

# Pedestrian and Bicyclist Standards and Innovations in Large Central Cities

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## **EXECUTIVE SUMMARY**

For many years, planning and policy decisions regarding surface transportation in large central cities took place within a framework in which the roadway and transit were central, with pedestrians and bicyclists just two more components that had to be worked in where possible. However, the Intermodal Surface Transportation Efficiency Act (ISTEA) began to change this way of thinking beginning in 1991 when it provided new sources of funding for bicycle and pedestrian facilities; these provisions were extended under the 1998 Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21).<sup>1</sup>

Nevertheless, some fifteen years later, promoting walking and bicycling while ensuring safety and mobility for the overall transportation system, continues to present a challenge, especially for large central cities, which must balance multiple and competing interests while facing limited space and funding. Further, they must address such issues with limited data in a number of areas, including safety, design, and usage.

Funded by the Federal Highway Administration (FHWA) and performed in conjunction with the National Association of City Transportation Officials, Inc. (NACTO), this report is the culmination of a year-long effort aimed at reviewing pedestrian and bicyclist standards and innovations in large central cities. The study involved a literature review and analysis of the challenges facing large central cities when trying to support pedestrians and bicyclists, as well as a review of several promising approaches being taken in various cities. In September 2005, a peer-to-peer session with representatives from ten cities, and several agencies and advocacy groups, was held to fill in gaps related to these approaches and policy concerns. The following report is a compilation and synthesis of the findings from both these endeavors.

### **Why Large Central Cities are Different**

Large central cities have several unique features relative to other locales. First and foremost is the sheer difference in size, geographically as well as overall population and density. In these cities, having more pedestrians than motor vehicles in their downtowns at certain times of the day is common place. Diversity is a second complicating factor in large central cities. Multiple languages and customs make encouraging stakeholder involvement, improving safety through education, and communicating policies and regulations more difficult.

A third factor unique to large central cities is the degree to which transportation must function within a built urban environment. Adding bicycle racks to all buses may be an excellent policy, but how does one accomplish this when roadways have insufficient widths or turning radii to allow buses to pass with additional accoutrements? Similarly, how does one widen a sidewalk when the choice is either to raze the buildings on one side or take space from a roadway already too narrow by current standards for the one lane that currently exists?

A fourth distinguishing factor of large central cities is the use of multiple modes by travelers. It is common for people to walk to and from transit or to use an automobile to park at a station, get on commuter rail, and then walk or use transit within the city. Finally, unlike their smaller urban counterparts, large central cities are more likely to have large recreational facilities utilized by bicyclists and pedestrians. Such facilities often difficult to access and tend to fall under different jurisdictional authority than the rest of the transportation system, making it difficult to fully integrate them and ensure easy and safe access.

### **Common Themes**

While bicyclist and pedestrian are often dealt with in tandem, this is an artificial construct. The key issues and concerns facing bicyclists and pedestrians are, in fact, somewhat different and even contradictory at times. According to FHWA, whether a person decides to walk or bicycle is related to a three-tiered hierarchy of factors: initial considerations, trip barriers, and destination barriers. For walking, the most significant barriers are related to safety (both perceived and actual), access, and aesthetics. Yet, while safety is also a barrier for bicyclists, the latter are more influenced by the third tier of factors – existence of facilities, system continuity, and access to transit – than are pedestrians.

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<sup>1</sup> Note that at the time this report was completed, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was just recently signed. Thus, the discussion in this report regarding federal involvement with bicycling and pedestrians relates to the prior authorizing legislation.

Nevertheless, several policy and planning themes are common to both and, two in particular stand out in discussions – funding and lack of data.

- **Federal Funding Exists...But Does Not Always Translate to Local Projects.** The key issue related to funding turns out not to be lack of availability of federal funding, but whether the availability of the monies translates into programs that prioritize pedestrian and bicyclist projects at the regional and local levels. The result is often increased restrictions on pedestrian and bicyclist projects at the local level. Further, when funding is scarce, often it is these projects and programs that are curtailed first.
- **Performance Measures and Data are Lacking.** To effectively plan and develop policies, it is necessary to know what one is managing. Good quality and relevant data is critical toward this end. However, useful and quality data is hard to find for pedestrians and bicyclists. Many cities do not collect such data or, if they do, it is to deal with a specific issue that has arisen, rather than on a regular basis. Even where data exists, there are often significant gaps. Justifying bicycle and pedestrian programs without sufficient data is difficult, especially when there is an overall under-valuation of non-motorized forms of transport.

### **Notable Examples and Policy Concerns and Approaches**

Several cities have managed to negotiate the various obstacles and have found opportunities for increasing bicycling and pedestrian activities. Oakland, CA, the Maricopa Association of Governments in Arizona, and the Portland, OR have all developed pedestrian Master Plans. The City of Portland has taken a step further with a *Pedestrian Master Plan* and *Pedestrian Design Guide* that integrally link pedestrian designs and plans with other transportation and non-transportation plans and goals for the city.

New York City has instituted a number of traffic calming techniques to encourage pedestrian and bicyclist usage and enhance safety, while Quebec and Montréal have incorporated several design features for bicyclists including bicycle paths and lanes with separate rights-of-way from motorized traffic. Meanwhile, Palo Alto, CA and Phoenix, AZ have undertaken significant steps to link bicycling with transit, including provision of bicycle lockers and racks on rail and/or buses.

Several broad policy challenges remain.

- **Development of Clear Policy Priorities.** Foremost among the policy challenges, perhaps, is the need to develop clear policy priorities. With little data available, such policy priorities are of particular import in providing guidance when faced with multiple needs and concerns.
- **Increasing Awareness and Acceptance.** Awareness and acceptance are crucial to establish bicycling and pedestrian activities as parts of the overall transportation system. A number of cities have undertaken educational programs aimed at improving safety as well as encouraging walking and bicycling. However, most educational efforts focus on pedestrians rather than on drivers though enforcement among drivers remains a key issue. The only time drivers are given similar attention is when they are initially obtaining their drivers licenses or when they are attending a class to reduce their insurance costs (often because they already have had a moving violation). A few cities have reached out to drivers in one way or another, but much more could be done.
- **Leadership and Partnerships.** Strong leadership, both in the public sector and in the civic community, is a necessity, as are strong partnerships. Whether with other public agencies, private companies, advocacy groups, community groups, or schools, partnering is a critical factor for success.

There is a tremendous opportunity here for cities. Effective leadership that establishes clear policy priorities and positions bicycle and pedestrian programs in a way that helps solve larger societal issues (like obesity, diabetes, asthma) may prove particularly effective for increasing awareness and acceptance, as well as for leveraging funding for these programs.

