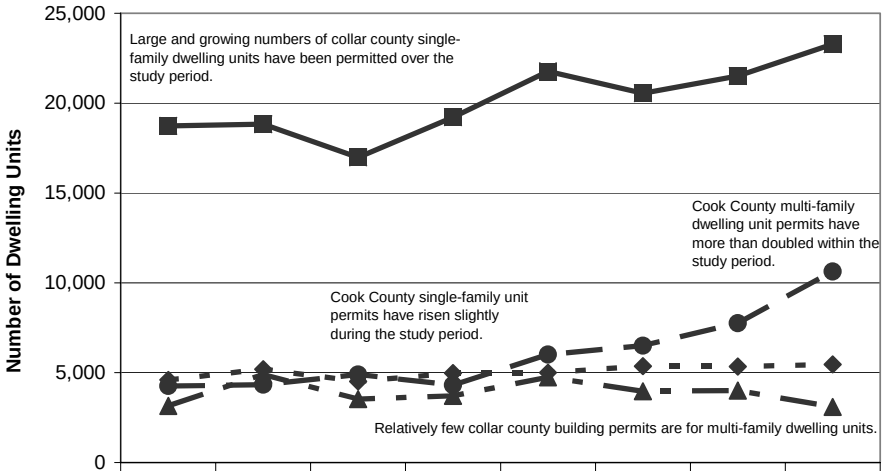
Table 18
Percent of Six-County Population in Each County, Northeastern Illinois, 1987-1997

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]

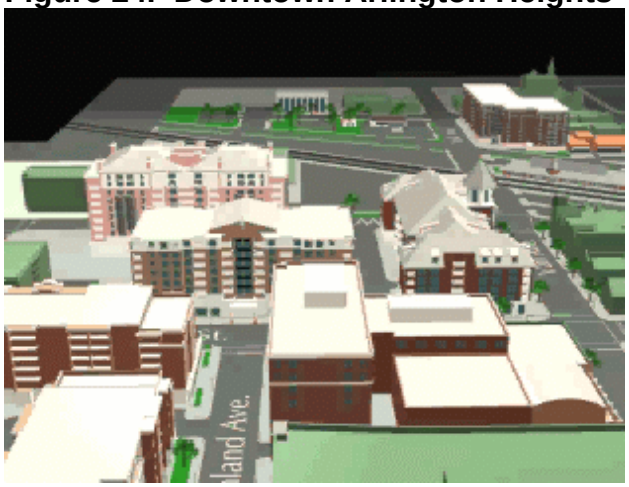
The efforts have led to such

[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

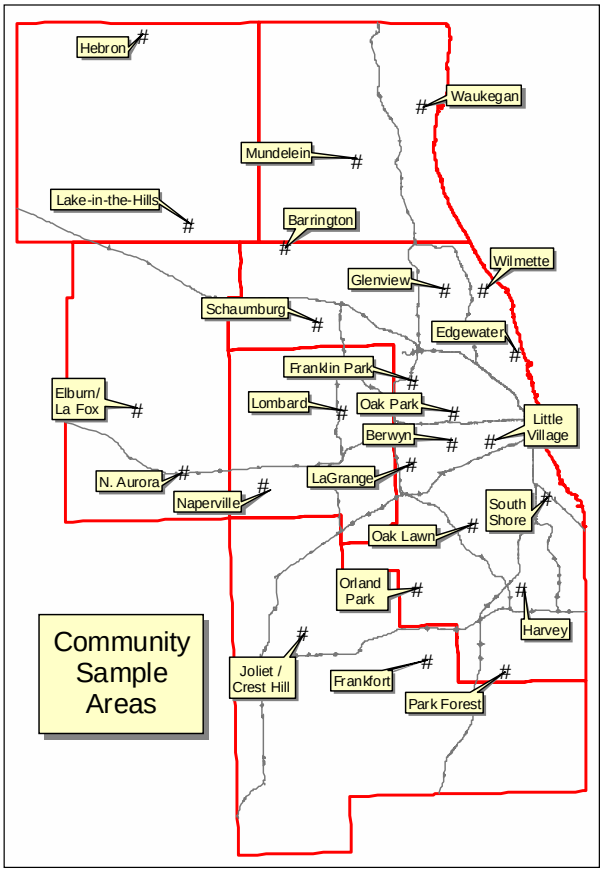
[98] Landis, Bruce W. "Real-Time Human Perceptions: Toward a Bicycle Level of Service" *Transportation Research Record 1578*, Transportation Research Board, Washington DC 1997. [Included in Appendix D]
[99] Landis, Bruce W. "Modeling the Roadside Walking Environment: A Pedestrian Level of Service" in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

