

Developing
Sustainable,
Competitive Cities
One Bike Lane
at a Time



An Analysis of the Chicago Bikeway System

BY ERIC HANSS

Introduction

City planners and theorists in the twentieth century have substantially re-envisioned the American urban landscape and the forces at play within and over it. From the rural utopias of Ebenezer Howard's Garden Cities to Daniel Burnham's City Beautiful movement and Le Corbusier's plan for the Radiant City, new visions and theories of the built environment and urbanism have altered the plan and design of cities new and old. While the historical and intellectual contexts of these theoretical plans cannot be ignored (Hall 2002, 5), these urban visions possess an allegorical power independent of the historical and social contexts in which they were first articulated. New perspectives on urban land use are adopted and implemented by planners, politicians, boosters, grass-roots organizations, critics, radicals, and concerned citizens alike. They are celebrated and despised at the time of their creation and invariably rediscovered, renewed, and reworked decades later. The urban landscape is not reshaped and re-engineered solely by shifts in national and global economic systems, financial and real estate markets, and federal subsidies. Land use in the city is contested by a wide field of stakeholders and subject to different aspirations, fantasies, and possible futures. Jane

Jacobs, one of the most important American planning theorists of the twentieth century, posited: "Private investment shapes cities, but social ideas (and laws) shape private investment." (Jacobs 1992, 313) The urban landscape is not simply an abstract plane over which political economy runs its course, it is also produced by the interactions between forces of development and allegories of urban life and city planning.

Cities have been seen from wildly different perspectives throughout American history, from the virtuous puritan commune of John Winthrop's City upon a Hill to the slum as the locus of decay and violence. Over the course of the twentieth century a pessimistic view of urban life would provoke a movement to reconceive cities. Planners and policy-makers proposed regional plans, satellite garden cities, and gutted and renewed urban cores to remake the urban landscape. These strategies were seen as solutions to illogical slums, congestion, and unlivable densities.

Today, however, we have a very different ideal of the livable urban landscape. The traumatic effects of eminent domain, the restructuring of cities and neighborhoods in the intense period of urban renewal from the 1950s through the 1960s, and white flight from urban battlegrounds have disappeared. In their place has emerged an overwhelming enthusiasm for the master-planned entertainment and consumption-oriented city in which "creativity has become the principal driving force in the growth and development of cities, regions, and nations." (Florida 2005, 1) Density and mixed-use zoning, once frowned upon, are now seen as the keys to prosperity and vitality. The city, maligned as a smoke-filled industrial wasteland or feared as the source of racist crime and violence, has been recast as the solution to economic problems. It is both a Petri dish for business and high-tech innovation, the site of cultural creativity, and the path to environmental sustainability. The "urban imaginary," based on contemporary patterns of use and a "set of meanings about cities that arise in a specific historical time and cultural space," (Zukin 1998, 629) has a strong influence on how local policy and planning decisions are made. I seek to explore the effect of urban planning on the implementation of bikeways across cities, taking Chicago as my case study.

Under the administrations of Richard J. Daley (1955–1976) and Richard M. Daley (1989–2011), Chicago has worked at remaking its economy and image through the adoption of new urban visions. Following suburbanization in the 1950s, the Loop—the city’s commercial and retail center—began to decrease in importance. Peripheral shopping centers displaced downtown department stores, and satellite office parks competed with more expensive urban skyscrapers for national corporate headquarters. Richard J. Daley’s 1958 *Development Plan for the Central Area of Chicago* and the 1973 *Chicago 21: A Plan for the Central Area Communities* responded to these threats:

The importance of the city’s central area lies in its continuing ability to play a major role in providing business leadership, employment, recreational and cultural facilities, a major shopping area, and residential opportunities... the bright future of the central area and its surrounding communities depends only upon the strength of our commitment—public and private. (*Chicago 21* 1973, iii)

Daley’s plan conceived of the central business district as the city’s heart and nerve center and “the nucleus of growth for Chicago and an ideal environment for culture, education and commerce to flourish.” (*Chicago 21* 1973, 69) New transit hubs, the redevelopment of the South Loop train yards into a residential high-rise community, new pedestrian environments, historic preservation, and environmental improvements were all put in motion by *Chicago 21*. The plan also posited mixed use as key to revitalization: “Future urban form should be more heterogeneous and complex. Residence, work, recreation, goods, and services should be brought closer together.” (*Chicago 21* 1973, 10)

Richard M. Daley, increasingly aware of interurban competition, continued these strategies and spread them across the city as a whole. Since the development of Theater Row in the Loop in the 1990s, Chicago has embarked on initiatives, projects, and master plans to better situate

itself as a world city. As part of a wider program to bring audiences and investment downtown, the city established Randolph Street as the Broadway of the Midwest, offering relocation and development subsidies to the Goodman Theater (\$18.8 million) and the Palace Theater (\$17.6 million) from North Loop Tax Increment Financing district funds. ("More the Merrier on Theatre Row" July 17, 1997) The 1997 announcement of Millennium Park, to be built over the Illinois Central Railroad, further emphasized Chicago's intention to transform the Loop into a spectacular downtown destination for tourists and residents alike; Millennium Park cost \$450 million, with \$270 million covered by Chicago and its taxpayers. (Cohen July 18, 2004) The Mayor's Office of Special Events (now part of the Chicago Department of Cultural Affairs and Special Events) expanded arts and culture, such as Taste of Chicago and Lollapalooza, which settled permanently in Chicago in 2005. The Department of Cultural Affairs helps artists find grants, performance and work space, and health insurance through the Chicago Artist Resource; it also advocated for new zoning and districts, such as the Cermak Road Creative Industries District.

Chicago's bid for the 2016 Olympic Games and the *Chicago Climate Action Plan* illustrates a desire to compete with New York, Los Angeles, and San Francisco as a world-class city. While unsuccessful, the 2016 Olympic bid displayed Chicago's athletic and entertainment facilities, restaurants and accommodations, transit system, sustainability, and aesthetic appeal for international evaluation. Richard M. Daley's campaign to make Chicago America's greenest city—one of the programs showcased in the Olympic bid—was the basis for the *Chicago Climate Action Plan*: "Chicago is recognized around the world as a leader in protecting our environment. I'm proud that we acted many years ago, in areas that many cities are just beginning to appreciate today." (*Chicago Climate Action Plan* 2008, 3) For Daley, sustainability includes regional quality-of-life and environmental health and the image of the city as a leader of an international urban competition:

More than 15 years ago, Mayor Richard M. Daley began to

transform Chicago into the most environmentally friendly city in the nation. Today, Chicago is one of the world's greenest and most livable cities.... We lead the way from green roofs to green buildings and policies. We've become the nation's laboratory for studying ways to reduce the "urban heat island" effect. (*Chicago Climate Action Plan 2008*, 1)

Similar to the Olympic bid and environmental initiatives, bike-friendly policies demonstrate Chicago as a progressive and competitive city, with cutting-edge planning: "Our bicycling program has produced more bike parking than any other U.S. city and 165 miles of bikeways." (*Chicago Climate Action Plan 2008*, 1)

Bikeway planning is unique because state governments, metropolitan planning organizations, and municipalities are responsible for a project's implementation, rather than private nonprofit and for-profit developers or public-private partnerships. Special provisions in federal transportation bills fund bikeways and have not been prone to the same cuts as other public planning projects. Beginning with the Intermodal Surface Transportation Efficiency Act of 1991 the amount of money available for bicycle and pedestrian-oriented infrastructure projects from Transportation Enhancements and Congestion Mitigation and Air Quality Improvement (CMAQ) programs has increased dramatically, each new plan exceeding the one before it. (Cradock 2011, 24) While much of this money is allocated over large spatial areas to state transit authorities and metropolitan-planning organizations, CMAQ funds can be distributed directly to local governments such as city administrations, and can be used at their discretion. Bike programs manage to avoid many of the problems of public-private partnerships, namely constraints on long-term flexibility, weakened public participation, and the loss of system-wide planning goals. (Siemiatycki 2010, 46) The programs and infrastructure of Bike 2015 illustrate the direct action of government administrations, such as the City of Chicago, rather than the piecemeal adoption of incentives and tax breaks by private developers. The use of

these funds for local projects, detached from regional goals, results in a high range of spatial variability.

The distribution of these investments can be observed and analyzed geographically, because bike lanes are part of the physical infrastructure. In old, dense cities like Chicago a comprehensive bike-lane network cannot be inserted into the urban fabric; it must be added section by section into the existing public way. Lines cannot be painted onto a street without an engineering survey and possible street-widening measures. Bike lanes are found only where there is political will for their construction.

This study asks if new theories of city planning and urban development influence the distribution of infrastructure. Are plans implemented equitably on the local and neighborhood level? In an environment of limited resources who benefits and who loses out? I argue that bikeways are amenities, and city governments use these amenities to compete for talented residents. Moreover, their status as an amenity results in a unequal spatial distribution of bikeways across the built environment.

Section 1 lays out the central theories of urban competition for talented people. I highlight the increased weight given to consumer and social amenities, livability, and sustainability. I also discuss the growing importance of bikeways, and on-street bike lanes in particular, to new development and planning. Section 2 examines the relationship between competition-focused urban policy and bikeways planning in Chicago from the early 1990s to 2011—in the form of the *Bike 2000* and *Bike 2015* plans. Section 3 analyzes the Chicago bike map's use of symbols and graphic design as a political marketing tool. Section 4 describes the spatial distribution of bike lanes across Chicago. A geostatistical analysis in ArcGIS demonstrates where and how significant bike amenities cluster. The relationship between high concentrations of bike lanes and high concentrations of the "creative class," as defined by Florida and others, completes the findings. Section 5 concludes the study by comparing Chicago and other national and international bikeways projects. In light of the findings in Section 4, it also questions the effects of new urban visions on equitable and truly sustainable implementation of public infrastructure and investment.

1. Envisioning the Revitalized City

New Paradigms for Growth and Amenity-driven Development

Theories of mobile human capital have replaced classic functional theories of urban hierarchy (Walter Christaller's central place theory, Brian Berry's geography of market centers, and Alfred Weber's least-cost theory) in order to explain the changing role of cities. The global flows of jobs, goods, and finance aided by advances in communications technology have reshaped the urban fabric and fortunes of many American cities. Saskia Sassen (2004) and Janet Abu-Lughod (1999) argue that a new class of global cities no longer depends on the production of goods but on innovation, knowledge, and finance as their chief products. Central business districts concentrate the services (such as lawyers, accountants, advertising agencies, and consultants) needed to support these complex operations. Proximity increases productivity by enabling face-to-face meetings and after-work discussions through which decisions are made and information is circulated. (Glaeser 2000, 9) These services depend on a pool of innovative, flexible, and well-educated people that are in-demand and mobile. Sassen and Abu-Lughod argue that firms no longer locate where they find the best tax and land incentives but in places that can attract and retain the best people.

Talented people can more or less pick and choose their cities, due to the demand for their skills. Amenity theorists, such as Edward Glaeser, argue for the importance of four urban amenities on location decisions: variety of consumer goods and services such as restaurants and theaters, physical setting and architectural aesthetics, public services like good schools, and transportation speed. Richard Florida's "creative class" theory has deeply influenced local and federal urban policy: "creativity has become *the* principal driving force in the growth and development of cities, regions, and nations." (Florida 2005, 1) Creative centers succeed by providing seed beds for the "super-creative core" (artists, engineers,

university professors, and architects) and “creative professionals” (scientists, high-tech workers, business managers, and financial, legal, and medical professionals). Creative workers circulate new ideas and drive innovation, and their jobs represent roughly 30 percent of the U.S. workforce, up from 20 percent in 1980. (Florida 2005, 35)

Creative-class workers desire social openness and tolerance, diversity, outdoor activities, bohemian character, and “coolness” (bustling streets, active nightlife, and good music)—demands best met by cities. The gentrification of New York’s Lower East Side (Zukin 1987), SoHo (Mele 2000), and Chicago’s Wicker Park (Lloyd 2006) valorized artists and a “grit-as-glamour” aesthetic, which attracted private, often corporate, development. The creative laborers in Lloyd’s Wicker Park were willing to sacrifice job security for lifestyle concerns, favoring freelance employment over corporate full-time work.

City administrations vie for these desirable residents using tax credits, favorable zoning, infrastructural improvements, and marketing. Mayor Richard M. Daley acknowledged the importance of amenities and their positive effects on quality of life in Chicago:

This is quite a wide variety of amenities—everything from fiber-glass cows to play lots—but they all have this in common: they improve the quality of life. And I believe very strongly that cities that pay attention—really pay attention—to quality of life will be the cities that thrive in the 21st century. (Daley 2001)

Critics argue that amenities theories neglect unequal development and the vulnerability of service workers. While the downtown and surrounding gentrified neighborhoods are remade and beautified, poorer inner-city neighborhoods languish. Florida is interested in high-tech, not low-tech, service, workers (Florida 2005, 23) and in the *quality* of economic growth in terms of wages rather than jobs. (Florida 2005, 24) These theories are not universal because tech-sector work is only available to educated individuals; they are not universal because they do not address

the effect of low-tech work on a city's economy. These theories couch amenity-driven development as value-free. Better parks, revitalized neighborhoods, city-sponsored events, and exciting nightlife and entertainment are posited as public goods for all. As a strategy for economic growth, Glaeser considers consumer-oriented policies inescapable. (Glaeser 2000, 6) The forces of the global economy do not play out uniformly, however: "[they] operate always through local political structures and interact with inherited spatial forms." (Abu-Lughod 1999, 417) This paper will investigate whether the spatial distribution of amenities truly serves all of a city's residents.

The Development of the Livable, Compact City: Urban Planning in the Twentieth Century

The costs of implementing environmental preservation, social equity, economic sustainability, and safe, beautiful, and vibrant urban spaces constrain these urban ideals. In *Urban Planning Today* Alexander Garvin lays out this central tension: "Public action to improve cities throughout the twentieth century has consisted of projects, plans, and processes that grew out of requirements of implementation rather than images of an ideal future." (Garvin 2006, xii) Rather than redesign and rebuild the city completely (as advocated by Le Corbusier's Radiant City, Lewis Mumford's Regional Planning Association of America, and urban renewal of the 1950s and 1960s) urban planning returned to what Peter Hall refers to as "planning's anarchist origins" (Hall 2002, 12)—targeted projects spurred by the entrepreneurialism of private citizens or firms and speculators encouraged and shaped by a framework of incentives, zoning laws, infrastructural improvements, and guideline plans.