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## I. INTRODUCTION

Increasing concerns with congestion, air quality, and more recently, public health, have spurred an interest on the part of policymakers in promoting walking and the use of bicycles, both for recreation and utilitarian (work-related) purposes. In 1991, the Surface Transportation Efficiency Act (ISTEA), provided for new sources of funding for bicycle and pedestrian facilities; seven years later, the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) extended these funding provisions.<sup>2</sup> During that time, as part of the 1994 National Bicycling and Walking Study, the U.S. Department of Transportation (USDOT) formally adopted a policy to increase non-motorized transportation to at least 15% of all trips while simultaneously reducing by at least 10% the number of non-motorized users injured or killed in traffic crashes.<sup>3</sup>

Federal planning requirements now include consideration of bicycles and pedestrians in state and metropolitan planning organization (MPO) long-range transportation plans. Furthermore, such projects must be considered in conjunction with all newly constructed and rehabilitated facilities. However, how best to promote the use of bicycles and walking, while ensuring safety and sufficient mobility for motor vehicles, presents an ongoing challenge in many locales, and while there are numerous guidelines, there are no national standards. For large central cities, the issues are particularly complex as they balance multiple and competing interests while facing limited space and funding. Further hampering policy and planning initiatives for bicyclists and pedestrians are data limitations in a number of areas, including safety, design, and usage.

This report is the result of a year-long project funded by the Federal Highway Administration (FHWA), aimed at exploring pedestrian and bicyclist standards and innovations in large central cities. The project involved two phases – the first, a literature review and development of a background paper; the second, a peer-to-peer session, which was held in September 2005 in conjunction with the National Association of City Transportation Officials (NACTO), Inc., to explore broader policy concerns and challenges. This document represents a synthesis of the findings described in the background paper and the presentations and discussion during the workshop.

### WHY LARGE CENTRAL CITIES ARE DIFFERENT

Before moving on to explore various policy issues related to bicyclist and pedestrian standards, it is helpful to briefly discuss why it is important to deal with large central cities in a forum separate from discussions in other locales. Large central cities differ from other urban, as well as from rural and suburban, environments in several quantitative and qualitative ways that may have a direct impact on planning and policy related to bicyclists and pedestrians.

#### Orders of Magnitude and Diversity

The first way in which large central cities differ from other locales is in sheer size, both in terms of geographic size as well as population size and density. With respect to population, in many central cities, one can find more pedestrians than motor vehicles at certain times of the day and, as one transportation official noted, “sidewalks should be considered major arterials.”<sup>4</sup> Since every trip begins and ends with someone walking, even if for a short distance, accommodating pedestrians and ensuring their safety becomes a necessity. Yet, most planning and policy decisions still take place within a framework in which the roadway is the center, and pedestrians are “just one more” component.

For bicyclists, orders of magnitude make planning challenging in a different way. In areas with high urban congestion, there is less space to accommodate bicycles on buses or rail systems. Further, in areas with

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<sup>2</sup> Note that at the time this report was completed, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was just recently signed. Thus, the discussion in this report regarding federal involvement with bicycling and pedestrians relates to the prior authorizing legislation.

<sup>3</sup> U.S. Department of Transportation (USDOT), Federal Highway Administration (FHWA), *FHWA Guidance: Bicycle and Pedestrian Provisions of Federal Transportation Legislation (February 24, 1999)*, Accessed online 6/7/05, <http://www.fhwa.dot.gov/environment/bikeped/BP-Guid.htm#App-2>.

<sup>4</sup> David Seglin, Coordinating Planner II, Chicago Department of Transportation, quoted in Allison C. de Cerreño and Isabella Pierson, *Context Sensitive Solutions in Large Central Cities* (NY: NYU Wagner Rudin Center, February 2004), p. 3.

large transit systems, the decision-making frameworks are more complex and operations often take precedence over planning to incorporate bicyclist needs.<sup>5</sup>

Diversity presents another complicating factor for large central cities. Even as cultural diversity is a draw for many, multiple languages make encouraging stakeholder involvement, improving safety through education, and communicating policies and regulations more difficult. Diversity also presents an issue in terms of equity in many central cities, though how this affects or is affected by pedestrian and bicycling is not always clear and can be very different from city to city. In Los Angeles, for example, Michael Uyeno, Senior Transportation Engineer of Los Angeles Department of Transportation, noted that bicycle use is often higher in poorer neighborhoods where there is less access to transit and lower automobile ownership. However, according to Frank Murphy, Deputy Chief, Traffic Division for Baltimore Department of Transportation, the situation is very different in Baltimore where bicyclists tend to be younger and more affluent. Indeed, there is very little bicycling in Baltimore's distressed neighborhoods. In Philadelphia, the relationship is less obvious: lower rates of bicycling are found in predominantly Latino and Asian neighborhoods, and those communities with predominantly white populations show slightly higher rates of bicycling than those with predominantly African-American populations, but when one looks at income levels, the areas with most bicycle commuters are those closest to the City's median income level.<sup>6</sup>

### **Built Environment**

Another way in which large central cities differ is the degree to which transportation must function within a built urban environment. Especially in older central cities like New York, Boston and Philadelphia, many facilities date back several centuries and were not designed to accommodate the types of traffic and traffic patterns we face today. As a result, there is often limited right of way and widening sidewalks or streets in some places is impossible without razing buildings on either side. Decisions must be made on a daily basis as to which is more important for the overall capacity of the system. Similarly, adding bike lanes onto streets which already have narrow traffic lanes and sidewalks beneath current design standards, becomes a dilemma, as does adding racks to buses when the road system cannot accommodate the resulting larger widths and necessary turning radii.<sup>7</sup>

Beyond the design and operational difficulties faced by large central cities is a perception problem. As FHWA notes in its "Design Guidance for Accommodating Bicycle and Pedestrian Travel,"

Retrofitting the built environment often provides even more challenges than building new roads and communities: space is at a premium and there is a perception that providing better conditions for bicyclists and pedestrians will necessarily take away space or convenience from motor vehicles.<sup>8</sup>

Finally, as noted by Barbara Gray, Senior Transportation Planner at Seattle Department of Transportation, land tends to be significantly more costly in central cities than in other regions of the country. This combined with greater competition for limited funding sources, makes it difficult for such cities to obtain right of ways even where there is sufficient space.