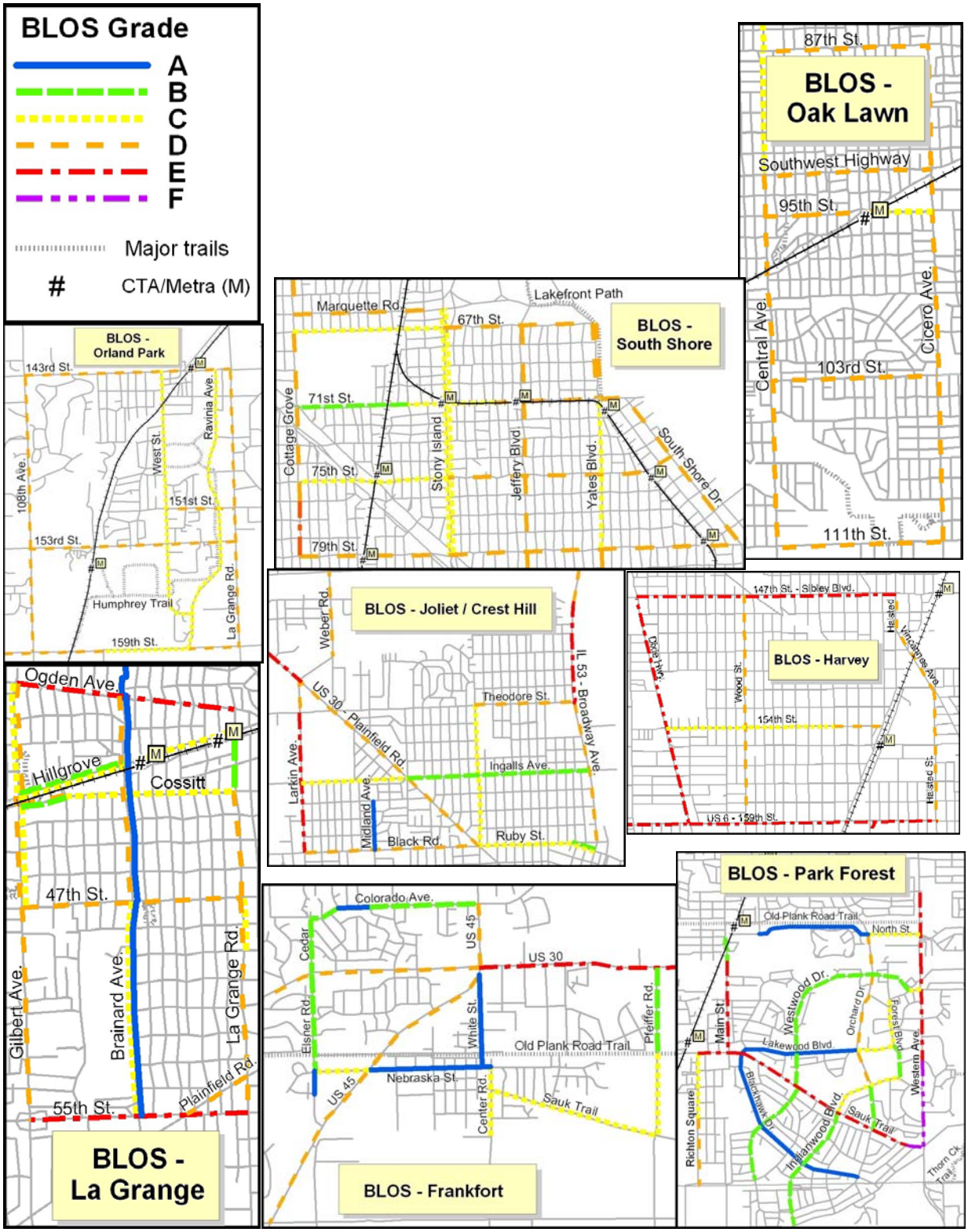


Figure 27
BLOS Community Sample Maps for Glenview, Wilmette, Franklin Park, Chicago Edgewater, Berwyn, Oak Park, Lombard, and Chicago Little Village

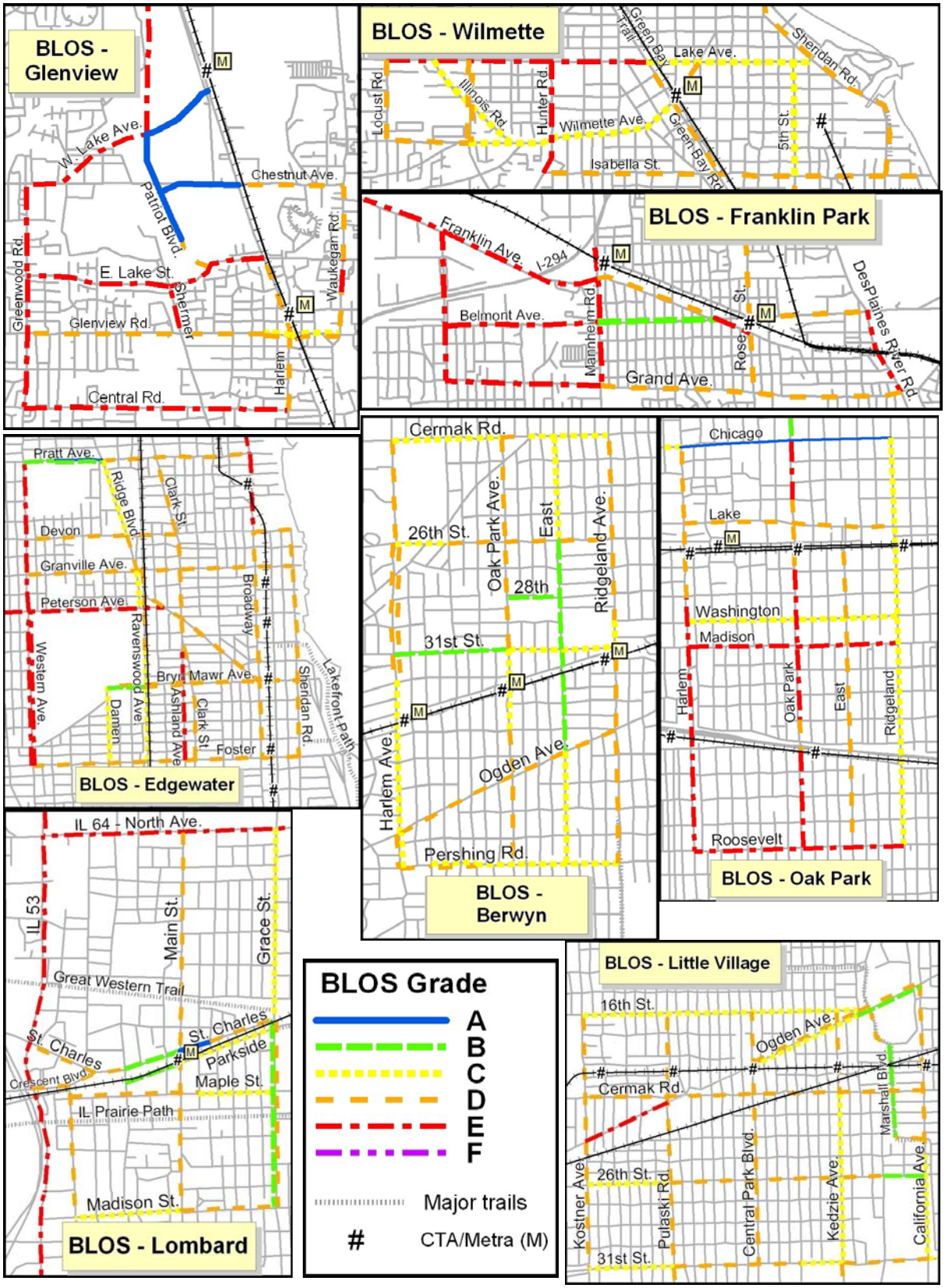


Figure 28
BLOS Community Sample Maps for Hebron, Waukegan, Lake in the Hills, Mundelein, Elburn, North Aurora/Aurora, Barrington, Schaumburg, Naperville