In *The Death and Life of Great American Cities* (first published in 1961) Jane Jacobs decried bulldozer-driven urban renewal, criticized suburban sprawl and "slurbs," and slammed the garden-city movement and its fight against urban density by noting that its "prescription for saving the city was to do the city in." (Jacobs 1992, 17) Based on her experiences in Greenwich Village and Boston's North End, Jacobs theorized that

dense urban areas could sustain social and economic activity through mixed-use, “energetic economies.” Her outlook opposed contemporary superblock housing and single-use zoning divided by stately green space. Jacobs’s images of bustling street life and new businesses in rehabilitated buildings and lofts shifted urban policy from suburban de-intensification to “highest and best use,” opening the door for urban planning that was more *laissez-faire* in character. The ensuing urban economic resurgence would be led by creative partnerships between various government bodies and private interests, alternatively called the growth machine, aimed at intensifying urban land use and rents.

National public-private incentives have had a significant effect on growth-machine driven development. Private developers would match the Urban Development Action Grants, legislated by the Carter administration in 1977. Other stimulation came with the Historic Preservation Tax Credits of 1976 administered by the National Park Service, with a further liberalization of terms in 1981. These incentives underwrote the waterfront redevelopments of Boston’s Quincy Market and Baltimore’s Inner Harbor. Through new urban policies and private-sector stewardship, cities were once again viable, even profitable: “Cities, the new message rang loud and clear, were machines for wealth creation.” (Hall 2002, 379) The majority of this funding, however, did not go to the neighborhood projects envisioned by Jacobs. Funding supported downtown commercial developments and shopping malls, with “neighborhood facilities” receiving only 15 percent of Urban Development Action Grants. (Gist 1980, 245) Much of the financing for urban planning disappeared in the 1980s under Reagan’s new federalism policy, leaving states and cities to encourage revitalization with small but flexible Block Grants and incentive packages, including Historic Preservation Tax Credits, Business Improvement Districts, and Tax Increment Financing districts. The result was a shift from housing to profitable projects—hotels, festival markets, and other consumption centers—and the stimulation of economic growth through arts, culture, and entertainment districts.

Sustainable growth in a city comes largely by providing government

policies and public services that support and encourage private activity:

Establishing, growing, and maintaining an emphasis on the public realm as a framework for private and nonprofit development... establishing and continually updating intelligent, flexible guidelines for private, nonprofit, and public development... establishing and continually updating incentives for private and nonprofit development... avoiding planning for single-function development. (Garvin 2006, xviii)

Garvin ties the ideals of sustainable growth to the practical considerations of implementation, becoming incorporated into the contemporary framework of public-private partnerships and entrepreneurial development strategies and attracting creative-class residents.

Sustainable growth, as laid out in the introduction to this study, plays a vital role in a perception of the new city. Smart transportation planning such as mass transit and alternative multi-modal strategies (pedestrian and bicycle-scaled land-use planning, infrastructure, modernized public transportation, and rail) foster growth by improving efficiency and interconnection with other urban centers, lowering trip times, and relieving individual transportation costs. The livability and environmental concerns enumerated by Chicago during the Richard M. Daley administration have a practical infrastructural purpose. The bikeways built under these plans, however, also function as desirable, in-demand amenities.

The Place of the Bicycle in the City of Tomorrow

Upon its introduction to America at the end of the nineteenth century, the bicycle was a consumer and fashion item for men and women, enjoying public prominence during the bicycle craze of 1897. Chicago emerged as the national center of bicycle production and many wheelmen's clubs called Chicago home and passed through on regional and interstate tours. When the cycle craze ended, Arnold, Schwinn & Company, a new manufacturer, absorbed many of the city's smaller workshops.

The effect of the bicycle on urban living and the built environment was recognized almost immediately.

Predicted one writer in 1892: the effect [of bicycles] upon the development of cities will be nothing short of revolutionary... the silent steed would all but eliminate the exasperating noise and confusion of city life. (Herlihy 2004, 259)

The first bicycle infrastructure, a cycling path from Prospect Park in Brooklyn to Coney Island, appeared in 1895. Commentators viewed the bicycle as a social good that improved the condition of women, catalyzed for the Good Roads Movement, and promoted outdoor exercise. (Herlihy 2004, 298) The once glamorous bicycle fell out of favor by 1900 with the introduction of the safety bike and the new popularity of inexpensive mass-produced automobile.

Bicycle popularity boomed several times after 1900, always in the form of a recreational fad. Increased interest in cycling in the mid-1930s caused planners to reconsider the bicycle: "In 1935, a petition demanding more bicycle paths in Chicago collected 165,000 signatures. In response, the city created 40 miles of trails in forest preserves." (Herlihy 2004, 360) Widespread utilitarian paths were not considered, because by 1933, a *Fortune Magazine* article illustrated that the car was the dominant mode of transportation, with Americans owning seventeen autos to every bicycle. (Herlihy 2004, 328) Adults undertaking long bike tours lead cycling's next booms in the 1970s and the late 1980s. The environmentalist movement and the oil crisis of the late 1970s encouraged municipalities to consider bicycle plans. Liberal cities, such as Davis, California, Seattle, Washington, and Madison, Wisconsin, constructed a network of bike lanes, while a handful of poorly conceived and implemented plans in other cities crumbled. (Clarke 1992, 199)

Despite these efforts the bicycle would not regain a significant proportion of national transportation modal share. Suburban sprawl supported by low-interest government lending, low taxes on petroleum,

and the preexisting urban fabric hampered the creation of bicycle networks. As recently as 2001, only 0.8 percent of all trips in the United States were accomplished by bike. (Cradock 2011, 39) Recreation and leisure remain the dominant use of the bicycle in the United States. (Heinen 2010, 81) The League of American Cyclists, the Bicycle Federation of America, and the Rails to Trails Conservancy—which has been involved in the construction of twelve thousand miles of bike paths since its founding in 1986—all supported recreational cycling.

Since the 1990s, bike-planning literature has highlighted the personal benefits (improved health and fitness, decreased travel times, and decreased transportation costs) and the societal benefits (decreased emissions, championed by the one-less-car movement, decreased noise, and decreased congestion, especially during peak commutes) of higher bike use. Drawing from best practices of the 1970s and 80s and more recent developments and refinements coming from Western Europe, planners have set out to increase modal shares. At this time, planning for utilitarian bicycle use and spending on bicycling infrastructure has occurred primarily in cities with shorter travel distances, high urban density, and lowest dependency on automobile. (Cradock 2011, 36)

Leisure rides and recreational usage continues to dominate thinking about American bikeways and the place of the bicycle in American life, with the majority of off-road bikeways located along urban parks, rivers, and lakes, or in rural areas. (Pucher 2008, 425) The opposition to constructing on-street bike lanes centered on “the perceived traffic danger of cycling as an important deterrent to more widespread cycling.” (Pucher 2008, 508) Utilitarian bike networks, such as in Chicago, have been implemented in more and more cities at larger and larger scales and densities. The effect of these networks on safety remains unstudied; rather, subjective safety concerns drives perceptions of on-street bike lanes. (Heinen 2010, 63) Separate bike paths, removed from the perceived danger of automobiles, remain the preferred type of bike infrastructure. (Heinen 2010, 63)

Two groups are working to change perceptions of bike use from

solely leisure to utilitarian. First, planners involved in mass transit and new urbanism have been instrumental in bringing these issues to the attention of city governments and metropolitan-planning organizations. Second, activist movements, such as Critical Mass, have built up large bases of support and demand, making bike plans politically feasible.

Critical Mass began in 1992 as a leaderless mass ride on the last Friday of every month. It stakes a claim to urban streets, asserts cyclists' rights, and defines the experience and attitudes of urban bike-riding. Perceived as a bike-based celebration or a serious protest, Critical Mass has spread across the United States and throughout the world. Mass rides are highly public spectacles, and participation by all is encouraged. Critical Mass has actively sought to create a dialogue about public space and a new vision for urban bicycling:

Riding a bicycle is a very social activity. . . Cyclists are keenly aware of the sentiments of a neighborhood and the rhythms of a city. Intimate enough to engage with people on the streets and mobile enough to get a sense for the big picture. (Switzky 2002, 186)

As Critical Mass rides have become larger, more common, and less confrontational, the social vision of urban cycling has reached a wider audience and gained sympathy from local governments. The rides have transmitted activist and environmentalist ideals to recreational and leisure riders that have been reinforced by social network sites, such as Chicago's Chainlink, with over 5,000 members. Critical Mass rides held in cooperation with city government are effective marketing, making the city that hosts them more appealing to bike fans.

Following the success of movements such as Critical Mass, cities and neighborhoods with bikeways can attract residents who associate biking with other cultural factors, such as environmental concerns, even where poor weather conditions would seem to oppose bike use. (Handy 2011, 35) Social values, such as a strong image of cycling and a poor image of car use, have also determined the location of bike-project spending. (Heinen

2010, 76) Additionally, the two-way relationship between the presence of bikeways and cycling rates must be considered: "Bicycle travel is not only influenced by residential location... but that households also choose their particular location because they intend to cycle." (Heinen 2010, 81) A subset of urban residents with environmental, social, and political attitudes towards urban life use bikeways. When demand is sufficient, bikeways are built, which in turn influences where members of the creative class surveyed by Florida decide to live. It is unsurprising to learn that the planning meeting for Chicago's first Critical Mass ride was held in a Wicker Park café in 1997. (Burton 2002, 19) The planning of bikeways and the final location of on-street lanes, therefore, is differentially determined on the local level, taking into account not only city-wide transportation schemes, but real and perceived local demands, and broader economic goals. The following sections of this essay demonstrate Chicago's sensitivity to these amenity concerns both in the rhetoric used in the bike plans and maps and the network of bike lanes existing on the ground.

2. Bikeways Enacted: The Chicago Bicycle Plans, 1991–2011

From *Bike 2000* to *Bike 2015*:

The Changing Role of Bikeways Development

There were several early attempts at bikeways in Chicago. A suggested network of cycling routes for long distance training, touring, and recreational cycling crisscrossed the larger Chicago-metropolitan area as early as 1897 (Fig. 1). Several bike lanes and off-street trails, including the Lakefront Trail, were established by Richard J. Daley in the 1970s. The first bike lane on Clark Street and in Washington Park (no longer existing) opened in 1971 as part of a system of recommended routes and paths (Fig. 2).

The *Bike 2000 Plan* and the *Bike 2015 Plan*, produced during the Richard M. Daley administration, look beyond recreation. They aimed to

encourage utilitarian trips by bike and higher modal share through infrastructural improvements and bike-friendly policies and programs. The *Bike 2000 Plan* addressed environmental concerns, which reflected the general trend in bike planning during the 1990s. In 1999, bicycle-based transportation represented less than 1 percent of the modal share in the United States (Pucher 2004); increasing that percentage held great promise:

Expanded use of bicycles serves the public interest in a number of ways beyond improved recreation. Better air quality, reduced energy use, reduced traffic congestion and reduced road maintenance costs are additional benefits... Travel by bicycle is inherently fast, efficient, and environmentally sound. (*Bike 2000 Plan* 1992, 1)

The plan's publication in 1992 coincided with the city's need to improve poor air quality and comply with the Clean Air Act of 1990. Replacing cars with bicycles was an attractive option, due to federal subsidies for bikeways from the Intermodal Surface Transportation Act. In order to improve air quality, the *Bike 2000 Plan* hoped to make bicycling a "serious alternative transportation mode" and increase bike use to 10 percent of all short single-occupancy trips by the year 2000. (*Bike 2000 Plan* 1992, 2) A proposed bikeway network constituted the plan's largest engineering commitment. These bikeways functioned to "encourage and support safe bicycle use" ("*Bike 2000 Plan*" 1992, 4) in a city traditionally hostile to cyclists. The utilitarian and environmental goals took priority over improving recreational cycling, which was placed last.

The *Bike 2015 Plan*, while reflecting the environmentalist ideals of the earlier plan, incorporates a new perspective on the role of bicycles and bikeways in cities. The primary goals remain nearly the same—increasing bike transit to 5 percent of all short trips and making Chicago's streets safer for cyclists—but the value of pro-bike policy to city government has changed. The one hundred miles of lanes, ten thousand new bike racks, and other initiatives resulting from the *Bike 2000 Plan* won

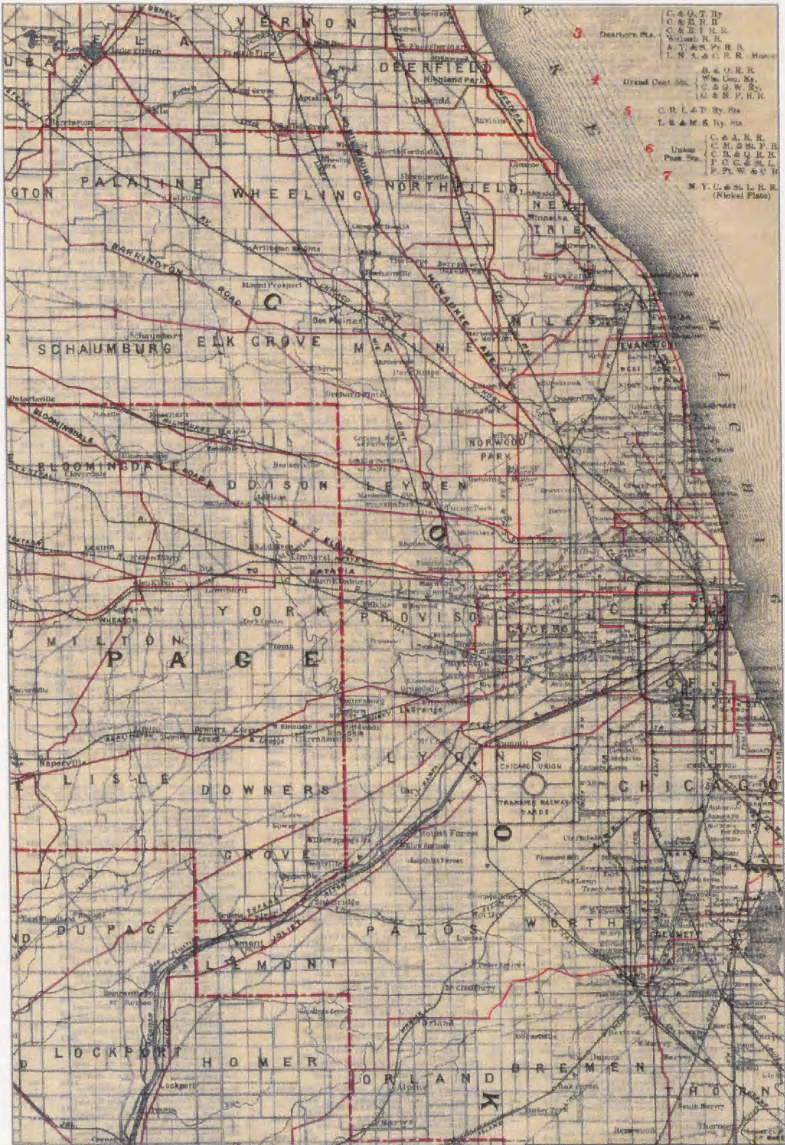


Fig. 1: New Bicycle Map Showing Carriage Roads—Also—Railroads, Junction Points, Stations, Post Offices & Villages. Chicago: Rufus Blanchard, 1897

Chicago recognition as the best big city (over one million residents) for bicycling in North America in *Bicycling Magazine*. (Coté, 38) By the 2005 publication of the *Bike 2015 Plan*, bicycle-friendly programs and well-developed bike amenities had become essential aspects of successful American cities, now run by sub-departments, such as the Chicago Bicycle Program. Following the lead of Madison, Portland, and Davis, major cities, such as New York and San Francisco, and other smaller cities, such as Seattle, Boulder, and Minneapolis, established bike plans and worked to prove their "bikeability." The wide variety of city programs cited throughout the *Bike 2015 Plan* as best practices speaks to the proliferation of urban bike planning across the United States.