### **Multi-Modal and Short Trips**

Large central cities are more likely to have multiple modes used by single transportation customers than are other locales. It is not uncommon for people living in these cities to bike or walk to transit; and for people commuting to these cities, using an automobile or bus to link to commuter rail or express bus and then further linking to subways or buses and/or walking within the city is the norm. Thus, making sure that transit systems are easily accessible and that they are integrated into the roadway system in a way that makes it safe for pedestrians or bicyclists to access is particularly important.

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<sup>5</sup> John Doolittle, Jr. and Ellen Kret Porter, *Synthesis of Transit Practice 4: Integration of Bicycles and Transit* (Washington, DC: National Academy Press, 1994), p. 9.

<sup>6</sup> Based on a brief analysis of Census data by Deborah Schaaf.

<sup>7</sup> Doolittle and Porter, *Synthesis of Transit Practice 4*, p. 9.

<sup>8</sup> USDOT, FHWA, "Design Guidance – Accommodating Bicycle and Pedestrian Travel: A Recommended Approach," *A US DOT Policy Statement, Integrating Bicycling and Walking into Transportation Infrastructure*, Accessed online 6/8/05, <http://www.fhwa.dot.gov/environment/bikeped/design.htm>.

Another complication of these multi-modal trips is that when trying to measure pedestrian or bicycling usage, bicycling and especially walking often end up undercounted. Similarly, in large central cities where many people take short walks (e.g., across a few blocks for lunch or to go to the ATM), origins and destinations often occur in the same planning zone and are not measured. Thus, when facilities are built, the number of pedestrians is often underrepresented and planning does not take account of them to the degree that it should.

### **Recreational Facilities**

Finally, large central cities tend to have large recreational facilities scattered around their cities that become major attractions for hundreds of thousands of pedestrians and bicyclists on a daily basis. Linking these recreational facilities with the rest of the transportation system and ensuring sufficient access, either directly or via transit, is critical. However, designated sources of federal funding are different for recreational use and transportation use, and jurisdictional boundaries exist with many of these facilities so more than one agency is involved, making such links more difficult than one might at first imagine.

### **FRAMEWORK FOR THE REPORT**

The following pages explore the policy and planning issues confronting policy makers and planners in large central cities as they address bicyclist and pedestrian needs and concerns. Section II discusses several policy themes common to both pedestrians and bicyclists, looking in particular at funding, performance measures, and issues of context sensitive design. Recognizing that not all the concerns and needs are the same for pedestrians and bicyclists, and that sometimes they are, in fact, contradictory, Sections III and IV focus separately and specifically on pedestrian issues and bicyclist issues, respectively. Given the lack of data and performance measures, best practices could not easily be identified during the course of this study. However, Section V highlights several promising approaches being taken in several cities around the United States and Canada. Finally, sections VI and VII offer a broader discussion of policy challenges and potential solutions as well as some concluding thoughts.

## II. COMMON POLICY THEMES RELATED TO BICYCLISTS AND PEDESTRIANS

Though bicyclists and pedestrians are often dealt with in tandem as they are in this report, it is important to note this is an artificial construct since the key issues and concerns are somewhat different. Further, in some instances, pedestrians and bicyclists present competing, rather than complementary needs and goals, particularly in large central cities where space is so limited.

With that said, several broad policy and planning themes are common to both bicyclists and pedestrians. This section will briefly explore several of these themes, touching on funding, performance measures, and context sensitive design/solutions (CSD/S). At the root of each of these is the broader issue of how to effectively balance the multiple, and often contradictory, needs of the different users and stakeholders of the transportation system.

### FUNDING

Bicycle and pedestrian projects are eligible for funding from most major Federal-aid highway, transit, and transportation safety programs.<sup>9</sup> Among them are the Congestion Mitigation Air Quality Program (CMAQ), the Surface Transportation Program (STP), the National Highway System (NHS), the Federal Lands Highways Program (FLH), and Federal Transit Capital, Urban & Rural Funds. Many of these programs, CMAQ, STP, and NHS among them specifically only cover transportation (i.e., non-recreational) projects, while the Recreational Trails Program is specifically geared toward funding recreational projects. Some of the funds may only be used for eligible construction projects, while others may be used for training (e.g., CMAQ), promotion of safety (e.g., STP, Transportation Enhancement Activities, State and Community Traffic Safety Program), and planning (e.g., STP, CMAQ, State/Metropolitan Planning Funds). Appendix A provides a complete listing.

According to FHWA, between FY 1992 and FY 2005, the number of new pedestrian and bicycle projects grew significantly, with 50 in 1992 and over 1,000 in 2005.<sup>10</sup> While these numbers are underestimated since they only include those projects coded as bicycle/pedestrian projects and likely exclude many bicycle/pedestrian components of larger highway projects, they are still indicative of an increased focus on such types of projects. There has been some fluctuation over the years (with a peak of 1,287 in 2002), but the majority of funding for these new projects has been derived from Transportation Enhancements (TE) under the STP. These funds are particularly flexible and may be used for projects on federal-aid highways and local highways, bridges on public roads, and transit facilities.<sup>11</sup> After TE, the next largest pot of funds that has been drawn upon for pedestrians and bicycles is CMAQ, which from 2000 to 2004 provided an average of almost 11% of the funding for new projects.<sup>12</sup>

Thus, a wide array of possible funding is available from federal programs. ***However, whether the availability of federal money translates into programs that prioritize pedestrian and bicyclist projects is really the crux of the funding issue.*** Indeed, FHWA is the first to point out that, “eligibility does not, however, guarantee that bicycle and pedestrian projects, plans, and programs will be funded – States and MPOs retain broad control over project selection procedures and choices and can set their own priorities for funding.”<sup>13</sup> The result is often increased restrictions on pedestrian and bicyclist projects at the local level. Utah, for example, limits eligibility of pedestrian projects for Transportation Enhancements funding to projects costing \$100,000 or more. According to Wayne Cottrell and Dharminder Pal, “this requirement eliminates many smaller projects, such as installing a sidewalk along a street.”<sup>14</sup> Of additional concern is that when funding is tight, bicycle and pedestrian projects are often among those first curtailed.

<sup>9</sup> USDOT, FHWA, *Bicycle and Pedestrian Provisions of the Federal-Aid Program*, p. 1, Accessed online 3/10/05, [www.fhwa.dot.gov/environment/bikeped/bp-broch.htm](http://www.fhwa.dot.gov/environment/bikeped/bp-broch.htm). Also, USDOT, FHWA, *FHWA Guidance: Bicycle and Pedestrian Provisions of Federal Transportation Legislation (February 24, 1999)*.