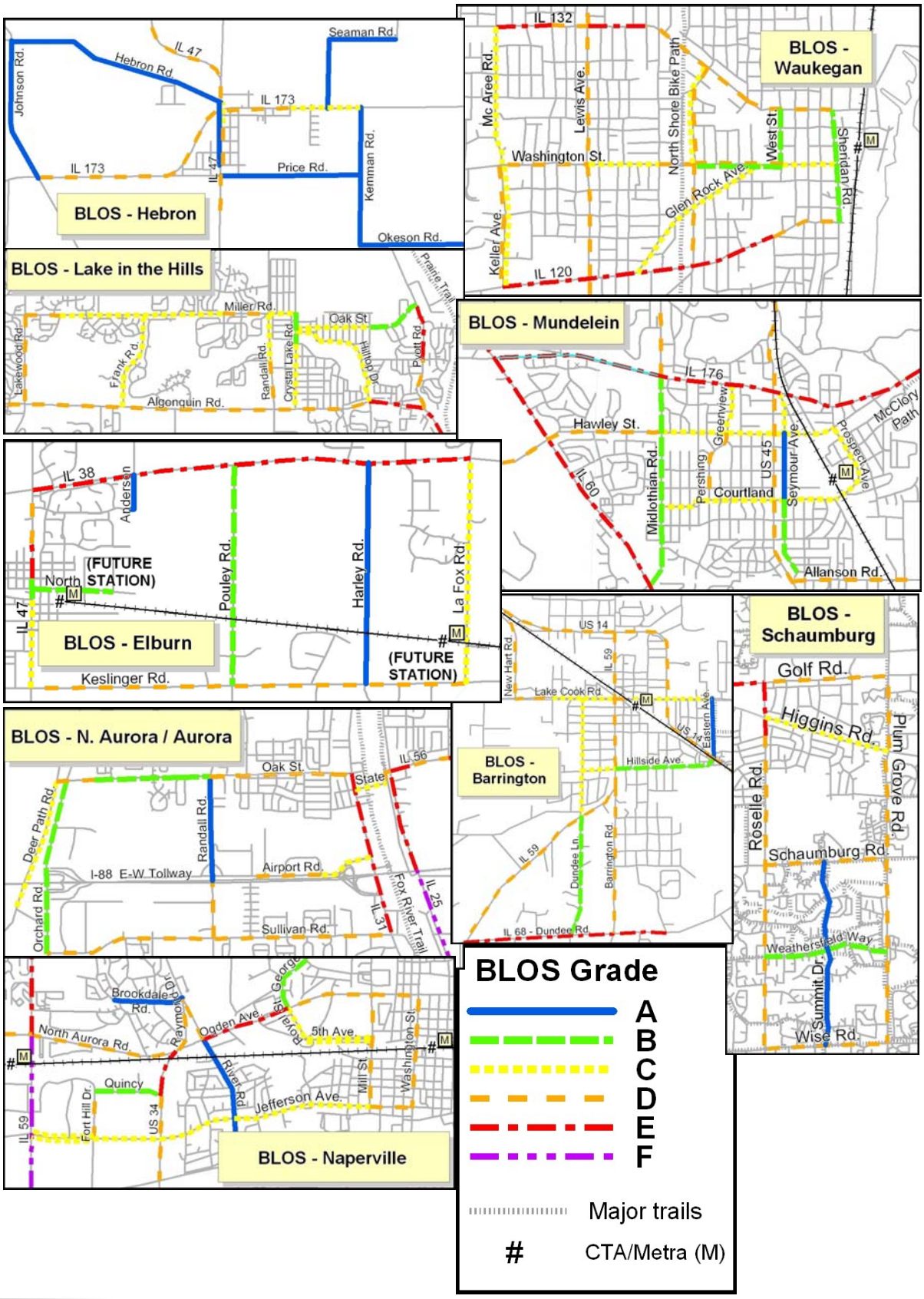
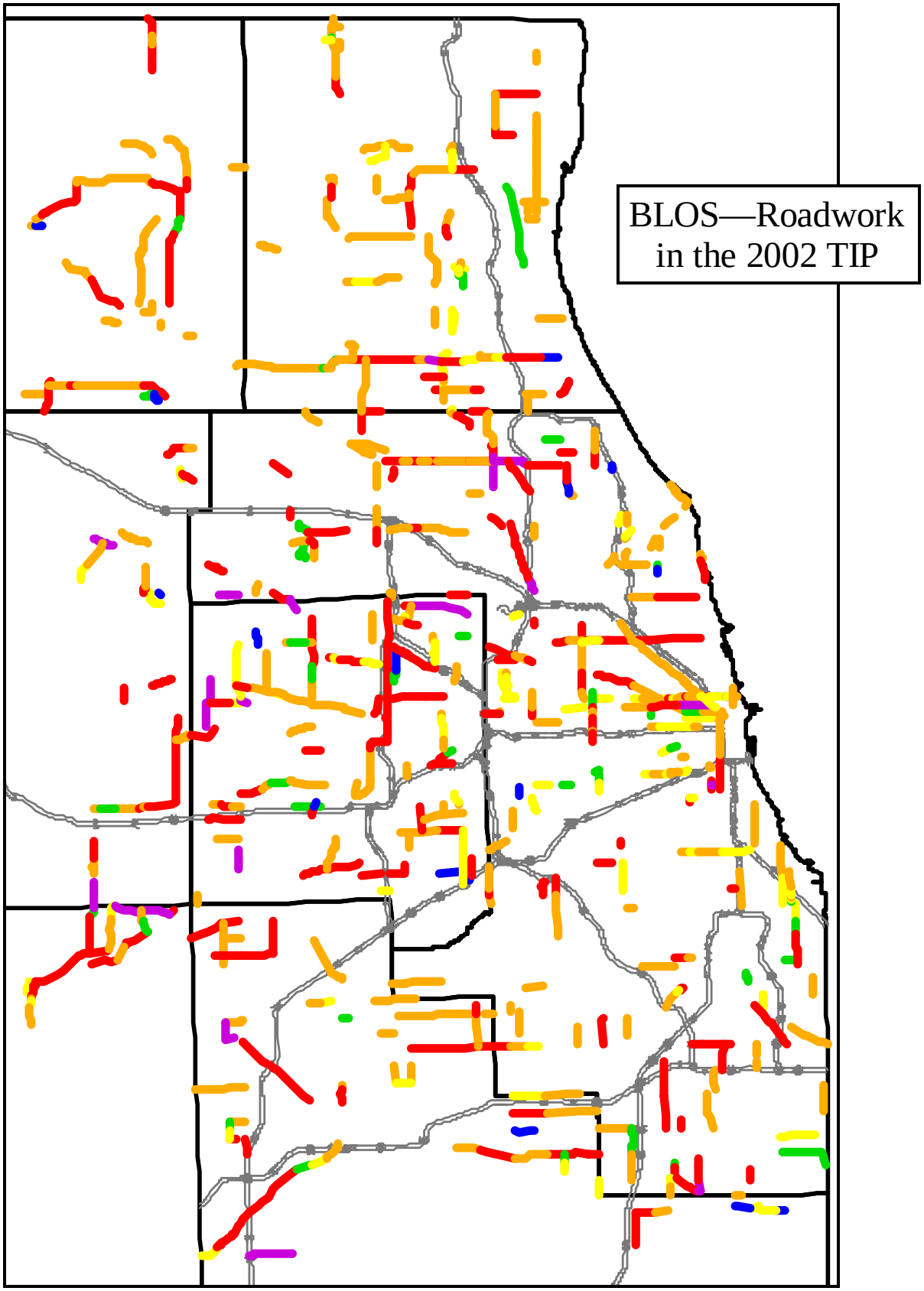