At fifty-pages, the *Bike 2015 Plan* demonstrates the growing importance of bike planning compared to the seven-page outline of the *Bike 2000 Plan*. The new plan portrays Chicago as a forerunner in bike-oriented planning, citing *Bicycling Magazine's* nod and Mayor Richard M. Daley's goal "to make the City of Chicago the most bicycle-friendly city in the United States." (*Bike 2015 Plan* 2006, 4) The bikeway network, now the hallmark of the plan, envisions five hundred miles of bike lanes, paths, and routes by 2015, with a bikeway within a half-mile of every home. This goal responds to interurban competition by creating a bike system "equal to the best in the world" and is expected to attract bicyclists, who "will feel safe and appreciate that Chicago honors and welcomes bicycling." (*Bike 2015 Plan* 2006, 6) The *Bike 2015 Plan's* front cover illustrates the city's support of bike-friendly policies with cyclists engaged in several kinds of activities above the "City of Chicago" in a large font and the city's seal. (Fig. 3) Secondary policies to the bikeway expansion include recommendations for better signage, better maintenance, and innovations, such as bike boxes (marked areas at intersections giving cyclists a starting priority over drivers), stop bars, raised lanes, and left-right turn lanes. Overall, the *Bike 2015 Plan* is more extensive, ambitious, and costly than the original plan. It represents a much larger commitment of city resources and emerges as a priority for the city administration.

The two plans illustrate a shift in the value of bicycle planning to

Chicago at the beginning of the twenty-first century. According to the *2005 Chicago Bicycle Users Survey*, 8 percent of bicyclists considered the environment the primary reason for riding, and an additional 12 percent considered the environment a secondary concern; only 3 percent biked because they do not have a car or access to public transit. (Wilbur Smith Associates 2006, 13) Biking is more attractive for other benefits: health and exercise (40 percent), pleasure (27 percent), and speed and ease (12 percent). While the *Bike 2000 Plan* focused on public concerns (environmental degradation and the Clean Air Act), the *Bike 2015 Plan* focused on personal concerns (quality-of-life and place-based amenities).

Thinking Regionally: The Place of Bicycles in Planning Chicago's Metropolitan Area

Investment in transportation (high-speed rail construction, freight-handling modernization, and mass-transit improvements) plays a leading role in both the Chicago Metropolitan Agency for Planning's *GO TO 2040* regional master plan, and the reports and recommendations generated by *Chicago Metropolis 2020* (renamed *Metropolis Strategies*). Both plans pay special attention to transportation's effects on innovation and knowledge generation:

[Economic benefits include] improved attraction and retention of businesses and skilled, innovative workers, who value a well-functioning transportation system... environmental benefits and enhanced access to jobs, education, and medical care and cultural and social interactions. (*GO TO 2040* 2010, 250)

Chicago Metropolis 2020's recommendations for statewide transportation improvements focuses on linking innovation centers to one another, in-state and nationally: "A transportation plan that facilitates the interaction of ideas supports the growth of the economy." (*Building Our Economy* 2010, 26) Expanding O'Hare Airport and redesigning the state and midwestern rail systems for high-speed trains would facilitate

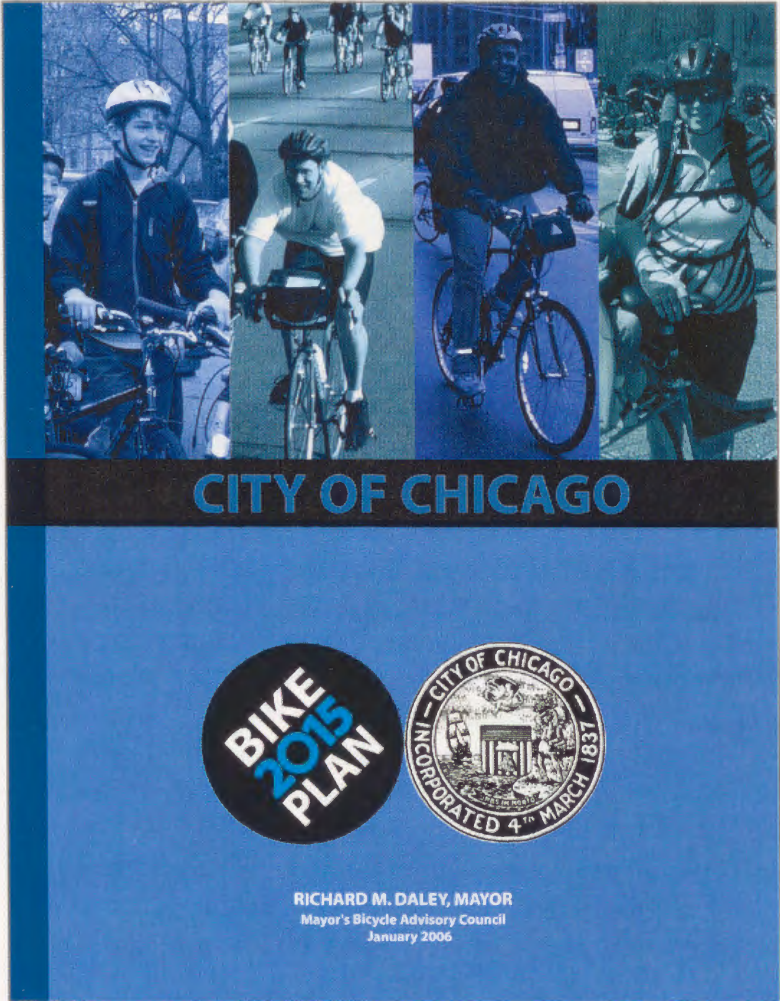


Fig. 3: Front cover, *Bike 2015 Plan*, 2006

face-to-face collaboration and interaction between academics and professionals.

Both documents encourage transportation options for cyclists and pedestrians in order to attract and retain human capital:

The region should strive toward fostering an environment to attract residents who will create innovative new technologies and industries—one where ease of mobility is ensured and where car ownership is not a requirement for living, working, and recreation. (*GO TO 2040* 2010, 250)

Knowledge workers show a decided preference for urban living. These patterns can only be supported in communities that offer transit, walking and cycling options. (*Building our Economy* 2010, 16)

Similar to the *Bike 2015 Plan*, the urban-planning visions, guidelines, and implementation recommendations in these documents see bike planning as a component to attracting and retaining talent. The effect of bicycling on the regional environment is small when placed next to rail and other mass-transit improvements. When viewed as an amenity, the value of bike programs is not in their raw environmental impact but in the appeals they make to talented individuals who desire vibrant, green-friendly cityscapes. While plans and press releases communicate these messages in broader terms, resources such as city bike maps allow individuals to make more fine-grained decisions, down to the neighborhood level, on a city's amenities and overall attractiveness.

Chicago 21: A Look Back

The *Bike 2000* and *Bike 2015* plans demonstrate a decidedly different emphasis than 1973's *Chicago 21: A Plan for the Central Area Communities*. The *Chicago 21* plan involved construction of new "towns" of modernist high-rise residential towers in Dearborn Park and the South Loop

on the site of former train yards. The plan was inspired by the Campaign for Urban Quality occurring concurrently in the 1970s, centered on “entrepreneurial regeneration through a series of spectacular projects which would transform the image of a rundown urban area.” (Hall 2002, 420) Many of *Chicago 21*'s core themes were enumerated in the world-city literature: concentration of complementary firms, specialized services and shopping, mixed-use cultural activities, leadership, and private-public partnerships. The plan's commercial projects designed by Skidmore, Owings, and Merrill are reminiscent of James Rouse's contemporary developments in Baltimore and Boston—festival markets with busy streets and integrated open space. Improvements in air and water quality add urban beauty rather than environmental impact, and new tunnels for automobiles allow for pedestrian shopping plazas. Environmental sustainability or the importance of innovative and creative individuals are absent from the planning; the downtown and super-block construction is championed over the revitalized and energetic neighborhoods popularized by Jacobs.

Chicago 21 proposes bike paths along the lakefront with extensions west to the garden boulevard system, constituting a nascent bike recreation infrastructure. Figures walking or riding bicycles appear in several pictures of open-space use and district use. At this very early moment in the green urbanism movement, bikeways are not seen as a popular or feasible transportation alternative capable of attracting desirable residents.

When the *Bike 2015* plan is contrasted with the *Bike 2000* and *Chicago 21* plans, a shift in city-building strategies towards planning for people rather than a public concern for the environment (*Bike 2000*) or a more rigid master-plan approach (*Chicago 21*) becomes apparent. The planning and popularity of bikeways is tied not only to advances in smart growth but has become part of an evolving complex of larger ideas about the environment and urban economies.

3. City of Bicycle Lanes: The *Chicago Bike Map*, 2001–2011

The *Chicago Bike Map* and the Representation of Bike Amenities

At first glance the *Chicago Bike Map: Streets for Cycling* (Fig. 4), originally published in 2001, appears to be a stylized but simple road map for navigating Chicago from the bicycle saddle. Recognizable as part of the broader category of wayfinding maps, it serves to answer questions such as “Where am I?” “Where do I want to go?” and “How do I get there?” (Akerman 2007, 19) While these queries seem to be strictly about orientation or navigation, they are also theoretical propositions, requiring the viewer to engage in an interior mental simulation, to place his or herself vicariously into the territory that the map represents. Bike maps do not simply provide an answer to the question, “How do I get there?”—especially when the depicted bikeway network is sporadic and fragmentary, as will be discussed below—they also allow cyclists to view the city on their own terms with bus routes and highways subordinated.

Before looking at how the *Chicago Bike Map* uses formal means to support urban cycling, I must first outline a framework of cartographic criticism. The accurate communication of information, especially spatial information, was a fundamental preoccupation of mid- to late-twentieth-century cartography. The ways in which color, thickness of line, symbol size and hierarchy, simplification, generalization, and text placement affect the relay of spatial data and geographic relationships from map to viewer were laid out by communications-approach cartographers like Arthur Robinson. Edward Tufte (1990) and Mark Monmonier (1996), critical cartographers who worked to uncover how maps create meaning beyond their denotative, graphic conventions, noted how graphical rules could be twisted into “little white lies” and out-and-out propaganda. J. B. Harley argues that cartographic conventions are rhetorical: “In their intentions as much as their applications they signify

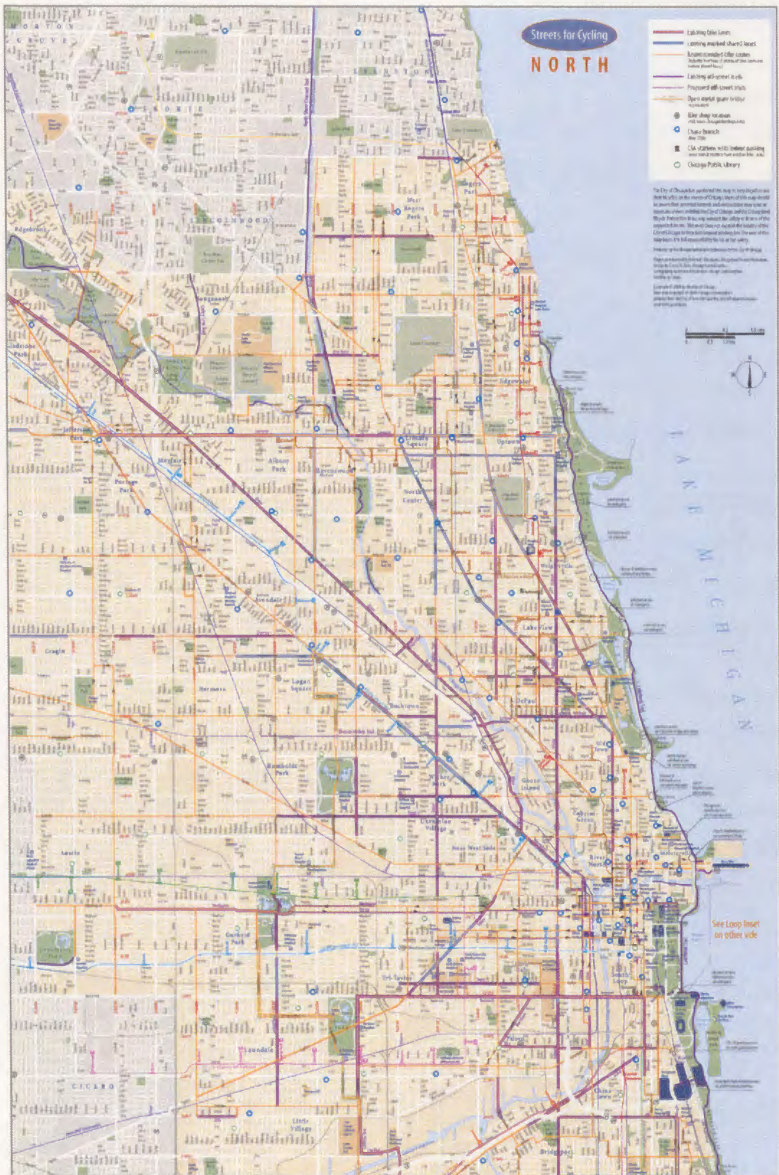


Fig. 4: The North Side—page, *Chicago Bike Map: Streets for Cycling*, 2008

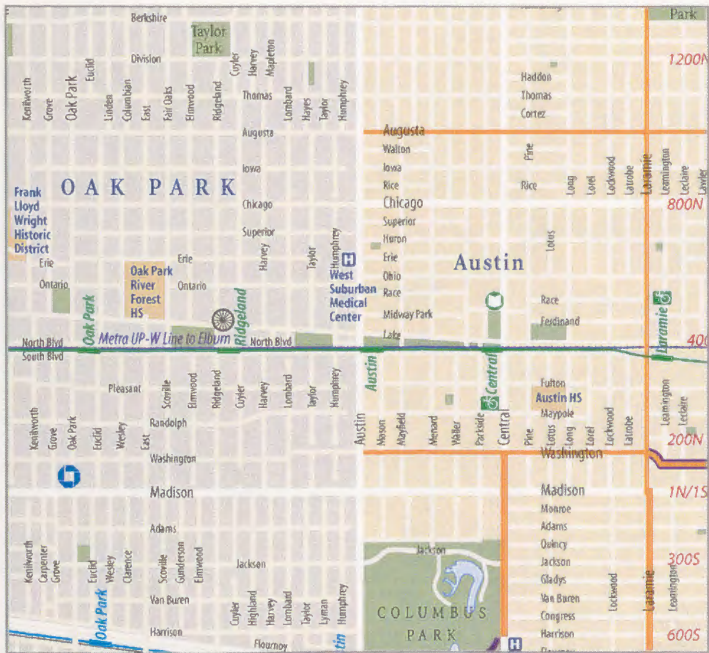


Fig. 5: Break between the city and surrounding municipalities, *Chicago Bike Map: Streets for Cycling*, 2008