<sup>10</sup> USDOT, FHWA, “Federal-Aid Highway Program Funding for Pedestrian and Bicycle Facilities and Programs,” Accessed online 3/10/05, <http://www.fhwa.dot.gov/environment/bikeped/bipedfund.htm>.

<sup>11</sup> Ibid. Also, USDOT, FHWA, “FHWA Guidance: Bicycle and Pedestrian Provisions.”

<sup>12</sup> USDOT, FHWA, “Federal-Aid Highway Program Funding for Pedestrian and Bicycle Facilities and Programs.”

<sup>13</sup> USDOT, FHWA, “FHWA Guidance: Bicycle and Pedestrian Provisions.”

<sup>14</sup> Wayne Cottrell and Dharminder Pal, “Evaluation of Pedestrian Data Needs and Collection Efforts,” in *Transportation Research Board 2003 Annual Meeting CD-ROM*, p. 8.

## Short-Changing Pedestrians and Bicyclists?

*Mean Streets 2004*, a Surface Transportation Policy Project (STPP) report by Michelle Ernst, analyzes federal transportation funds over the 12-year period from 1992-2003 and finds that no state spends more

### Where Did That Sidewalk Go?

*While sidewalks are generally built for pedestrians, they end up being used (and arguably misused) for many other functions which narrow the actual space for those who are walking. The following is adapted from "Sidewalk Saga: The Uses and Abuses of Sidewalks," a list created by Bill Wilkinson, AICP, and inspired by walks around San Diego, New York City, and Bethesda.*

#### Artwork

Awnings and supports  
Barricades and bollards  
Benches  
Bus shelters and queues  
Construction scaffolding and storage  
Dining  
Dog walking ... and excretions  
Driveways  
Elevator hatches and stairways  
Feeding pigeons, squirrels, other creatures  
Fences  
Grates  
Guy wires  
Kiosks and bulletin boards  
Loitering, pan-handling, smoking  
Hydrants  
Mailboxes  
Meters and fee vendor machines for parking  
Newspaper stands, boxes, and "stacks"  
Parking (bikes, scooters, cars, delivery trucks)  
Poles (street lights, telephones, other utilities)  
Pullouts (bus, taxi, hotel, and other)  
Recycling bins and boxes  
Signposts  
Signs ("A-board" and other types)  
Snow, sand, gravel storage  
Subway entrances  
Taxi stands, dispatchers, call boxes, queues  
Traffic signal poles  
Traffic signal and utility control boxes  
Trash receptacles, bags, and bins  
Trees, tree wells, planters, planting strips  
Umbrellas  
Utility covers  
Vendors, tables, displays, "carts"  
Water fountains (for drinking and watching)

than 2.5% of federal transportation funds on safety programs for pedestrians and/or bicyclists.<sup>15</sup> Additionally, Ernst suggests that for more than twelve years, states have missed the opportunity to allocate \$1.6 billion on bicycle and pedestrian projects available through federal law; instead "many states have chosen to leave this money on the table rather than do the projects that could make walking and bicycling safer for everyone."<sup>16</sup>

Anecdotally, it is important to note here that some state and local governments argue that the amount of money spent on bicycle and pedestrian facilities and safety is often undercounted. In many cases, they argue, when roadways or bridges are being rehabilitated, modifications for improved access or safety for pedestrians and bicyclists are made at the same time but such efforts are not formally tracked as pedestrian or bicycle-related projects. Further, while the percentages may still be small, the total amount of funding has increased greatly over the years. In 1991, states and MPOs spent \$17.1 million in federal funds on stand-alone bicycle and pedestrian projects; in 2001, that figure had risen to \$339.1 million.<sup>17</sup>

In *Whose Roads?*, Todd Litman relates similar findings to Ernst, noting that generally local governments provide about 5-15% of their transportation budgets on non-motorized modes while far less support is provided by other levels of government. He points to Oregon, a leading state in pedestrian and bicycle planning, noting that it spends only 2% of state transportation funds on non-motorized programs. Most states are spending less than 1% of their budget.<sup>18</sup> Ernst notes that these low levels of spending on pedestrian and bicyclist facilities results from the way funding is provided. "Because state Departments of Transportation typically control the vast majority of federal funds...federally-funded roads have tended to be designed and built with little regard to local needs..."<sup>19</sup> The result is often high-speed arterials, focused more on moving vehicles than on moving people or allowing for bicyclists; precisely the kinds of roads that pose the most hazards for pedestrians and bicyclists.

### Under-valuing Non-Motorized Transportation

Under-spending on bicycle and pedestrian programs results from a combination of under-valuation of non-motorized transport modes, undercounting of non-

<sup>15</sup> Michelle Ernst, *Mean Streets 2004: How Far Have We Come?* (Washington, DC: Surface Transportation Policy Project (STPP), 2004), p. 7, Accessed online 1/5/05, [www.transact.org/library/reports\\_html/ms2004/pdf/Final\\_Mean\\_Streets\\_2004\\_4.pdf](http://www.transact.org/library/reports_html/ms2004/pdf/Final_Mean_Streets_2004_4.pdf).

<sup>16</sup> *Ibid.*, p. 8.

<sup>17</sup> Jennifer Dill and Theresa Carr, "Bicycle Commuting Facilities in Major US Cities: If You Build Them, Commuters Will Use Them," in *Transportation Research Record 1828 – Pedestrians and Bicycles 2003* (Washington, DC: TRB, 2003), Paper #03-4134, p. 116.

<sup>18</sup> Todd Litman, *Whose Roads? Defining Bicyclists' and Pedestrians' Right to Use Public Roadways* (Victoria, BC: VTPI, November 2004), p. 6, Accessed online 4/12/05, <http://www.vtpi.org/whoserd.pdf>.

<sup>19</sup> Ernst, *Mean Streets 2004*, p. 7.



motorized trips, and inaccurate data on pedestrian and bicycle trips. According to Litman it is a common misconception among policy makers that pedestrian and bicyclists do not pay their fair share toward roadway costs because they do not pay vehicle user fees such as fuel taxes, vehicle registration fees, and road tolls.<sup>20</sup> Thus, they are often less inclined to provide funding for such projects. However, while it is true that most highway expenses are funded by user fees, roughly 40% still comes from general taxes and bonds. Moreover, most local roads, where 90% of walking and bicycling occur, are funded primarily through general taxes that residents pay regardless of how they choose to travel.<sup>21</sup>

Compounding the under-valuation of non-motorized transportation is the fact that many trips made by walking or bicycling, including short-trips that link walking or bicycling to other modes of transport, tend to be undercounted or not considered in transportation planning.<sup>22</sup> Similarly, crash data on walking and bicycling trips tend to misrepresent the total number of walking and bicycling injuries. The Pedestrian and Bicycle Information Center (PBIC) reports that hospital records show that only a portion of pedestrian collisions resulting in injuries are recorded by the police.<sup>23</sup> Thus, even when funds are available, it can be difficult to justify spending when data is so sparse and investment outcomes difficult to predict.