Figure 29
BLOS Regionwide Map of Roads Listed in
CATS' FY 2002-2006 Transportation Improvement Program (TIP)



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

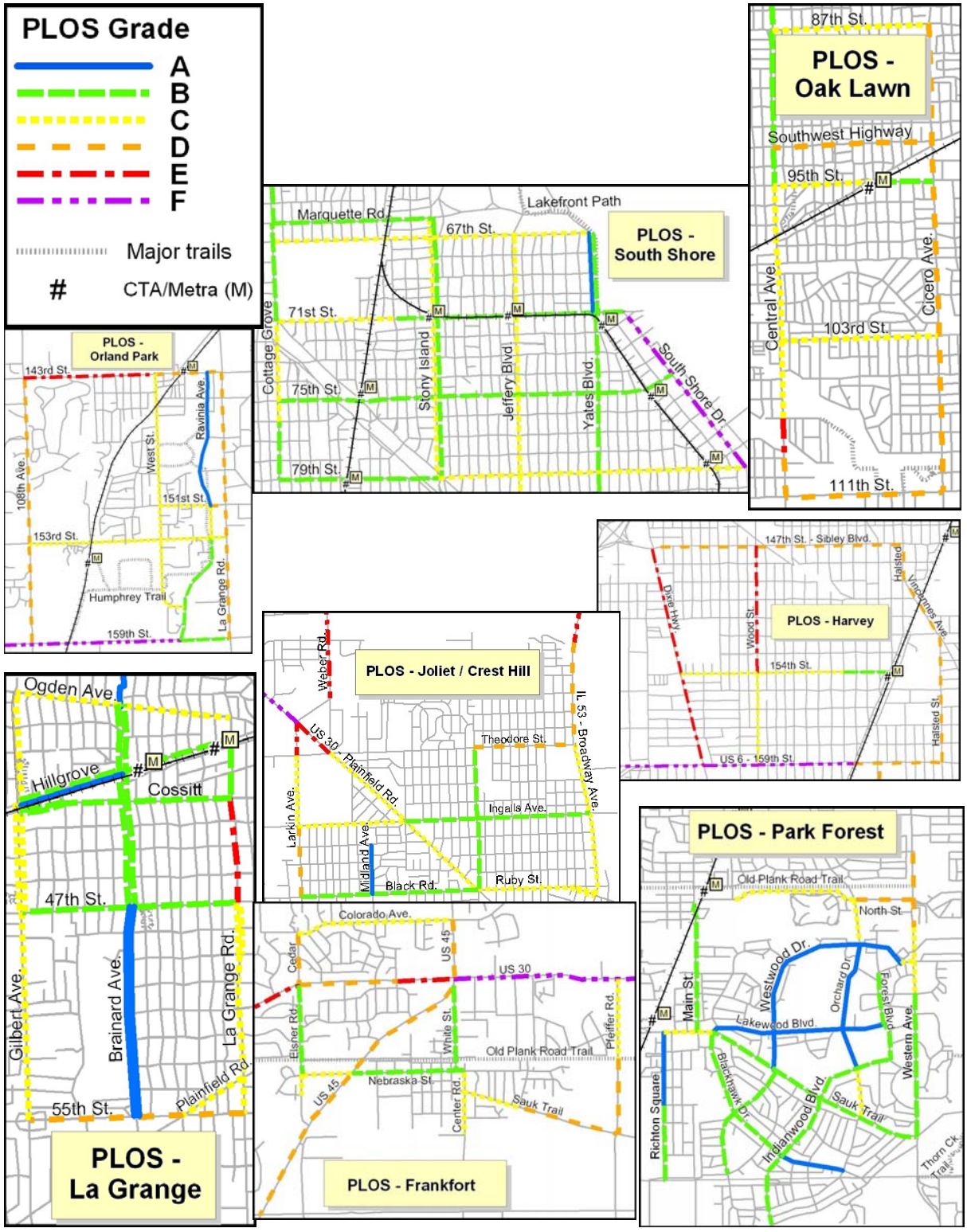


Figure 31
PLOS Community Sample Maps for Glenview, Wilmette, Franklin Park, Chicago Edgewater, Berwyn, Oak Park, Lombard, and Chicago Little Village