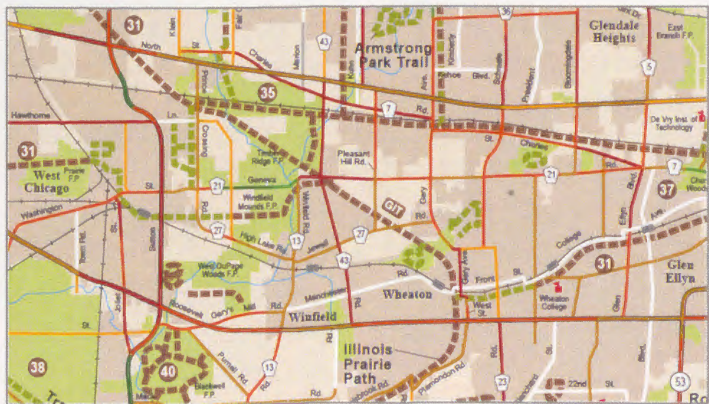


Fig. 6: Cook County Bicycle Map (excerpt), 2006

subjective human purposes.” (Harley 2002, 113) Denis Wood argues that maps are encoded, and that their treatment as passive, empirical representations masks the presence of an author (the state, for instance) and the author’s interests. (Wood 1992) Wood’s seminal 1986 analysis of the North Carolina highway map with his collaborator John Fels demonstrated that illustrations and other extra-cartographic additions go beyond representing geographic features and adding graphic clarity to form value-laden opinions about a territory.

Between the first edition in 2001 and the most recent addition in 2011, the formal elements of *Streets for Cycling* have changed only slightly. The layout, bounds, fonts, hues, and general symbology have remained intact. The city is separated from the surrounding suburbs by a slightly different color, with the city in a light sand color and the suburbs in a 30-percent gray color. There are bikeways that continue into the outlying areas, but many end abruptly at the city’s borders. The thick yellow-orange stroke of the bikeways demarcates the city limits more obviously than the color conventions (Fig. 5). This disconnection between the city and the suburbs differs from the recreational bike routes of Cook County, whose prominent and continuous lines tie the collar counties together (Fig. 6). On the Chicago map, the bikeway network is made an unique attribute of the city. The network, in a sense, *defines* Chicago, and a clear distinction is marked from long-distance bike maps needed for long tours or planned trail rides. The *Streets for Cycling* notes all of the city’s streets in a white that can be distinguished from the tan with a bit of effort, but it does not make for a good road map overall. The map’s most visible elements are the on-street bike lanes and off-street trails, marked in thick purple, the most emphatic color on the map, followed closely by the royal blue of the shared lanes (Fig. 7). Bike lanes are the most visually forceful, marked with a double line (for north-south or east-west travel when lanes go both ways). They are generalized, exceeding the width of the street itself, bracketing the street and widening it noticeably. The automotive traffic on these streets, in most cases, also moves in both directions, calling into question the decision to make the markings for

bike lanes, generally five-feet wide compared to ten-plus feet vehicular travel lanes per direction of travel, double-thick. (*Bike Lane Design Guide* 2002) Bike lanes mark a fragmentary network that prevent door-to-door navigation, and the subdued, white street symbology makes it difficult to pick up paths for non-bikeway navigation. The “Recommended bike routes” are also prominent, represented in a visually attractive yellow-orange as thick as the street itself. These bike routes make the network more coherent and better distributed across the city as a whole, nearing the goal of having a bikeway—of whatever type—within a half-mile of every resident.

Split in half between the North and South sides, the bike map illustrates an unequal distribution of the purple bike lanes. The gentrified neighborhoods along the lakefront and those pushing further west appear to be best served, an issue that will be explored in Section 4 below. The yellow bike routes bolster the concept of a network, but the relative lack of purple bike lanes marks a clear divide between neighborhoods that have many interconnected bike lanes and those that do not. The visual dominance and the resulting increased importance of the bike-lanes category disrupts the functional purpose of the wayfinding map.

The formal symbological choices used in *Streets for Cycling* emphasize the density of available bike amenities. The clusters of bike lanes in certain areas of the city indicate “what is where” and “how much” rather than a network relationship. The online version, which can be browsed only by large-scale units (tiles), several neighborhoods large (Fig. 8), reinforces this finding.

Beyond recording changes to the bikeway network as it has expanded year-by-year since *Streets for Cycling* was first published, the *Chicago Bike Map* exhibits changes in legend categories worth noting. An important feature, “proposed bike lanes” is included in the years 2001 to 2006. Drawn in a dotted grey tone on the side of the recommended bike route, these proposed lanes depict the forthcoming network. In the earliest maps, they represent a substantial proportion of total bike lanes. Not only do these proposed bikeways give Chicago’s residents a taste of



Fig. 7: Legend, *Chicago Bike Map*, 2008

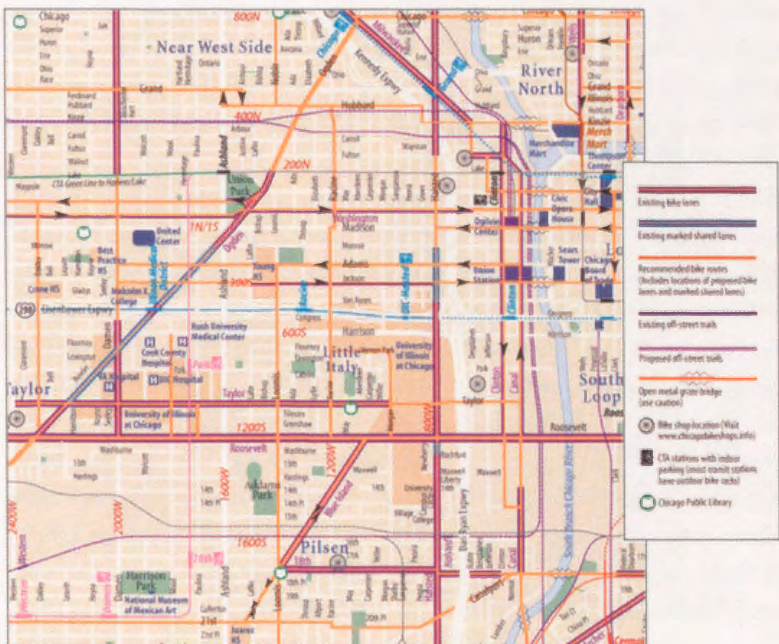


Fig. 8: Tile from the *Chicago Online Bike Map*, accessed August 25, 2013

what to expect, they fill out the network in its early stages, strengthening Chicago's claim to the title of America's best large city for bicyclists. Some of these lanes were never completed (Fig. 9), especially on the South Side. These cases may have reasonable explanations (road improvement funding never came through or was insufficient for engineering a bike lane, a local alderman who directed funds to other street repairs), but the question remains: Why map what isn't there? Editions later than 2006 rename the "proposed marked lanes" into "recommended bike routes" (Fig. 7). By changing proposed to recommended, the city is no longer accountable for lanes that do not appear but continues to benefit from the richer future network implied. This reading suggests that the map is marketing its intended efforts to bicyclists rather than demonstrating how to use the bikeway network to get from one point to another.

The front and back covers affiliate the maps with Chicago and its bike-friendly policies; changes in the cover designs correspond to the city's changing appreciation of bikeways between the *Bike 2000* and *Bike 2015* plans (Fig. 10). The front cover integrates the bicycle into the urban scene in both editions. The first design presents a bustling street with pedestrians, buses, cars, and cyclists interacting harmoniously. The umbrellas of outdoor diners and a figure walking a dog add to the idyllic scene. The viewer sees a cityscape in which bicycles form an important part, lending the street a Jacobs-inspired vitality and new urbanist charm. The second design in 2007, changed a year after the disappearance of the proposed bike lanes, is quite different. The earlier cyclists, now enlarged, ride over a map grid. This image is void of cars, pedestrians, and diners; it focuses solely on bicyclists. The city is theirs. The latest version of the cover, appearing in 2010, replaced the street with silhouettes of different bike users—commuters, parents, road and BMX bikers. It displays the city's fine-tuned appreciation of different bicycling lifestyles and needs. The 2010 map forms a picture of Chicago—linked through the presence of the official medallion—as a city that prioritizes the people who benefit from bike programs.

The back cover contains "A Message from the Mayor." Key changes

take place after the 2005 edition of *Streets for Cycling* (Fig. 11). Mayor Daley appears in a formal photograph in the editions through 2005; after 2007 he appears on the Lakefront Trail holding a red, white, and blue road bike. The mayor has made cycling a part of his daily routine, bicycling to work since the early 1990s. (Neufeld 2010) The text of the message is also changed to incorporate another of Daley's key pursuits, "to make Chicago the most environmentally friendly big city in the nation," with one strategy being to "promote environmentally friendly lifestyles." (*Chicago Bike Map* 2007) In 2010 the implementation of the *Bike 2015 Plan's* strategies became a "top priority." (*Chicago Bike Map* 2010) Its placement on a prominent part of the map announces and markets Chicago as a desirable place to live and play.

A survey of bicyclists by the Chicago Department of Transportation suggests that they do not use the *Chicago Bike Map*. Only 6 percent used the map, compared to 23 percent who used on-street bike lanes and the 22 percent who used the Lakefront Trail. (Wilbur Smith Associates 2006, 12) Most trips by bike are not short neighborhood jaunts; 65 percent of trips are between two and nine miles. (Wilbur Smith Associates 2006, 11) The majority of trips, 52 percent, are for recreation, with 13 percent for journeys to and from school or work. (Wilbur Smith Associates 2006, 9) The slightly lower use of the Lakefront Trail suggests that bike users are not taking recreational spins down the city's premier cycling path but are using the street network to get around, most often on streets not equipped with bike lanes. The low use of the map shows that many bicyclists, especially those already familiar with Chicago's streets or with a predetermined destination, have no need for a door-to-door map. First-time cyclists, visitors, and those viewing *Streets for Cycling* for other purposes would then logically constitute the bulk of the map's viewers. The impression that the map makes and its role in communicating Chicago's bike-friendly programs are thus highly relevant to the map's use.

This reading of the *Chicago Bicycle Map: Streets for Cycling* represents one of many possible interpretations. Maps are polysemous—either explicitly or implicitly, they create a range of objective and subjective



Fig. 10: Front covers, *Chicago Bike Map: Streets for Cycling*, 2004, 2007, and 2010

A Message from the Mayor



Dear Friends,

Bicycling is a great way to get around Chicago. It's fun, fast, and good for the environment.

To help you to bicycle in Chicago, we've prepared this map which identifies the city's best cycling routes. Are you looking for good streets to bike to the local store, your public library or to the Loop? Do you want to ride to the Lakefront Trail? If so, I encourage you to try the routes identified on this map.

My goal is to make the City of Chicago the most bicycle-friendly city in the United States. We have an ambitious, multi-million dollar program to establish 100 miles of new bike lanes, 250 miles of signed routes, and to install 1500 bike racks. Major improvements to the Lakefront Trail are underway, with new bike paths planned at other locations.

Please help by biking responsibly and sharing the road with others. Contact us if you have suggestions to improve cycling conditions. Let's work together to make Chicago the best big city for biking!



Richard M. Daley
Mayor

A Message from the Mayor



Dear Friends,

As part of our effort to make Chicago the most environmentally friendly big city in the nation, one of our main goals is to promote environmentally friendly lifestyles. Bicycling is a great way to get around Chicago. It's fun, fast, healthy and good for our environment.

To encourage you to bike in Chicago, we have prepared this map that identifies the city's best cycling routes. Are you looking for good streets to bike to your local store, public library or to the Loop? Do you want to ride to the Lakefront Trail? If so, I encourage you to try the routes identified on this map.

We want to make Chicago the most bicycle-friendly city in the United States. We have an ambitious, multi-million dollar program to establish 45 miles of new bike lanes, 70 miles of signed routes and install 3500 bike racks. Major improvements to the Lakefront Trail are underway, with new bike paths to be built at other locations.

Milestones for 2007 include the implementation of Chicago's Bike 2015 Plan. The plan identifies 150 strategies for city agencies, the private sector, and the bicycling community to make bicycling an integral part of daily life in Chicago.

Please help by biking responsibly and sharing the road with others. Contact us if you have any suggestions to improve cycling conditions. Let's work together to make Chicago a better and safer place to bicycle.