## PERFORMANCE MEASURES AND DATA

To effectively plan and make policies, it is important to know what one is managing, and good quality and useful data is critical. However, data related to bicyclists and pedestrians is sorely lacking in most areas. Moreover, even where data exists, it is not always useful. As Cottrell and Pal note, their survey results “suggested that a linkage between the data, pedestrian safety issues, and mitigating strategies is lacking.”<sup>24</sup>

A 2000 report by the Bureau of Transportation Statistics identified four types of primary data needs: usage, trip, and user characteristics; user preferences; facilities; and crash and safety data. Then, based on a literature review and outreach to user groups, they determined three criteria for determining the priorities of data needs: the importance of the data for the intended application/audience; the quality of existing data; and, the utility of the data and range of applications, audiences, and geographic scales.<sup>25</sup> As Table 1 shows, no current data sets rank beyond fair in providing accurate, relevant, and useful information on bicycles and pedestrians.

Numerous databases exist, but each has its own shortcomings related to pedestrians and bicyclists. Without describing them all, it is helpful to at least provide a few examples here. For usage, trip, and user characteristics, one can look to census data, metropolitan household surveys, the Nationwide Personal Travel Survey (NPTS) (since 2001, renamed the National Household Travel Survey (NHTS)), local counts, and other local and national surveys. While census data is helpful for determining mode shares, only work trips are included and they only constitute about 25% of all trips. Further, because of the way in which the questions are phrased and the fact that multimodal trips are not included, census data tends to undercount pedestrian and bicycle trips.<sup>26</sup> Metropolitan household surveys are often done with relatively small samples and are often not performed since they are expensive. Like census and NPTS/NHTS data, they also fail to track trips utilizing multiple modes and, as with the census data, they focus only on work trips.<sup>27</sup> Counts provide local information and can focus on a particular facility, but they are conducted sporadically at best, rarely updated, and with no national standards the quality varies greatly.<sup>28</sup> Moreover, local counts are costly and there are no incentives for collecting such data.

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<sup>20</sup> Litman, *Whose Roads?* p. 6.

<sup>21</sup> *Ibid.*, pp. 6-7.

<sup>22</sup> Litman, *Whose Roads?* p. 3.

<sup>23</sup> Pedestrian and Bicycle Information Center (PBIC), WakingInfo.org, “Pedestrian Crashes in Perspective,” Accessed online 2/23/05, <http://www.walkinginfo.org/pc/perspective.htm>.

<sup>24</sup> Cottrell and Pal, “Evaluation of Pedestrian Data Needs and Collection Efforts,” p. 10.

<sup>25</sup> USDOT, Bureau of Transportation Statistics (BTS), *Bicycle and Pedestrian Data: Sources, Needs, and Gaps*, BTS-00-02 (Washington, DC: BTS, 2000), p. 2.

<sup>26</sup> *Ibid.*, pp. 20-21.

<sup>27</sup> *Ibid.*, pp. 22-23.

<sup>28</sup> USDOT, BTS, *Bicycle and Pedestrian Data*, p. 20.

**Table 1. Quality of Existing Data on Pedestrians and Bicyclists**

Type of Data and Description	Quality of Existing Data
<b>Usage, Trip, and User Characteristics</b>	
Number of bicyclists and pedestrians by facility or geographic area	Poor
User and trip characteristics by geographic area or facility	Fair
<b>User Preferences</b>	
Relative preferences for facility design characteristics and other supporting factors	Fair
<b>Facilities Data</b>	
Characteristics relating to quality for pedestrian or bicycle travel	Fair
<b>Crash and Safety Data</b>	
Specific bicycle- and pedestrian-relevant crash variables	Fair
Data regarding crashes that do not involve a motor vehicle	Poor
<b>Secondary Data</b>	
Safety and demand impacts of design features	Fair
Safety and demand impacts of policies and programs	Fair

Source: USDOT, BTS, *Bicycle and Pedestrian Data: Sources, Needs, and Gaps*, BTS-00-02 (Washington, DC: BTS, 2000), Table 1, p. 3.

Several cities noted that they have collected or do collect data periodically. The City of Philadelphia collected crash data between 1999 and 2003, but there were significant gaps. Most notably, ages were only included for eight months of that period. Furthermore, according to Deborah Schaaf, Senior Planner, Philadelphia City Planning Commission, the coding is confusing in many places. For example, there are codes for “mid-block,” “corner,” “pedestrian,” but someone reviewing the data cannot easily tell if a pedestrian crash occurred at mid-block or at the corner. New York City works with its regional metropolitan planning organization, the New York Metropolitan Transportation Council (NYMTC) to collect data on bicycles. NYMTC now conducts annual counts at more than 100 locations, both on trailway and street facilities. However, doing the same for pedestrians is much more costly and thus such counts do not occur as frequently, nor are they as widespread.

For crashes and safety, there are two national databases: the Fatality Analysis Reporting System (FARS) and the National Automotive Sampling System General Estimates System (NASSGES). Both include only crashes that involve motor vehicles, and neither includes information on variables specific to pedestrians and bicyclists (e.g., was the person riding the bicycle wearing a helmet?). Furthermore, the NASSGES is limited by the accuracy and content of the police reports it relies on.<sup>29</sup>

Without such data, some cities find it difficult to justify bicycle and pedestrian programs, particularly when faced with multiple and competing needs and finite sources of funding. In many cases, new programs or projects are put in place as demonstration projects, with very little market research prior to their implementation. Moreover, in many of these efforts, follow up data is not collected.<sup>30</sup> “The scarcity of user and non-user attitude information,” according to Doolittle and Porter, “makes it difficult to reach a conclusion about perceptions of these programs.”<sup>31</sup> Worse, because there is so little data available, decision makers tend to rely on advisory groups for information on users and needs, which can often politicize the situation. This has certainly been the case in several of the large central cities.

It is important to note, however, that even when data exists, politicization can still occur, especially in cities with multiple stakeholders and multiple interests. As an example, Schaaf pointed to the use of flashers to slow cars down near schools in Philadelphia. In 2004-2005, there were 74 verifiable school-related traffic accidents. Of these, 52 were deemed to have been caused by pedestrian error (32 dart-outs, 7 crossing against light, and 13 crossing mid-block). Roughly one-third of the accidents (22) were deemed to have been caused by driver error, and 14 violations were issued. Notably, speed was not considered to be a factor in any of the accidents. Yet, the City came under a significant amount of

<sup>29</sup>USDOT, BTS, *Bicycle and Pedestrian Data*, p. 24.