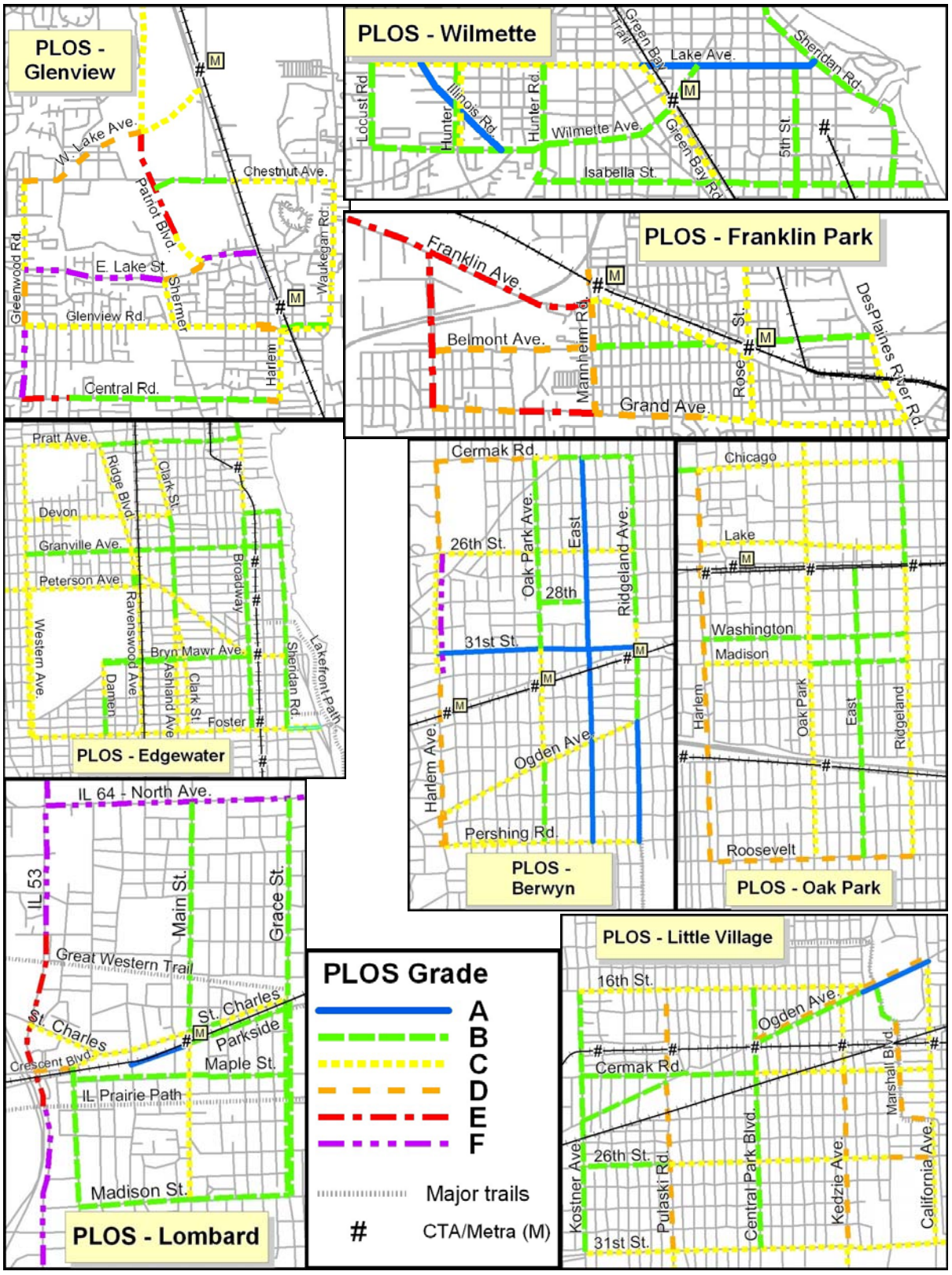


Figure 32
PLOS Community Sample Maps for Hebron, Waukegan, Lake in the Hills, Mundelein, Elburn, North Aurora/Aurora, Barrington, Schaumburg, Naperville