Richard M. Daley
Mayor

Fig. 11: "A Message from the Mayor," *Chicago Bike Map: Streets for Cycling*, 2005 and 2007

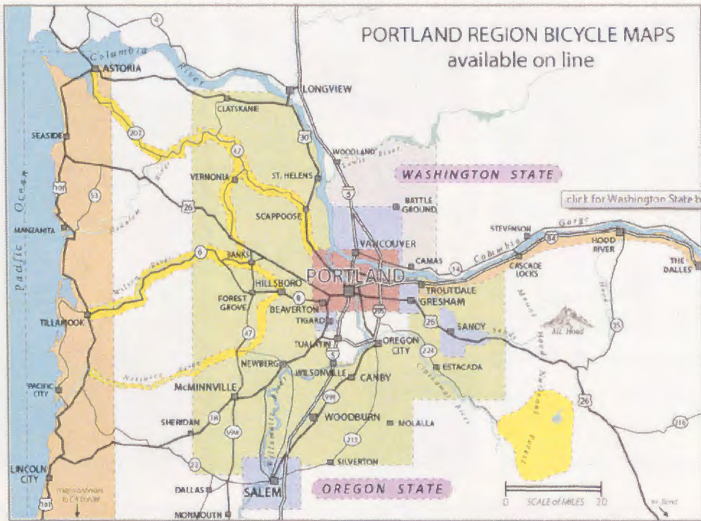


Fig. 12: *Portland Region Bicycle Maps*, 2010, accessed May 3, 2011

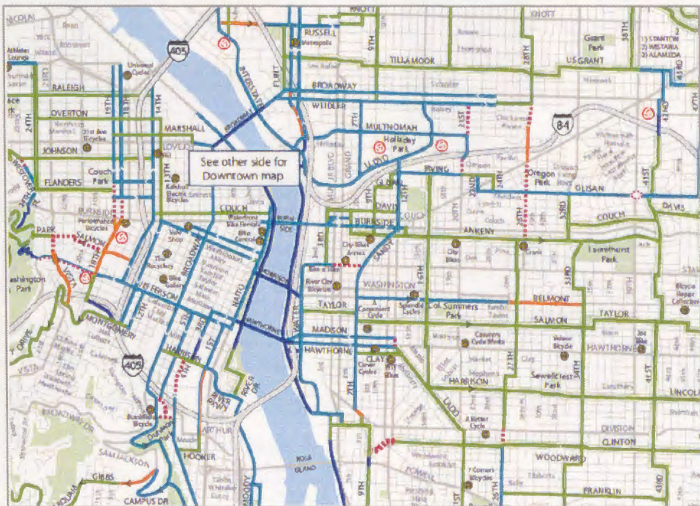


Fig. 13: *Downtown Portland, Portland by Bicycle: Citywide Commuter Map*, 2010, accessed May 3, 2011

meanings. The formal, textual, and illustrative elements sell the city to members of the creative class, inform residents of the presence of bike-ways in their neighborhood, and serve as a tool—both as a guide to the streets and to safe biking practices. The coordinated, highly visible effect of these cartographic and extra-cartographic choices above other conventions, however, constitute a guided effort to represent the city, especially the North Side, as a strong supporter of environmentalism and urban cycling.

Comparison: Streets for Cycling and the Portland, Oregon, and New York City Bike Maps

Portland's innovative planning—the growth boundary, a multitude of green initiatives, mass transit-oriented neighborhood development, and early implementation of a bikeway network—have become national best practices referred to as the “Portland Model.” (Saunders 2006, viii) Early on, Portland introduced bikeways, which now cover the city and surrounding municipalities, complemented by traffic-calming measures, dedicated lights, and bike boxes. New York City is a newcomer to bikeways development (the first comprehensive plans was in 1994), with the bulk of its efforts occurring at the same time as Chicago. New York City's recent burst of construction in targeted areas of the city (especially Manhattan and Brooklyn) is akin to Chicago's growing network, while Portland has steadily built on its early advantage.

The Portland map shows the same dense distribution of bikeway types as Chicago's *Streets for Cycling*, particularly recommended bike routes, but, otherwise, programmatic similarities are few. On Portland's Web site a regional map connects the city's bikeways with the surrounding region, encompassing not only the suburbs and several recreation areas, but a good bit of neighboring Washington state (Fig. 12). Paths cross over the Columbia River to Vancouver, Washington (rather than ending abruptly at the city limits, as is the case with the Chicago map), and biking appears to be an amenity offered as part of Portland's *regional* character. The map is allied to the local total-system approach to sustain-

able urban planning, rather than interurban competition. Navigation throughout the entire system is a priority. Extra-wide shoulders are depicted in orange and trouble spots appear as dotted red lines (Fig. 13). Portland's distribution of bike lanes is less visually fragmentary than Chicago's dark purple double lines: mid-blues mark bike lanes and a soft green line denotes recommended routes (Fig. 13). On the whole the only heavy concentration of bike lanes appears in the downtown, although crosstown arterial lanes run through Portland's residential neighborhoods. New development and gentrifying neighborhoods are not marked by particularly dense clusters of bike lanes, as in *Streets for Cycling*. The Portland map does not highlight particular areas or its well-developed system in a way that paints the city as a prime mover-and-shaker in the American urban hierarchy, rather, it speaks for itself and the city's unique approach to smart, integrated planning.

New York City's map is closer to Chicago's *Streets for Cycling* than the Portland map. The front cover to the 2010 edition proudly displays both "+30 Miles of New Bike Routes" and a new protected lane running crosstown on Grand Street in SoHo (Fig. 14). Imminent development is advertised and attributed to the official agencies outlined in the footer. This iconic picture of bustling streets, rehabbed historic downtown lofts, and the highlighted, modern infrastructure—the protected bicycle path picked out in green—draws the link between bicycling and the city. More so than Chicago, it emphasizes the creative class and consumers examined by Zukin and Mele by picking out the Lower East Side and the hip neighborhoods of West Brooklyn with an inset map (Fig. 15). Both areas are well serviced. The thick red line for bike lanes makes a visually bold assertion, and, like the Chicago map, draws a sharp divide between areas with heavy amenities and those without. Distinct from Chicago and Portland, New York's bikeway network has very few recommended routes—it is almost all lanes. By and large, arterial lanes run up and down Manhattan; the area between Madison Square Park and the Financial District is concentrated (Fig. 16). Large parts of Brooklyn and Queens are underserved. The absence of bikeways in some areas is not

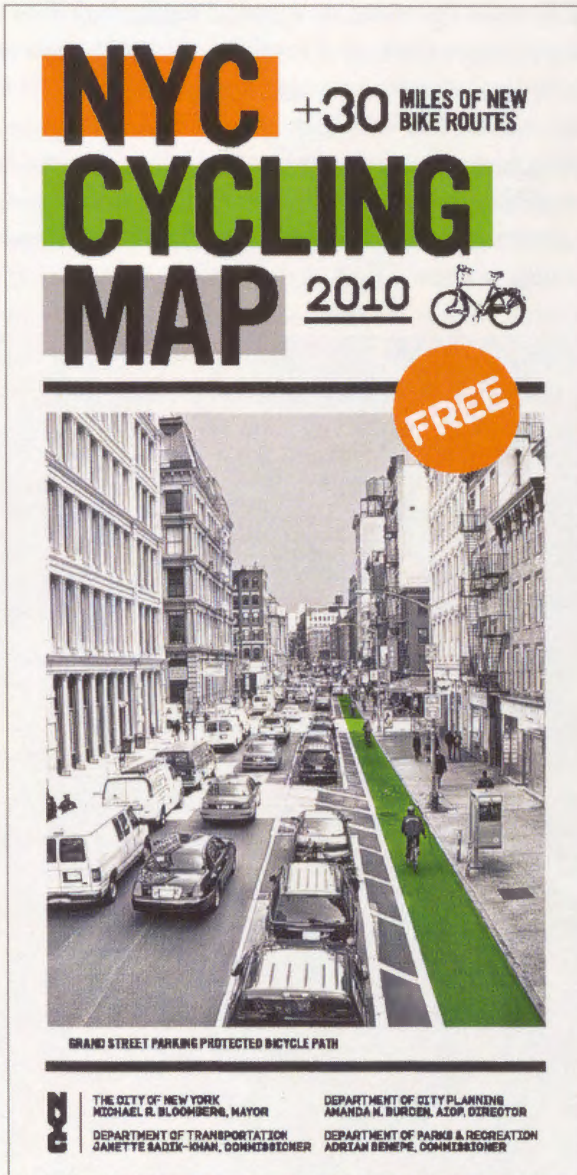


Fig. 14: Front cover, *NYC Cycling Map*, 2010

surprising. Several affluent neighborhoods, Prospect Park West in Brooklyn for example, have even called for the removal of bike lanes, as they cause inconveniences to drivers and make the streets less idyllic. (Grynbaum, Mar 17, 2011) The New York example is guided by the appeal of bike lanes to a downtown demographic (made obvious by the opposition of well-heeled New Yorkers uptown), rather than overall bike friendliness. This map illustrates the city's very busy building program and provides a taste of things to come.



Fig. 15: NYC Cycling Map, 2010

Each city's position on bikeways influences the message communicated in its maps. Portland, with an early lead and a regionally integrated planning philosophy, neither aggressively markets its amenities nor puts a Portland brand on them. Chicago and New York, as newcomers, have additional work to do. In 2010 New York surpassed Chicago in *Bicycling Magazine's* list of friendliest cities for bikes, coming in at number eight over Chicago's number ten. (Portland was number two behind Minneapolis.) ("America's Top 50" 2010) As both cities strive to climb the rankings dominated by smaller cities with older, more established programs, they must broadcast their efforts to potential residents and visitors. Where amenities appear—on the map and on the ground—are now fundamental decisions to cities like Chicago.

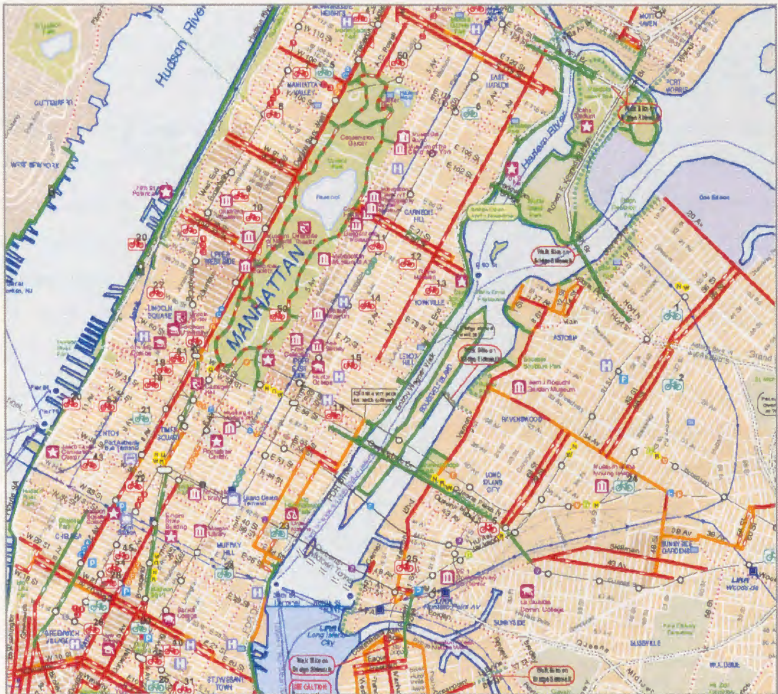


Fig. 16: Central Manhattan, *NYC Cycling Map*, 2010.

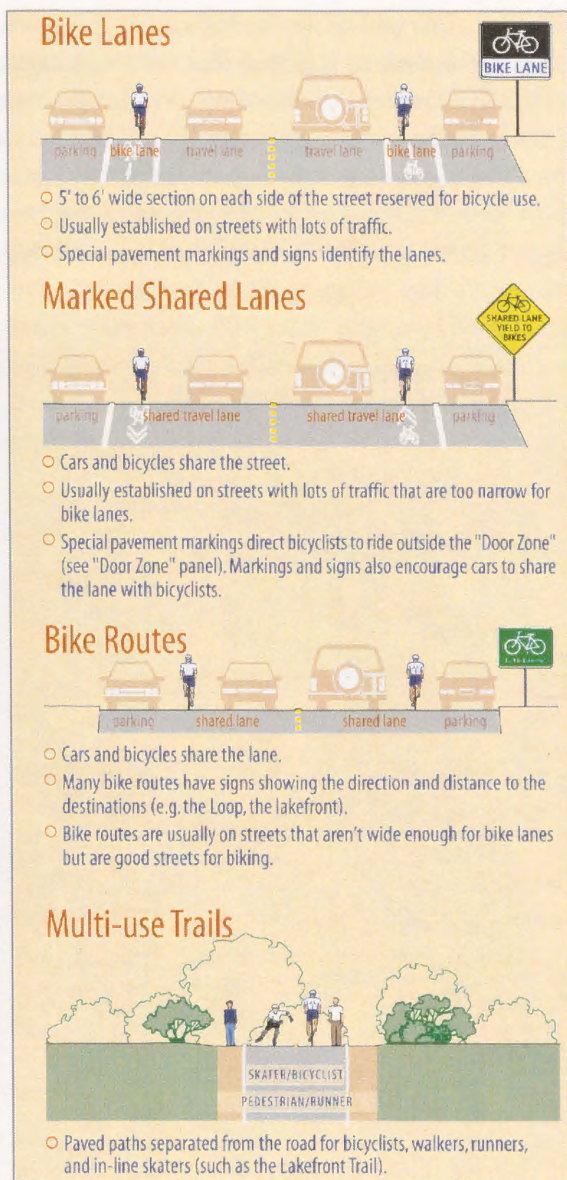


Fig. 17: Bikeway types, *Chicago Bike Map*, 2010

4. Evaluating Development: A Spatial Analysis of Chicago Bikeways

The Distribution of Bike Lanes in the City of Chicago

On the *Chicago Bike Map: Streets for Cycling*, the majority of Chicago's bike lanes appear to be on the North Side, especially in areas lying north of the Loop along Lake Michigan, to the northwest, west, and to a limited extent around the area of the South Loop. The distribution seems to be weighted to the north, which is made clear when the map is flipped between the North and South sides. I will use ArcGIS geostatistical tools to test whether this distribution is statistically significant. The null hypothesis states that bike lanes are randomly distributed across Chicago's zip codes.

The bikeway system is made up of a variety of features: bike lanes, bus-bike lanes, raised bike lanes, and bicycle boulevards (Fig. 17). They require careful planning and construction as road and/or sidewalk space is given up for bicycle-only use or mixed street uses. These lanes require physical space and are governed by usage laws. Shared-use lanes, while not single-use only, include assertive marking, forcing drivers to yield space, as indicated by a wider curb lane; as such, shared lanes have been grouped in with the other constructed bike lanes in the analysis that follows.