<sup>30</sup> Doolittle and Porter, *Synthesis of Transit Practice 4*, p. 11.

<sup>31</sup> *Ibid.*, p. 23.

pressure by community groups and the media to install flashers to reduce motor vehicle speed as a means for increasing safety.

### **CONTEXT SENSITIVE DESIGN/SOLUTIONS<sup>32</sup> AND LAND USE DECISIONS**

In large central cities, where transportation projects are constrained by the built urban environment, having flexibility in design is particularly important. Context sensitive design/solutions (CSD/S) offers such flexibility. CSD/S has been defined differently by various agencies. According to FHWA, context sensitive design (CSD) is “a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility.”<sup>33</sup> New York State defines context sensitive solutions (CSS) as “a philosophy wherein safe transportation solutions are designed in harmony with the community.”<sup>34</sup> However defined, CSD/S incorporates public involvement, an inclusive and multidisciplinary planning process, and flexibility in design.

According to FHWA, in the past

the "burden" of having to find space for pedestrians and bicyclists has often been rejected as impossible in many communities because of space and funding constraints and a perceived lack of demand. There was also anxiety about encouraging an activity that many felt to be dangerous and fraught with liability issues. Designers continued to design from the centerline out and often simply ran out of space before bike lanes, paved shoulders, sidewalks and other "amenities" could be included.<sup>35</sup>

Bicycle and pedestrian user groups point to an alternative method of designing that begins with the sidewalk or trail, and designs back into the centerline, placing buffers, then paved shoulders or bike lanes, and leaving the remaining space for motorized traffic. This approach encourages more (and safer) walking and bicycling, and ensures that they are included as critical elements in every transportation project rather than as an afterthought in a handful of unconnected and arbitrary locations within a community.<sup>36</sup> However, even using this alternative method in built urban environments often requires flexibility in design since the amount of space left for motorized traffic may be narrower than current standards allow.

Also of importance here are overall land use policy decisions and how land use regulations can be improved to support an intermodal transportation system that promotes and supports walking and bicycling and integrates them with the rest of the transportation system. Because most cities in the United States have land use regulations that favor automobile access, substantial changes to zoning laws and subdivision regulations are often needed to accommodate non-motorized modes of transportation. Moreover, changes to automobile parking requirements, street design standards, land use densities, and transit-focused developments are all needed to meet these objectives.<sup>37</sup>

Aida Berkovitz points out that land use planning plays a critical role in reducing pedestrian and bicyclist fatalities and injuries that result from traffic-related collisions. In fact, she suggests that “the way we plan

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<sup>32</sup> The terminology used when describing CSD or CSS is still being shaped. Some locales interchange them while others have shifted to CSS in recognition that this is a process that includes more than just a design element; it also incorporates a multi-disciplinary approach as well as significant public outreach. This report will utilize the dual phrase “context sensitive design/solutions (CSD/S)” to encompass all expressions of the concept.

<sup>33</sup> USDOT, FHWA, “Context Sensitive Design/Thinking Beyond the Pavement,” Accessed online 8/18/03, <http://www.fhwa.dot.gov/csd/index.htm>.

<sup>34</sup> New York State Department of Transportation, “Context Sensitive Solutions,” Accessed online 8/18/03, <http://dotweb1.dot.state.ny.us/design/css/kypntpub.html>.

<sup>35</sup> USDOT, FHWA, “Design Guidance – Accommodating Bicycle and Pedestrian Travel.”

<sup>36</sup> Ibid.

<sup>37</sup> USDOT, FHWA, “Lesson 7: Using Land-Use Regulations to Encourage Non-Motorized Travel,” *FHWA Course on Bicycle and Pedestrian Transportation* (Washington, DC: FHWA), p. 7-1, Accessed online 5/4/05, [http://safety.fhwa.dot.gov/ped\\_bike/univcourse/swless07.htm](http://safety.fhwa.dot.gov/ped_bike/univcourse/swless07.htm).



and build our communities and roadway systems is more likely to have a broader and more sustained effect on traffic safety than attempts to change behavior.<sup>38</sup>

**Figure 1. Low Cost Design: 87<sup>th</sup> Avenue Walkway**



Before



After

Among the cities that participated in the peer-to-peer workshop, the City of Seattle is moving in this direction. In addition to experimenting with flexible design and low-cost approaches (Figure 1), it has begun to design from property to centerline

instead of the more traditional approach. Additionally, as part of its overall strategy for Seattle's growth, the City has been promoting urban villages to concentrate jobs and housing growth. There are now 37 such villages, which are designed as compact, walkable neighborhoods, well served by transit and easy to access by bicycle. In addition to these villages, Gray noted that the City has adopted several new land use policies and codes that encourage pedestrian and bicycle use. There are now pedestrian designations within which ground level retail is required as are pedestrian-friendly sidewalk setbacks. Additionally, the number of bicycle parking spaces is no longer determined by a ratio with motor vehicles; it is now based on land use. Finally, there are formal station area overlay zones within which transit agencies reserve land to allow for more bicycle facilities in preparation for future needs and trends.

## SUMMARY

These broad policy themes have implications for both pedestrian and bicyclist programs. Among them, the lack of sufficient data and performance measures, is perhaps the most important since without them it is difficult to justify programs and the funding for them. Yet, better data requires more funding for research and, with limited resources, policy decisions must be made that balance research and data collection with capital projects and operations.

Beyond data, funding, CSD/S, and land use, there are several additional areas that affect policy and/or planning, but are more targeted to either pedestrians or bicyclists. These form the discussion for the next two sections.

<sup>38</sup> Aida Berkovitz, "The Marriage of Safety and Land-Use Planning: A Fresh Look at Local Roadways," *Public Roads Magazine* 65 (September/October 2001): 15.

### III. KEY PEDESTRIAN ISSUES

While some themes are common to both pedestrians and bicyclists, the two groups have distinct and not always complementary needs. As a result, there are some notable differences in focus and emphasis from the agency and decision making perspectives. In the case of pedestrians, needs are vast and varied, though most can be categorized under three broad and interrelated areas: safety, access, and aesthetics.<sup>39</sup> The primary focus of most planning, policy, and design is safety. This is especially true in the large central cities where a great deal of pedestrian movement is already the norm. Secondary to safety is encouraging greater pedestrian movement, though they are related goals since increasing safety can help engender more walking and more walking often necessitates the need for additional safety.