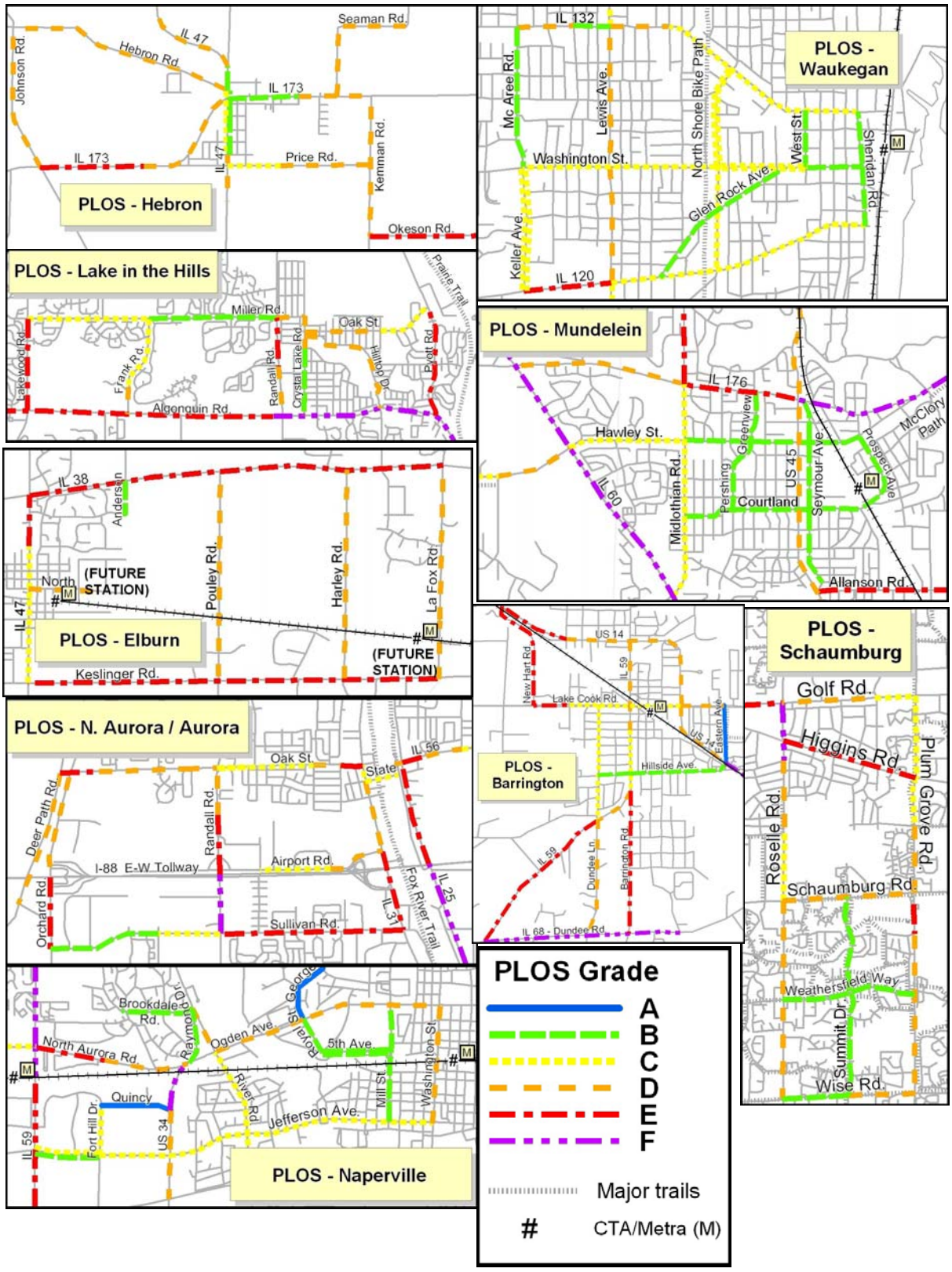
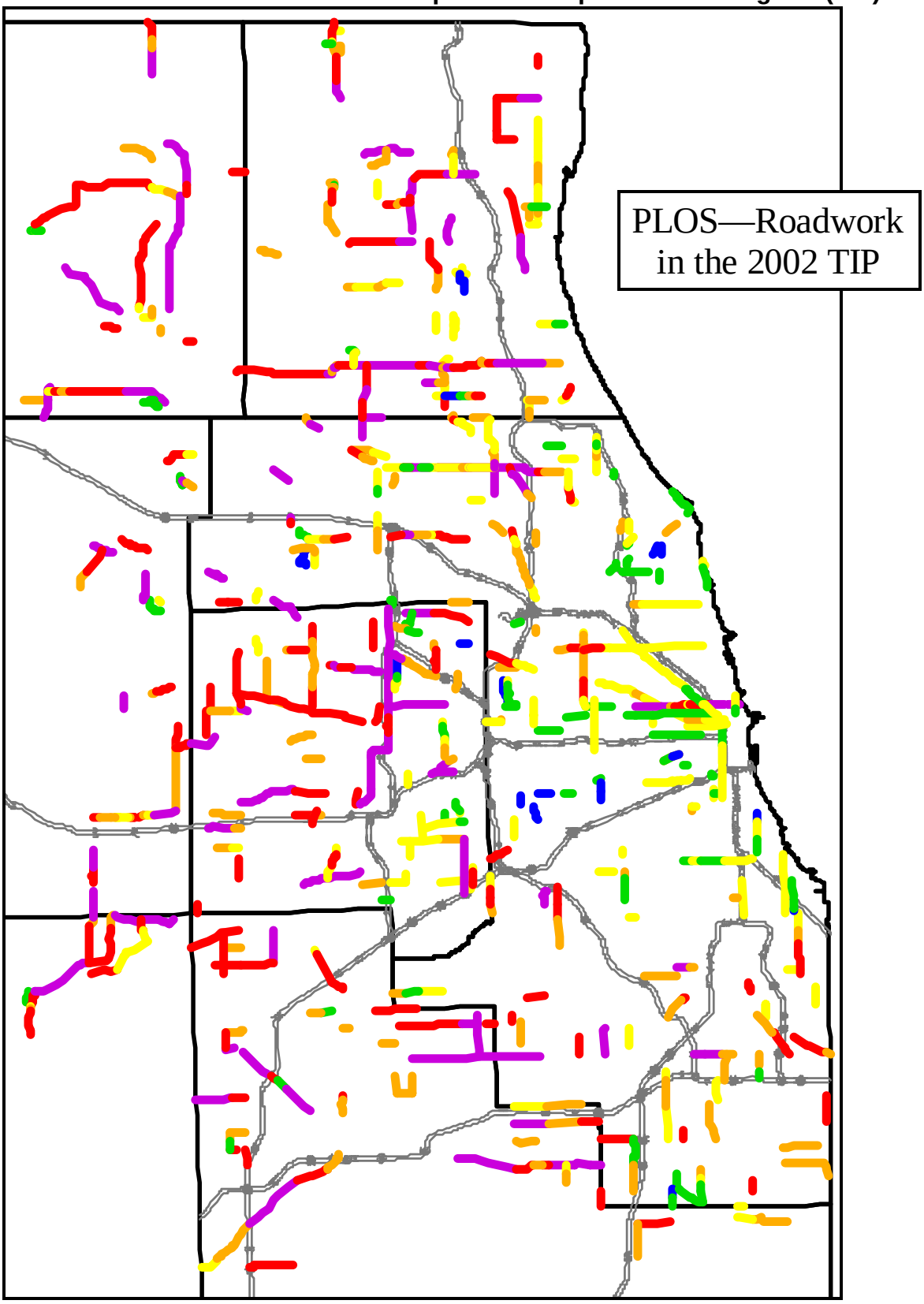


Figure 33
PLOS Regionwide Map of Roads Listed in
CATS' FY 2002-2006 Transportation Improvement Program (TIP)



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.