Recommended routes make up the great majority of Chicago's bikeways. The city selects them as good for biking, and they have street signs that indicate distance and direction to key destinations, such as the Loop. The city defines bike lanes as streets that lack space to build dedicated lanes; it could also be argued that this definition indicates less demand for lanes, less development, more resistance from constituents and aldermen, and/or fewer cyclists. Although they reflect the city's attempt to bolster the bikeway network on the whole, I do not include them in my analysis of true bikeways. I also excluded the Lakefront Trail because it would heavily skew city-wide results along zip codes abutting Lake Michigan.

I ran a select-by attribute query of “Existing Bike Lanes” and “Existing Shared Lanes,” and I exported the data to a separate feature class from which individual sum footages by zip code were later calculated. These existing lanes on the whole constitute 25.7 percent of total bikeways footage. Notably, the recommended route layout touches almost every corner of the City of Chicago, while the bike-lane system is oriented around the center and northwest with some outlying lanes (for a comparison, see Fig. 18). While a center-outward plan would be an obvious strategy in light of the city’s support of commuters to the Loop, building is skewed towards the zip codes north of the Loop along Lake Michigan.

I selected zip codes as the unit of measure because they capture a significant share of the city’s bike lanes. Many zip codes contain one or more lanes, running east-west and north-south, making them better than census blocks or tracts, which may contain small portions of one lane but frequently have none. Smaller sampling areas provide less variability in the total footage of bike lanes per unit, which prevents the study of distribution differences. Neighborhood area—a spatial unit unique to the city of Chicago—could make clear cases for relationships between the data and well-defined areas, (rather than zip codes that may cut across one or more neighborhood), but demographic data from the U.S. Census is more difficult to aggregate to the neighborhood level, introducing extra error. I did not consider political wards due to their extreme variability in shape. While zip codes deviate in size, their shape is relatively constant. To account for the discrepancies in size from zip code to zip code the dependent variable, total footage of bike lanes per zip, was normalized as a density (in this case divided by the unique shape area, in square feet, and multiplied by ten thousand to account for the very small number produced). Zip code 60661 was removed as an outlier with a density of over twelve, as it greatly exceeded the next maximum 60622, the zip code containing Wicker Park, with a density of 5.27 (see Fig. 19 for densities). The areas with the highest densities are close to downtown and the lake, dipping south to Hyde Park, veering west to Pilsen, north to Logan Square, and east to Uptown, capturing a good majority of the zip codes

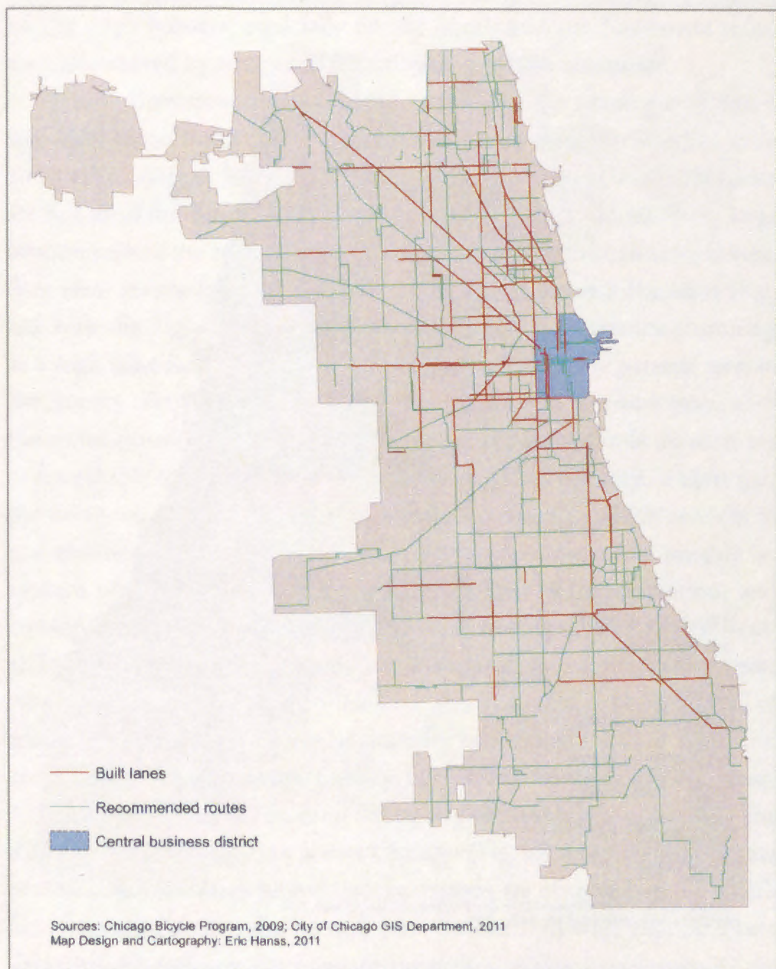


Fig. 18: Comparison of recommended routes and built bike lanes

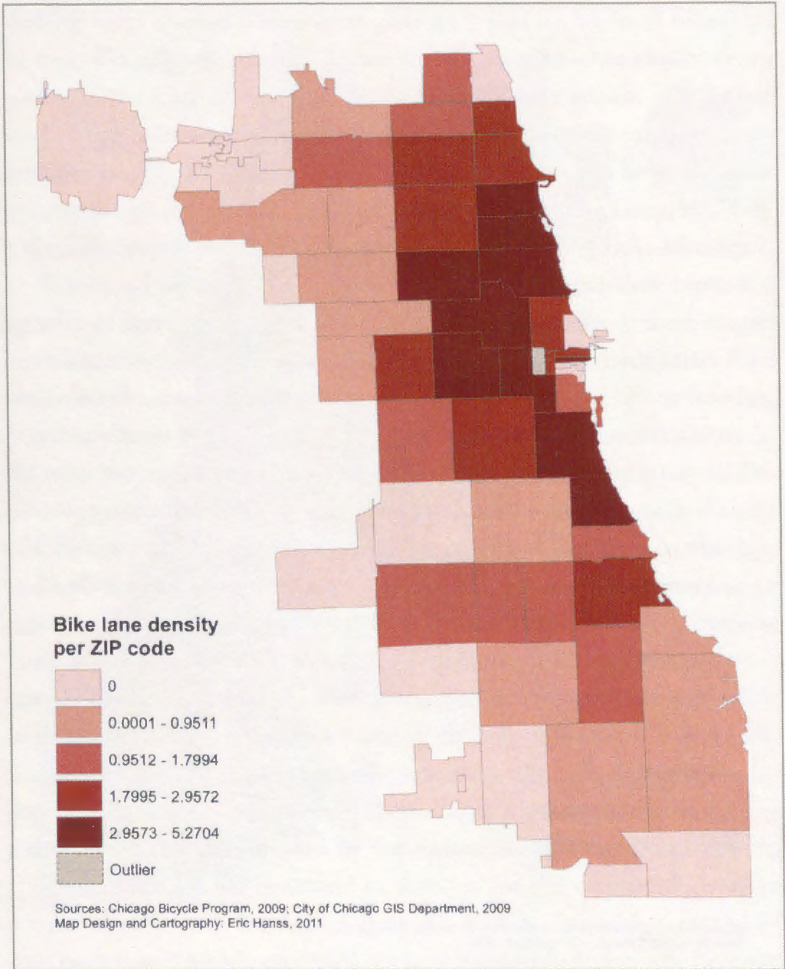


Fig. 19: Bike-lane density per zip code

in between. While these zips are by and large close to the central business district, the pattern shows a strong bias to the North Side, especially in the neighborhoods along Lake Michigan. This map makes clear that areas on the city's borders, especially on the South and the Northwest sides, are underserved by the current distribution of bike amenities.

I next determined whether the pattern on the density map was a statistically significant cluster or the result of a random distribution. I ran an Anselin Moran's I function to determine clustering. (While zip codes are not ideal for Anselin Moran's I, as their large size and relatively large borders reduce the number of neighbors for each individual sample area, they were necessary to use for the reasons noted above.) The areas (Fig. 20) with the highest Z-scores, appearing in red, demonstrate clustering at a high bike-lane density significant to 1 percent. The pattern seen in the density distribution above is largely repeated in this new map, with the zones around Hyde Park notably disappearing. Not only do these zip codes exhibit true clustering, they represent a local network, a tight spatial unit with a high availability of bike lanes, many of which connect to one another. The group of zip codes in this cluster contain roughly 49 percent of the city's total bike lanes, 23 percent of its population, and constitute 15 percent of its total area. These discrepancies between availability of bike lanes and population and size of area indicate that these amenities, so fundamental to the *Bike 2015 Plan* and the overall goal of reaching a short-distance modal share for bike-based travel of 5 percent, are not located evenly across the city, but are concentrated in select areas.

Population density is not a strong explanation for this pattern. The distribution of population across Chicago (Fig. 21) does not mirror that of bike lanes, although higher concentrations are observed on the North Side in general and in the zip codes on the lakefront with high bike-lane densities. An ordinary least square regression, taking lane density as the dependent variable and population density (as of the 2000 Census, Sample File 1 100 Percent) as the explanatory variable, results in an adjusted r^2 of approximately 0.16 (Table 1). The lack of explanatory power rules out population density as a determining variable.