#### WALKING AS A MODE OF TRANSPORT

By way of context it is helpful to begin with a brief discussion of the status of walking as a mode of transport in the United States today. Information on levels of walking is collected through two major sources: Nationwide Personal Transportation Survey (NPTS) and the U.S. Census "Journey to Work" Survey. Although the overall number of walking trips increased between 1990 and 2001 as populations grew, according to the 1995 NPTS, walking is on the decline across the United States when compared to other modes. In 1977, walking represented 9.3% of average annual person trips per household. That figure has declined steadily, with walking representing an 8.6% share in 1983, 7.2% in 1990, and only 5.4% in 1995.<sup>40</sup> Importantly, and perhaps unexpectedly, that trend is also reflected in the largest metropolitan statistical areas (MSAs), those with at least 3 million inhabitants.<sup>41</sup> While the overall levels of walking remain higher in these largest of MSA's, in 1977, walking represented a 16.1% share of total average annual person trips per household and declined to half that (8.0%) in 1995.<sup>42</sup>

Census data mirror the NPTS data in terms of the decline in walking. In 1990, 3.9% of workers reported that in the week prior to the census, walking was their primary mode of travel to work. Ten years later, that figure had declined to 2.9%.<sup>43</sup> Table 2 details walking trends between 1990 and 2000 for selected MSAs.

**Table 2. % of Population Walking as Their Primary Mode of Transport to Work, Selected Cities, 1990 and 2000**

Metropolitan Statistical Area	1990	2000
Atlanta	1.5	1.3
Boston	5.2	4.1
Chicago	4.1	3.1
Detroit	2.4	1.8
Houston	2.3	1.6
Los Angeles	2.9	2.6
Philadelphia	5.3	3.9
Phoenix	2.7	2.1
New York	6.2	5.6
San Francisco	3.6	3.3
Seattle	3.6	3.2
Washington, DC	3.9	3.0

Source: FHWA, *Journey to Work Trends in the United States and its Major Metropolitan Areas, 1960-2000, Ch. 4*  
<http://www.fhwa.dot.gov/ctpp/jtw/jtw4.htm>.

<sup>39</sup> PBIC, WalkingInfo.org, Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE), "Implementation," Accessed online 4/28/051, [http://www.walkinginfo.org/pedsafe/pedsafe\\_implementation.cfm](http://www.walkinginfo.org/pedsafe/pedsafe_implementation.cfm).

<sup>40</sup> USDOT, FHWA, *1995 Nationwide Personal Transportation Survey (NPTS): Summary of Travel Trends*, FHWA-PL-00-06 (Washington, DC: FHWA, December 1999), Table 6, p. 14, Accessed online 6/8/05, [http://npts.ornl.gov/npts/1995/Doc/trends\\_report.pdf](http://npts.ornl.gov/npts/1995/Doc/trends_report.pdf). A person trip is one or more people making a trip in any mode.

<sup>41</sup> MSA is defined as a county or group of contiguous counties with at least one city of at least 50,000 inhabitants or twin cities with a total of that many inhabitants within the boundaries. Ibid.

<sup>42</sup> Ibid.

<sup>43</sup> US Census Bureau, *Journey to Work 2000: Census 2000 Brief*, C2KBR-33 (Washington, DC: US Census Bureau, March 2004), Accessed online 6/8/05, <http://www.census.gov/prod/2004pubs/c2kbr-33.pdf>.

### Factors Influencing Whether an Individual Decides to Walk

FHWA identifies a three-tiered hierarchy of factors that may influence a person's decision to walk or bicycle rather than use another mode of transport. The first set of factors is grouped under the first tier in the hierarchy – initial considerations. Included here are such elements as habits of relying on driving for short trips, distances involved in trips, individual attitudes and values, perceptions and misperceptions related to safety and individual capabilities, and situational constraints (e.g., needing to transport heavy or bulky items).<sup>44</sup>

The second group of factors involves trip barriers. Here, even if a person would prefer to walk, they may find it difficult to do so. Actual safety problems are a key concern factor here. Also in this category of factors are access and linkage difficulties as well as the directness of the route. Finally, environmental factors, like steep hills or extreme temperatures may change a person's mind.<sup>45</sup> The final tier of factors in the hierarchy includes destination barriers, and represents perhaps a more significant set of barriers for bicyclists (which will be discussed in the next section).

### SAFETY

Among the concerns cited by individuals in determining whether or not to walk, safety is by far the one most frequently cited, and for good reason. According to the National Highway Traffic and Safety Administration's National Center for Statistics and Analysis, "on average, a pedestrian is killed in a traffic crash about every 2 hours [and] is injured in a traffic crash every 8 minutes."<sup>46</sup> In 2001, pedestrians accounted for nearly 12% of all highway fatalities.<sup>47</sup> According to Ernst, walking is the most dangerous mode of travel. In 2001, the fatality rate per 100 million miles traveled was highest for pedestrians (Table 3).<sup>48</sup>

**Table 3. Fatality Rate per 100 Million Miles Traveled by Mode Traveled, 2001**

Mode	Rate of Fatalities
Public Transit	0.8
Passenger Cars/Trucks	1.3
Pedestrians	20.1

Source: Ernst, *Mean Streets 2004*, p. 5. Note that the figure for commercial airlines in 2001 was 7.3 – unusually high because it includes those who died during September 11, 2001. Rates in previous years ranged from 0 to 1.2.

Interestingly, pedestrian fatalities shows a significant decrease in total number of fatalities involving a motor vehicle over the past few decades, declining nationally from 8,096 in 1979 to 4,763 in 2000.<sup>49</sup> However, data gaps make it difficult to gauge whether this decrease in fatalities is the result of increased safety, fewer people walking instead of using other modes of transport, or more people walking on trails and not roads. Indeed, it is telling that despite the reduction in crash statistics, pedestrians and bicyclists remain over-represented in crash statistics – 12% of highway fatalities, but only 8.7% of all trips.<sup>50</sup>

### Defining Safety and the Need for New Tools for Assessment

Safety means different things to different people and to every profession. Even among the transportation community, safety is defined differently and, as a result, different groups of professionals will often focus

<sup>44</sup> USDOT, FHWA, "Lesson 2: Bicycling and Walking in the United States Today," *FHWA Course on Bicycle and Pedestrian Transportation*, pp. 2-3 to 2-4, Accessed online 5/4/05, [http://safety.fhwa.dot.gov/ped\\_bike/univcourse/swless02.htm](http://safety.fhwa.dot.gov/ped_bike/univcourse/swless02.htm).