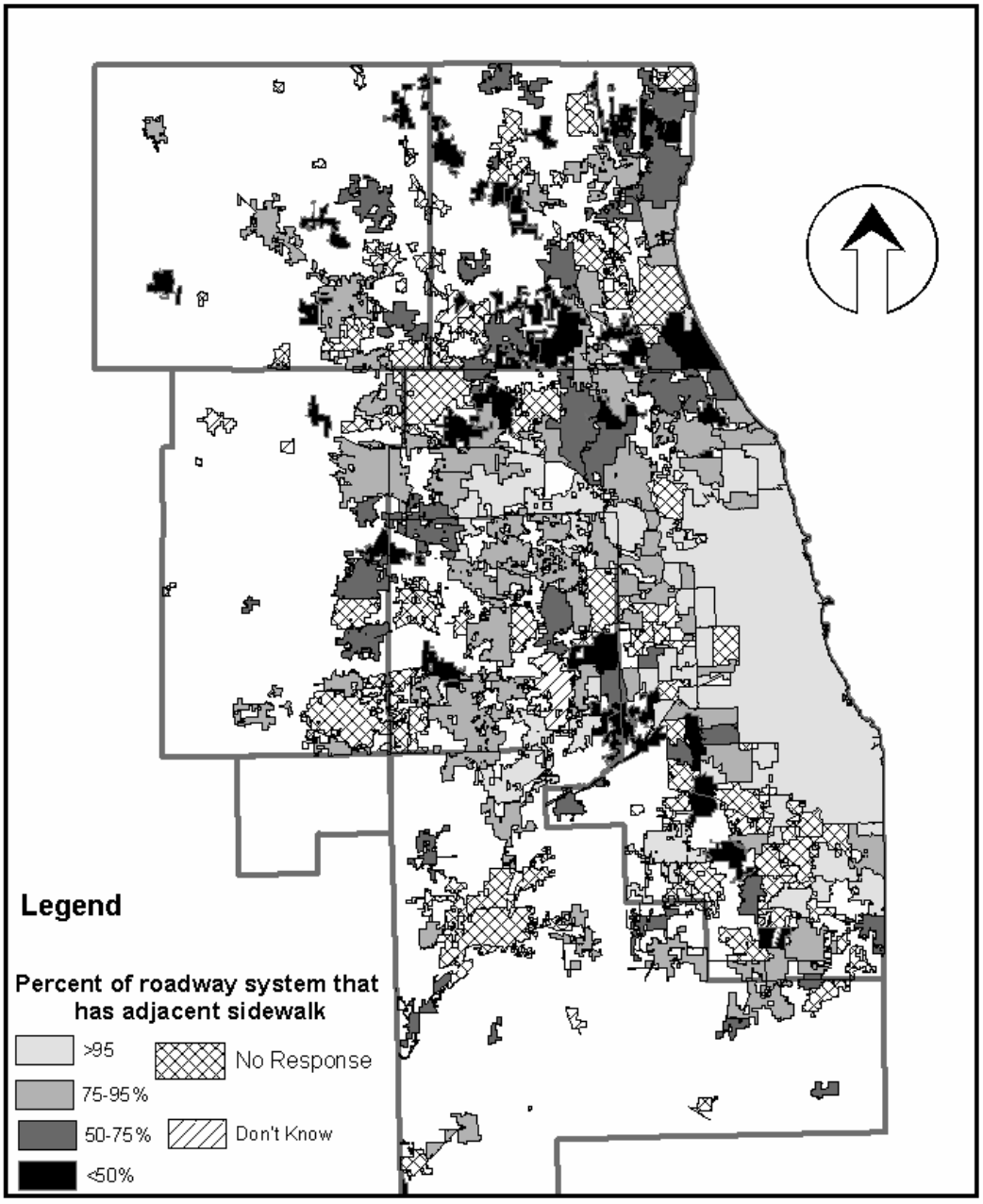
[103] The survey was conducted in the summer of 2002, with two follow-up exercises. All municipalities were surveyed. The response rate was 70%.