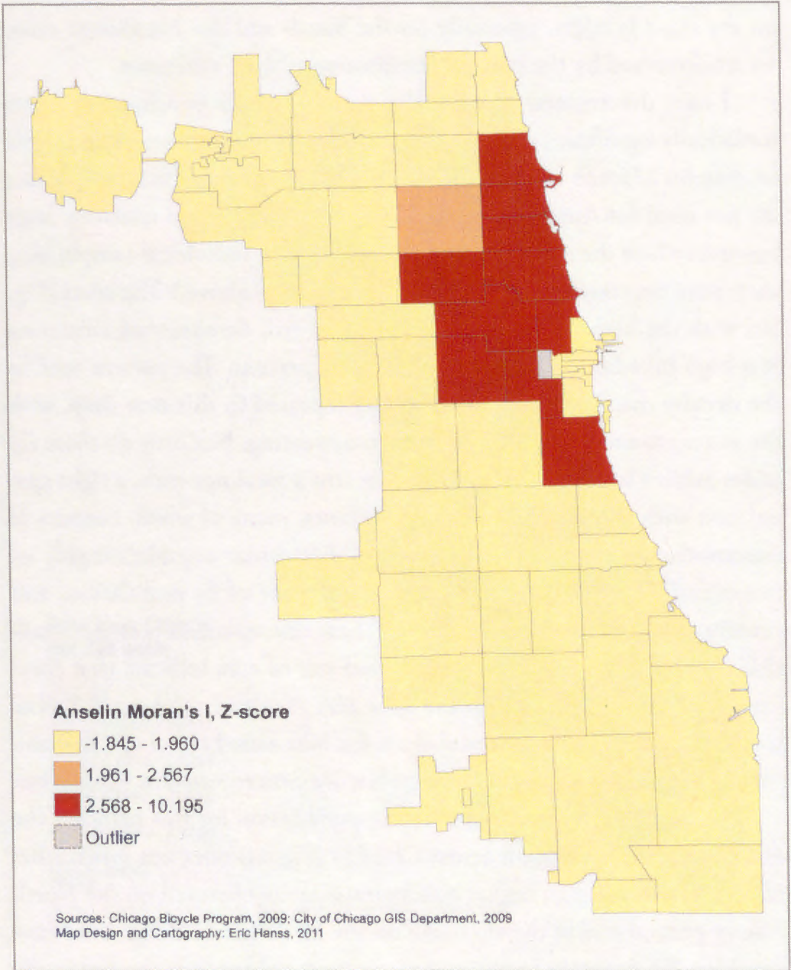


Fig. 20: Clustering of zip codes with high bike-lane densities

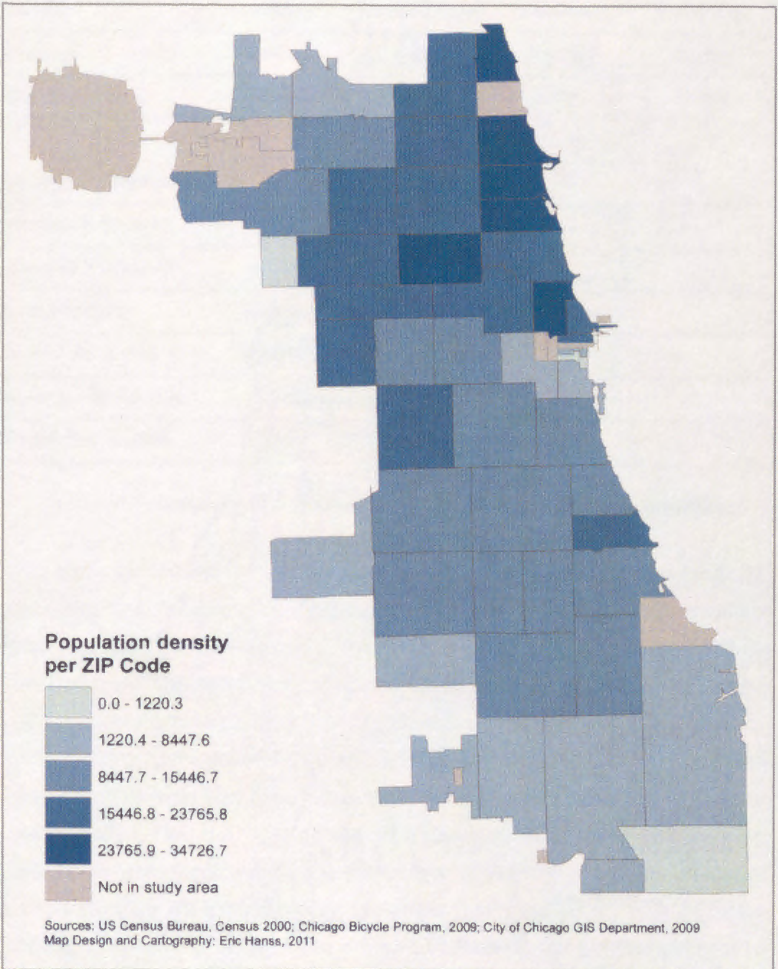


Fig. 21: Population density per zip code

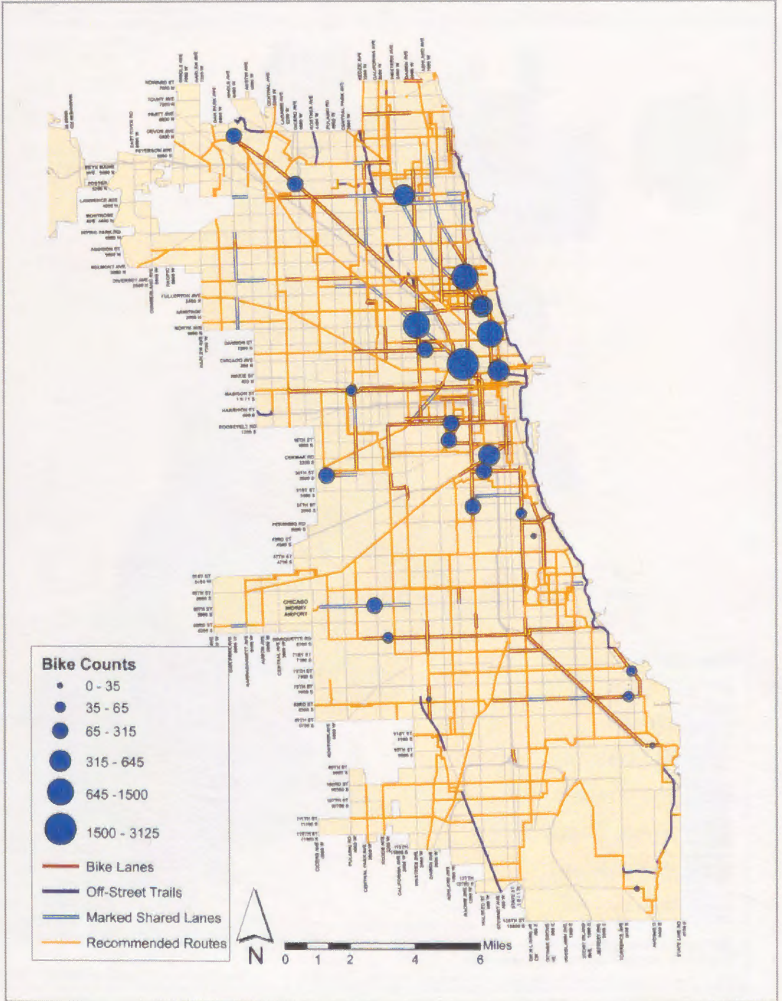


Fig. 22: 2009 Bike Counts Project, 2011

Population Per Zip: Ordinary Least Squares Regression

Variable	OLS Results			
	Coefficient	Standard Error	t-Statistic	Probability
Intercept	0.2974	0.4122	0.7217	0.4741
Population_2009	0.0001	0.0000	3.2387	0.0021
OLS Diagnostics				
Degrees of Freedom:	49			
Multiple R-Squared:	0.1825			
Adjusted R-Squared:	0.1651			
Joint FStatistic:	10.4893	Probability:	0.0022	
Joint Wald Statistic:	10.6035	Probability:	0.0011	
Koeneker BP Statistic:	0.1522	Probability:	0.6965	
Jarque-Bera Statistic	11.5038	Probability:	0.0032	

Table 1: Population OLS returns, bike-lane density as dependent variable

Data collected by the *Chicago Bicycle Program* in 2009 (Fig. 22) indicates that bike-traffic figures by total riders and percentage modal share are also much higher in this area. These counts were taken using the industry-standard procedure of laying selective pneumatic tubes calibrated to ignore passing motor vehicles over a one-day span. Twenty-six locations corresponding to an earlier study of motorists run in 2006, nineteen of which had bike lanes, were tested to provide a calculation for modal share. This is a weak study for making a clear correlation between bike lanes and increased modal shares due to the low number of sites and the possibility of confounding variables (weather, time, lack of repeat testing, and several equipment errors). However, the general geographical pattern of high ridership (Fig. 22) does demonstrate that bike counts are higher on Chicago's North Side.

Ridership counts on streets with bike lanes are much more substantial in the cluster of zips with high density than those that lie outside of

the cluster. The highest count is found immediately to the south of the zip code containing the maximum lane density (60622) on Milwaukee Avenue, a major corridor through several of Chicago's well-established and up-and-coming neighborhoods with amenities for consumers. The following section explores the human element of bike-lane implementation. Do these neighborhoods have residents more likely to use alternate modes of transportation? Do bike lanes keep these areas on the competitive crest, helping them to better attract talent and private development?

Bike Lanes and the Creative Class in Chicago

The large cluster of zip codes with high bike-lane density on the North Side and areas near the Loop encompasses the neighborhoods associated with Chicago's gentrification from the 1970s to the present day. This cluster stretches from Pilsen and University Village in the southwest to Logan Square on the northwest and spans the area between Uptown and the Near North Side along Lake Michigan. The correspondence between high-bike lane density and citywide highs for ridership figures and modal share as demonstrated by the *2009 Chicago Department of Transportation's Bicycle Count Survey* demonstrates not only a high presence of built bike amenities, but a strong affinity for cycling in these areas. These areas have experienced residential and commercial revitalization, intensification, and the cultivation of high levels of specialized consumer amenities, such as artisanal bakeries, wine bars, and art galleries. They are by and large defined as Chicago's creative-class areas, containing several neighborhoods previously studied in the literature, principally Greene's high amenity-zone (Greene 2006) and Lloyd's Wicker Park. (Lloyd 2006)

Creative-class theory, amenity theory, and urban bicycle plans reflect quality-of-place and lifestyle considerations required by talented individuals. High numbers of cyclists provide a dynamic vitality to the urban streetscape and social opportunities, from participation in Critical Mass to bar crawls to small group rides and social visits. The improvements to air quality boost the attractiveness of a city to talented individuals. A review of the bike-planning literature indicates that household structure

and employment status have significant effects on cycling rates. Individuals with demographic characteristics aligned with studies of the creative class by Lloyd, Florida, and Clark—students, those without children, part-time workers, and part-time workers without children—are more likely to cycle for non-recreational purposes than those with families and full-time jobs. (Heinen 2010, 70) Bike-friendly cities provide recreation, socialization, consumption, an improved environment, and a bustling street scene, which align with creative-class values.

Recalling the importance of attitudes and perceived social norms on bicycle modal shares, the bike lanes indicate a city's tolerance (a key part of Florida's rubric) and support of important social values. As limited, place-based physical amenities, bike lanes do not form a coherent network over most American cities—they make certain neighborhoods and corridors more attractive to the creative class, who hold the benefits of biking in high regard. Chicago's politicians understand the relationship between bikeways and talent. During his run for mayoral office in 2011, Rahm Emmanuel included a program directed towards college students studying technology industries. The *Chicago Sun-Times* reported:

He would only say that Chicago's "night-life and cultural life" would be showcased. So would his plan to add 100 miles of bicycle paths over four years because that's the mode of transportation favored by so many techies. "Young people are looking for a city that's got a quality of life and a capacity to build a career and, maybe one day your own company. All of those aspects are going to be what I use to market the city," he said. (Spielman Feb 12, 2011)

Emmanuel also held a press conference in a Wicker Park bike shop during his campaign to detail his support for continued bike planning. These events communicated not only the city's interest in amenity development, but the effects of these amenities on where young, talented individuals choose to live.

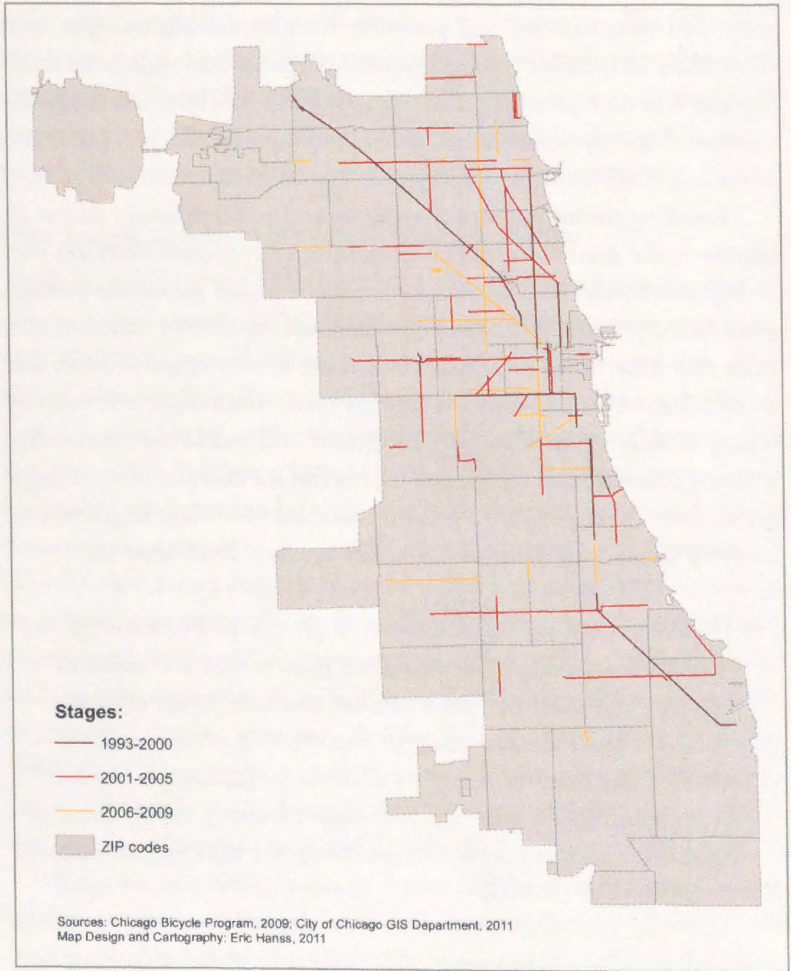


Fig. 23: Bike-lane development by stage, 1993–2009

The spatial concentration of bike amenities in creative-class gentrification zones can be better observed when the growth of the bikeway network is broken down into stages. The three stages (Fig. 23) roughly fall under the *Bike 2000 Plan* between 1993–2000, the inter-plan years of 2001–2005, and the current phase of development under the *Bike 2015 Plan*, 2006–2009. The most recent development reinforces the system of bike lanes already in place in gentrifying neighborhoods: Pilsen, the West Loop, Ukrainian Village, Wicker Park, and Logan Square saw increases in bike lanes (Fig. 23), while fringe areas, which received a fair share of bike lanes in the first stage, received very little after the initial period. The creative-class hypothesis suggests that new lanes were built in demonstrated areas of strong bicycle usage. This raises the question introduced above of whether higher and more visible concentrations of bike lanes create neighborhoods that are more attractive to talented people.

I ran a multivariate regression of bike-lane density using creative-class variables to explore the correlation between the location of these amenities and talented individuals. Florida indicates that members of the creative class, by and large, are young, mobile, and well educated. I used demographic data from the *2000 U.S. Census Sample File 1* to determine the percentage of the population who were twenty-five to thirty-four years old, the percentage of the population with a bachelor's degree or higher, and the percentage never married per zip code. (While many members of the creative class are over thirty-four and married, these variables targeted the young, highly mobile talent that cities seek for long-term growth.) I aggregated the data points from the census block level, which lead to some error as census blocks do not correspond perfectly with zip code areas. I removed some zip codes from the analysis due to insufficient data or null variables. All three variables exhibited significant spatial autocorrelation (Fig. 24), with a strong correspondence with the high-lane density cluster demonstrated in the previous section. Autocorrelation, however, indicates that the explanatory and dependent variables are not themselves perfectly spatially independent, making the model weak for regression. With these reservations in mind, I ran the

multivariate model. The results from the regression showed a strong correlation between the dependent and explanatory variables, with high percentages of creative-class individuals explaining 49 percent of the distribution of bike lanes across Chicago (Table 2). The residuals are distributed randomly (Fig. 25).

Creative Class: Ordinary Least Squares Multivariate Regression

Variable	OLS Results			
	Coefficient	Standard Error	t-Statistic	Probability
Intercept	-1.3834	0.5289	-2.6156	0.0128
PCT_Degree	0.5025	0.9278	0.5416	0.5907
PCT_Never Married	1.0796	1.3513	0.7990	0.4285
PCT_25_34	12.6042	2.5813	4.8829	0.0000
OLS Diagnostics				
Degrees of Freedom:	49			
Multiple R-Squared:	0.5237			
Adjusted R-Squared:	0.4920			
Joint FStatistic:	16.4944	Probability:	0.0000	
Joint Wald Statistic:	70.2438	Probability:	0.0000	
Koeneker BP Statistic:	0.0255	Probability:	0.9989	
Jarque-Bera Statistic	5.1934	Probability:	0.0745	

Table 2: Creative-class multivariate OLS returns, bike-lane density as dependent variable

Despite the difficulties posed by the strong autocorrelation of both the dependent and independent variables, this multivariate creative-class model possesses a high degree of relevance. The randomly distributed residuals and the high Joint F and Joint Wald statistics indicate that the distribution of the explanatory variables is not skewing the data. Most importantly, the adjusted R-squared of 0.49 has much more explanatory

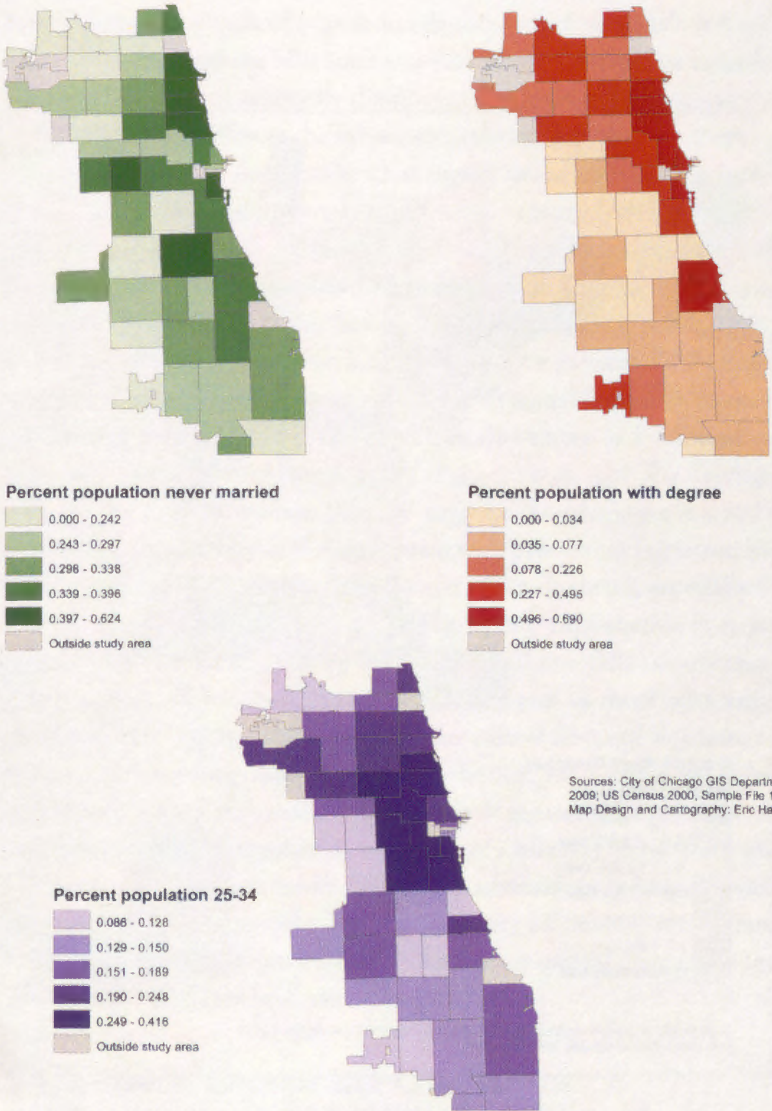


Fig. 24: Clustering of creative-class variables by zip code

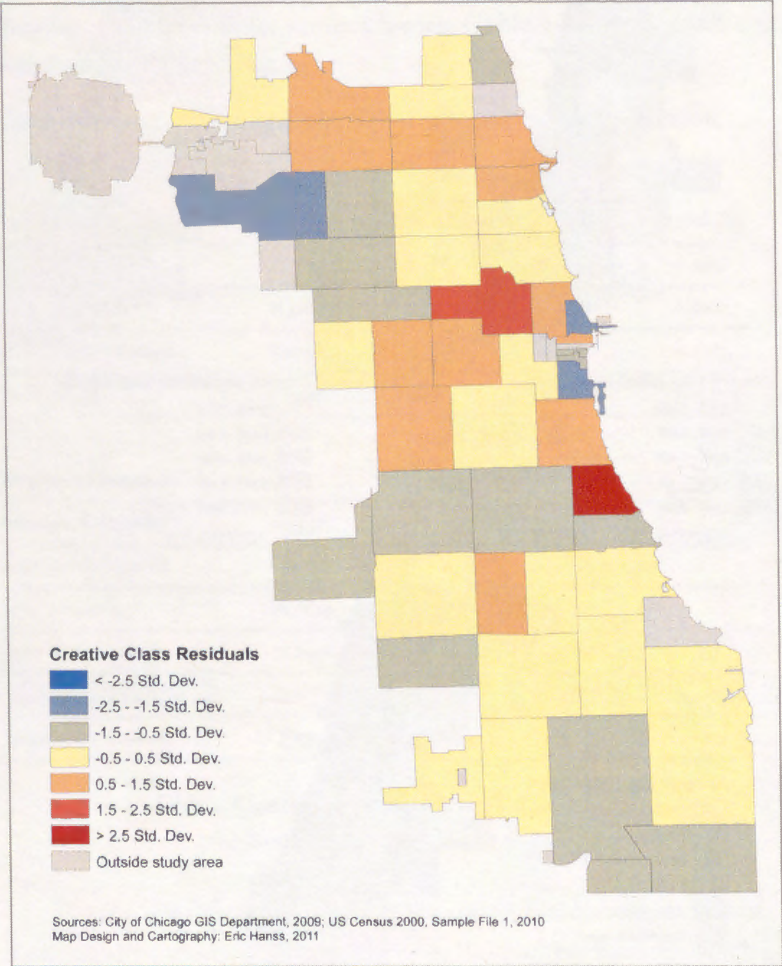


Fig. 25: Creative-class multivariate regression residuals

power than the normalized population density (which was 0.16). It is telling in itself that both the bike lanes and the chosen creative-class variables are clustered and not randomly distributed throughout the city, and the high correlation reinforces the substantive relationship between them.

The strength of the creative-class model raises the question introduced earlier—is there a two-way relationship between high cycling rates and the number of bike lanes? To return to the bike traffic counts in Figure 22, there is an association between lanes and higher numbers of riders. A causal relationship, however, is not apparent. Pucher, Komonoff, and Shimek caution that bike lanes are not a panacea: “We are not aware of any rigorous statistical studies of their actual impact on increasing cycling levels; to some extent, such facilities may be a response to increased cycling instead of its cause.” (Pucher 2004, 107) The development of the Chicago system (Fig. 23) suggests that the latter is a more substantive explanation in this case. Areas with preexisting infrastructure have been filled-in during the latest phases of development, especially in the hypothesized creative-class zone, in lieu of new construction in as-yet unreached areas. As an amenity, bike lanes fulfill mutually complementary purposes, by bolstering neighborhood appeal to those who value cycling and by raising cycling levels. In the case of Chicago, a pattern of self-selection is present and supported by the city. The Richard M. Daley administration has increased the desirability of gentrified neighborhoods to a particular demographic by making early bikeway networks more comprehensive and high-profile. The Daley administration has cultivated the image of a more modern and attractive city by cultural promotion, hallmark public-space development, and environmental policy. The use of bikeways in this context comes as no surprise.

5. Chicago in Context and Conclusions

Earlier parts of this study illustrated how Chicago has positioned itself as a leader in the contemporary environment of urban competition driven by new urban visions with the large bikeway network, among other

projects. *The Bike 2015 Plan* boasts five hundred miles of lanes, recommended routes, and paths by 2015. (*Bike 2015 Plan* 2005, 6) New York City's bikeway program, discussed in Section 4, mirrors and exceeds Chicago's efforts with nine hundred miles of planned lanes and paths. ("Bicycle Network Development" 2011) Chicago slipped to number ten, below San Francisco and New York on *Bicycling Magazine's* list of the top fifty most bikeable cities in 2010.

Both Chicago and New York compete in ways that are unique to large American cities. As seen in Section 4, smaller cities, like Minneapolis, Portland, Madison, and Seattle, do not market their sustainability initiatives as aggressively, which was demonstrated in the inclusive character of the Portland bike map. These cities implemented comprehensive transportation and land-use policies at an earlier date and did not experience rapid industrialization and suburban expansion to the same extent as Chicago, New York, or Los Angeles. America's large cities, which were burdened by negative perceptions of a decaying urban fabric and poor environment, had to reinvent their images. Many of the observations about Chicago made in this study hold for large cities on the whole and lack the same relevance to smaller cities.

City size poses particular obstacles to program effectiveness. Overall 54 percent of Chicago's households bike at least once a year, and just over 10 percent bike four times or more a week. (Wilbur Smith Associates 2006, i) Recreational biking for health and fitness continues to be the top reason to bike in Chicago (Table 3), even among members of the regional advocacy organization, the Active Transportation Alliance, formerly the Chicagoland Bicycle Federation. (2007 CBF Survey 2008) These statistics reflect the national trend. The city's overall modal share for bike use is not far above the national average of 1 percent when the bulk number of trips and relatively low percentage of regular use are considered. Many of the bike lanes monitored in the Chicago Department of Transportation's average-traffic-counts study had modal shares at or around the national mean, except in several notable locations (Table 4). The difficulty of raising modal shares across the board can be seen in the

reevaluated goals of the *Bike 2000* and *Bike 2015* plans, with the target for single-occupancy trips five miles and under shifting from 10 percent to 5 percent. It is unreasonable to expect mass movement towards bicycle commuting in such a short length of time. While bike-friendly programs, cyclist and pedestrian safety, and utilitarian bike use are noticeably on the rise, the question for policy makers is how much improvement can be expected without broader, systemic changes in the way American cities are planned on the whole. New transportation behavior and higher use of alternatives like bicycles can only be influenced by incorporating bikeways development with broader initiatives inhibiting car use.

Purpose	Cyclists	
	# of Records	% of Total
Go to/from work	34	10%
Work related travel	8	2%
Go to/from school	11	3%
Shopping	21	6%
Social	23	7%
Other personal business	7	2%
Recreation	184	52%
Fitness	58	17%
Other	5	1%
Total	351	100%

Table 3: Cyclists by purpose of latest bicycle trip, the *Chicago Department of Transportation's Bike User Survey*

Location	Date Installed	Total Bikes	Mode Share	CDOT 2006
				MotorVehicle ADT
2985 E. 130th St	9/17/2009	21	0.5%	4256
469 W. 26th St	9/10/2009	220	2.35%	9226
4341 W. 26th St	8/17/2009	223	1.25%	17312
655 E. 43rd St	9/23/2009	32	0.40%	7585
3244 W. 59th St (westbound only)	8/26/2009	31	0.25%	13500
2858 E. 83rd St	8/19/2009	47	0.060%	8269
3421 E. 95th St	9/21/2009	31	0.20%	16788
2224 S. Archer Ave	8/24/2009	439	2.80%	15300
1324 W. Augusta Blve (westbound only)	10/7/2009	-270	2.85%	9200
1623 S. Blue Island Ave	9/8/2009	317	5.75%	5210
8216 S. Damen Ave	5/27/2009	10	0.05%	23672
430 N. Dearborn St	9/1/2009	510	3.05%	16113
3740 S. Dr Martin L King Jr Dr	8/25/2009	40	0.25%	15577
5118 N. Elston Ave	8/31/2009	251	1.55%	15308
2710 S. Halsted St	9/30/2009	889	5.75%	14544
3527 S. Halsted St	9/24/2009	197	1.25%	15308
2225 W. Lawrence Ave	5/21/2009	644	2.35%	26631
2710 N. Lincoln Ave (southbound only)	11/9/2009	379	5.00%	7200
2040 N. Lincoln Ave (southbound only)	10/6/2009	270	3.60%	7200
2938 W. Marquette Rd	8/20/2009	55	0.30%	17600
640 N. Milwaukee Ave	9/15/2009	3121	21.90%	11117
640 N. Milwaukee Ave	11/12/2009	2083	15.80%	11117
1616 N. Milwaukee Ave	10/1/2009	1065	7.70%	12763
6324 N. Milwaukee Ave	9/29/2009	155	0.60%	26810
1249 W. Roosevelt Rd	9/9/2009	282	1.05%	26802
7750 S. South Shore Dr	9/22/2009	47	0.3%	16332
3658 W. Washington Blvd	5/18/2009	63	0.55%	11794
1325 N. Wells St	9/14/2009	1501	7.80%	17706
1325 N. Wells St	11/10/2009	978	5.25%	17706

Table 4: Observed results from the 2009 Bike Count Study

Amsterdam, named the cycling capital of Europe, is the international model for bikeway construction in the United States. In contrast to Copenhagen, which developed its bikeway network very early, Amsterdam's network was developed in the 1980s at the same time as comprehensive networks in larger U.S. cities. In 2003, 38 percent of all trips, 34 percent of work trips, and 33 percent of shopping trips were made by bike in Amsterdam. (Pucher 2010, 37) The city has over 200 km of on-street bike lanes and 200 km of bike paths, leading many to correlate dense networks of bike lanes to high modal shares. Achieving the same level of everyday, utilitarian bike use as in Amsterdam would require incubation of a pro-bike culture, a large amount of traffic calming, and comprehensive land use and urban transportation policies that would reduce the importance of the automobile in daily life.

It is unreasonable to expect a bike program in Chicago or other large American city to be as effective as Amsterdam's. In America, local governments are responsible for the bulk of bikeways spending, which requires coordination between city departments and metropolitan-planning organizations. Some planners have suggested that federal policy should establish specific goals and provide assistance in meeting them. (Handy 2011, 36) Perhaps the federal government could foster comprehensive transportation strategies to complement existing regional suggestions, such as the Chicago Metropolitan Agency for Planning's *GO TO 2040*.

As seen in the case of Chicago, interurban competition dictates how bike policy is implemented and where bike lanes are built. More bike lanes exist in the creative-class enclaves on the North Side than in poor neighborhoods on the West and South. Once used to reach environmental goals, bike lanes are now viewed as amenities, which lead to economic development, as was demonstrated during Rahm Emmanuel's mayoral campaign.

In local contexts are bike programs truly sustainable? Sustainability is traditionally evaluated under the rubric of the three E's—environment, equality, and economics. The Chicago example illustrates that, while levels of commuting have grown since the creation of the *Bike 2000*

Plan, bicycles have not yet gained a percentage of the modal share large enough to have a direct environmental benefits. Like cities across the world, Chicago's bikeways illustrate foresight in future development and transportation needs. Economically, the bikeways contribute to long-term neighborhood success by attracting talented residents who start firms, create demand for services, and invest in housing.

The distribution of bikeways in one cluster, however, is not equitable. Many of Chicago's poorest neighborhoods have few on-street bike lanes or none at all. David Wilson has laid out the most pointed critique of Chicago's recent gentrification, driven by Tax Increment Financing:

In ascendant neoliberal Chicago, there is a heightened privileging of a supposed "creative class" and an intensified de-privileging of the African American poor. On the one hand, more land and government resources are turned over for an emergent gentry class, to provide homes, communities, supportive retail bases, and nourishing public spaces. On the other hand, the already ghettoized black poor experience a reduction in basic things: housing subsidies, job training, decent paying jobs, and public school funding. In the name of city survivability, this trend is powerfully rationalized in a supposed new era of bitter intercity competition and stark global times. In the tenor of the times, mobilizing public and private resources to "re-culturalize" and re-gentrify the city is not a luxury, but a necessity. (Wilson 2006, 202)

Are there larger social costs associated with bikeways construction? Does bikeways development benefit all of Chicago's residents, or does it result in what Brian Berry has termed "islands of renewal in a sea of decay?" (Berry 1985) Recommended bike routes reach throughout the city, as do a certain number of bike lanes—the dominant distribution, however, is clustered in Chicago's gentrified or gentrifying neighborhoods.

Bike lanes, like other public goods, collect in areas where political will, demand, and economic forces coincide. Even the best intentioned

plans can result in unsustainable outcomes such as differential development in rich and poor neighborhoods. To best avoid this danger, bike lanes must be recognized as amenities that make cities more exciting and appealing than the suburbs, helping to reverse decades-long trends of low-density expansion and bring life back to the city center. At the same time, if bicycle programs and the benefits they provide are to serve all and bring down automobile dependency, they cannot be evaluated on levels of ridership and bike-lane mileage alone. They must be considered as part of a total system, encompassing social, environmental, and economic concerns. Bikeway networks need to be distributed equitably throughout the city. Truly sustainable and successful cities must come to recognize that bikeways are not a panacea in and of themselves, they are a product of "the entire socio-economic-political-cultural life of the time." (Hall 2002, 5)

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