[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

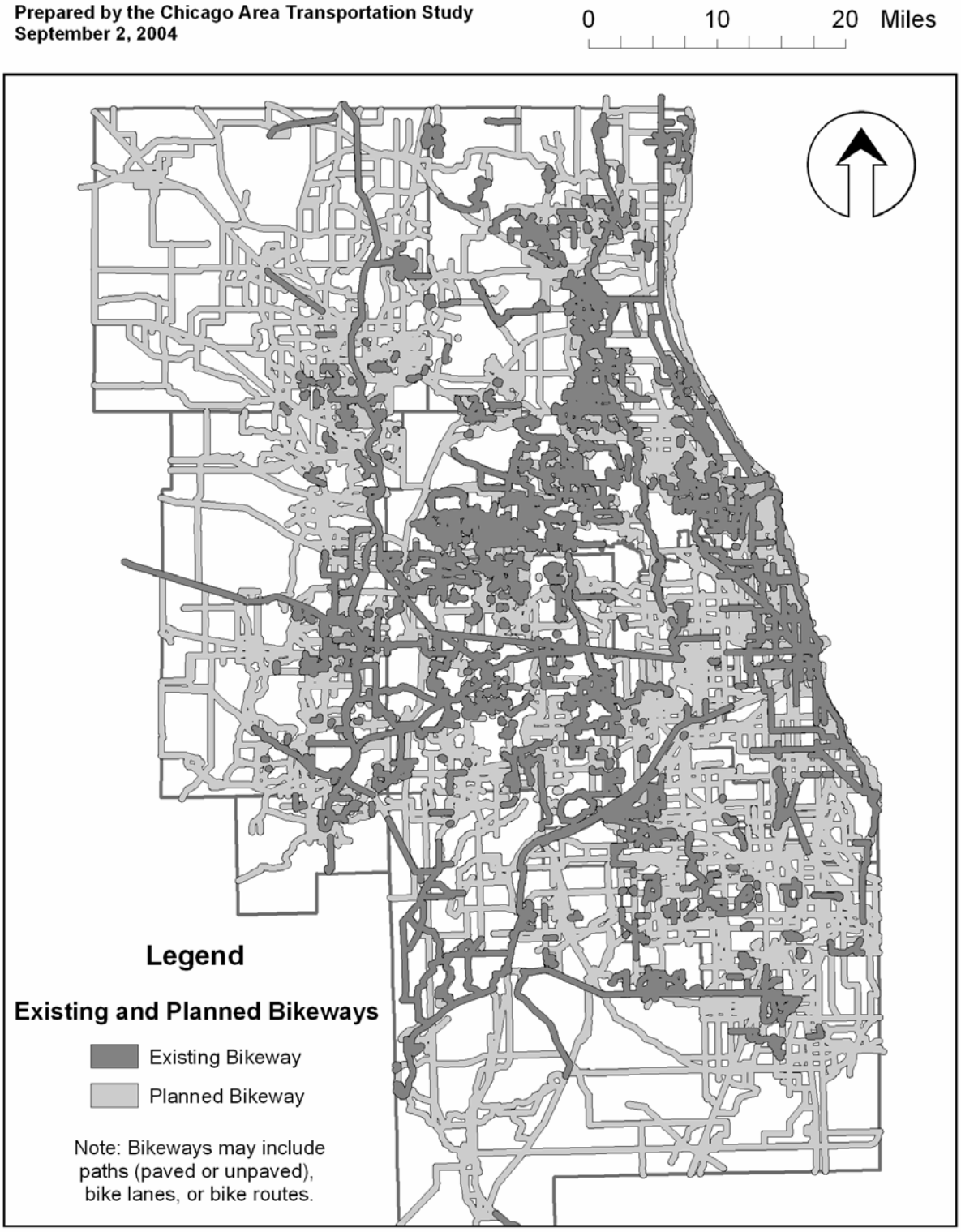


Figure 35 shows the extensive network of existing and planned bicycle facilities in the BIS.

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.

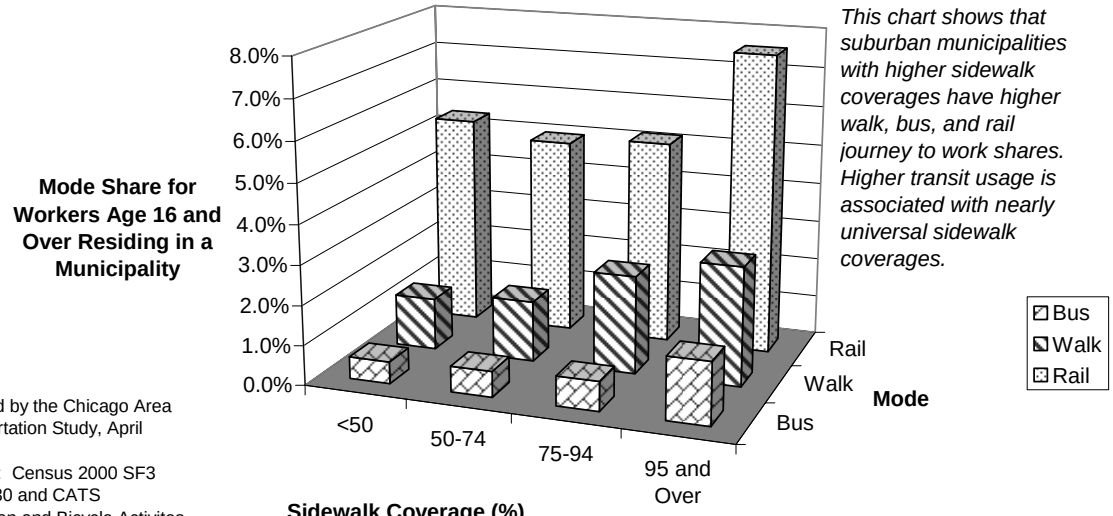
Figure 36 shows the relationship between sidewalk coverage (the percent of streets with an adjacent sidewalk) and work-trip mode shares for rail, walking, and bicycling for suburban municipalities. The chart shows that the higher the sidewalk coverage, the higher the walk-trip mode share. For transit, 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.

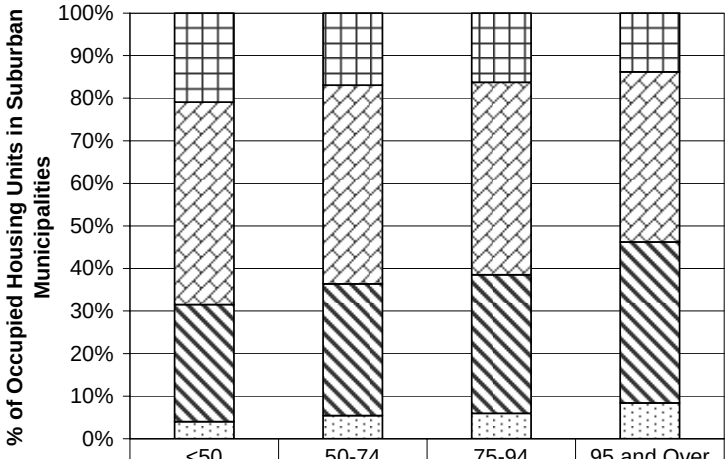


Prepared by the Chicago Area Transportation Study, April 2003.
Sources: Census 2000 SF3 Table P30 and CATS Pedestrian and Bicycle Activites Survey

	<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.