<sup>45</sup> *Ibid.*, pp. 2-5.

<sup>46</sup> USDOT, National Highway Traffic and Safety Administration (NHTSA), National Center for Statistics & Analysis (NCSA), *Traffic Safety Facts 2003: Pedestrians*, DOT HS 809 769, p. 1, Accessed online 3/14/05, <http://www.accidentreconstruction.com/security/library/pedsafetyfacts2003.pdf>.

<sup>47</sup> USDOT, NHTSA, NCSA, *Pedestrian Roadway Fatalities*, DOT HS 809 456 (Washington, DC: NCSA, April 2003), p. 2, Accessed online 6/8/05, <http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/Rpts/2003/809-456.pdf>.

<sup>48</sup> Ernst, *Mean Streets 2004*, p. 5.

<sup>49</sup> USDOT, NHTSA, NCSA, *Pedestrian Roadway Fatalities*, p. 1.

<sup>50</sup> USDOT, FHWA, *National Bicycling and Walking Study: Ten Year Status Report* (Washington, DC: FHWA, October 2004), p. 6; USDOT, NHTSA, NCSA, *Pedestrian Roadway Fatalities*, p. 2.

on different methods to mitigate safety problems. Highway engineers tend to define safety in terms of the elimination of the *causes* of collisions and/or the *reduction of the level of severity* of crashes. Thus, countermeasures may take the form of widened shoulders, roadside clearing and smoothing of sharp curves. To traffic safety professionals in law enforcement, public health, or state highway agencies, safety is instead defined as the *reduction in the numbers and rates of fatalities and injuries* in traffic crashes; as a result their safety efforts focus on ways to change behavior. For the public, however, safety is often related to a perception, a feeling of safety and ease while walking on the streets, and not having to worry about crime.<sup>51</sup>

A comprehensive view of roadway safety, according to Berkovitz, must encompass all of these definitions since each contributes an important aspect to the overall sense and reality of roadway safety for pedestrians. Further, to do this, planners need new tools that can demonstrate all of these benefits, not just provide numbers and rates of crashes.<sup>52</sup> Berkovitz suggests that just as good quality and useful data is lacking, so too are the current tools for enhancing safety. She notes that since the 1970s, the focus has been on the hazard-elimination program (now referred to as the STP safety set-aside funds). Under this program, states use their crash statistics along with known benefits related to countermeasures to prioritize projects. This method has worked well to reduce vehicle collisions on highways; however, it has been much less effective for dealing with local streets. She suggests that this is partly because pedestrian-vehicle collisions are randomly spread throughout communities, rather than occurring at the same location each time; thus even though such collisions have higher fatality rates, the locations in which they occur are unlikely to be rated as high hazard sites.<sup>53</sup> Also, as she notes, “if people seldom walk or ride a bicycle in an area, it is unlikely that someone will get hit there, but that doesn’t mean that there isn’t a safety problem for pedestrians or bicyclists in the area.”<sup>54</sup>

Berkovitz further argues that a shift in focus is necessary – one that would highlight roads in the urban built environment. Historically, most FHWA and NHTSA safety efforts have focused upon principal arterials and expressways. However, because urban arterials carry “the bulk of the day-to-day traffic of most Americans,” Berkovitz believes the greatest gains in highway safety are likely to occur here.<sup>55</sup>

### **Special Issues Related to Safety, Additional Data Gaps, and Policy and Planning Decisions**

When trying to identify the data gaps and planning and policy approaches, it is helpful to briefly outline some specific safety issues related to pedestrians. First and foremost, it is important to bear in mind that pedestrian fatalities are “primarily an urban problem.” According to the Insurance Institute for Highway Safety, in 2003, almost three-quarters (72%) of pedestrian deaths occurred in urban areas.<sup>56</sup>

**Intersections.** Intersections represent obvious areas of conflict between vehicles and pedestrians and attention has increasingly been paid to designing them in a way to increase pedestrian safety. However, the vast majority of traffic-related pedestrian fatalities occur at non-intersection sites. In 2003, only 18% of pedestrian fatalities involving individuals under the age of 70 occurred at an intersection; for those 70 and above, the figure was almost twice that (36%), but still represented a much lower number than those fatalities occurring at a non-intersection location.<sup>57</sup>

**Alcohol and Time of Day.** The data related to alcohol consumption and pedestrians is meager, though it does contribute in some cases to accidents. The data does indicate that alcohol impairment among pedestrians is largely a male problem, similar to findings among drivers.<sup>58</sup> Also of importance is the fact that accident locations involving alcohol-impaired pedestrians tend to occur near their homes or within short distances from their starting points.<sup>59</sup> Dealing with drinking among pedestrians is a high priority for

<sup>51</sup> Berkovitz, “The Marriage of Safety and Land-Use Planning,” p. 2.

<sup>52</sup> *Ibid.*, p. 3.

<sup>53</sup> *Ibid.*, p. 6.

<sup>54</sup> *Ibid.*

<sup>55</sup> *Ibid.*, p. 5.

<sup>56</sup> Insurance Institute for Highway Safety (IIHS), “Fatality Facts 2003: Pedestrians,” p. 8, Accessed online 1/27/05, [http://www.hwysafety.org/safety%5Ffacts/fatality\\_facts/pedestrians.htm](http://www.hwysafety.org/safety%5Ffacts/fatality_facts/pedestrians.htm).

<sup>57</sup> *Ibid.*, p. 9.

<sup>58</sup> USDOT, NHTSA, “4: Drinking Drivers, Pedestrians, and Bicyclists,” in *Alcohol and Highway Safety 2001: A Review of the State of Knowledge*, DOT HS 809 383 (Washington, DC: NHTSA, November 2001), Accessed online 6/8/05, [http://www.nhtsa.dot.gov/people/injury/research/AlcoholHighway/4\\_drinking\\_drivers.htm](http://www.nhtsa.dot.gov/people/injury/research/AlcoholHighway/4_drinking_drivers.htm).

<sup>59</sup> *Ibid.*

the City of Baltimore, where crashes tend to occur in clusters in city centers, especially streets with bars and fast food establishments open late at night. In 1995, Baltimore began a program called, "Walk Smart Baltimore," to help reduce pedestrian accidents, with a strong focus on the pedestrian alcohol problem. According to the Presenter's Guide for "Walk Smart Baltimore," estimates suggest that roughly 42% of the adult (age 14+) pedestrians who are hit by cars in Baltimore have been drinking, and many of these individuals have particularly high blood alcohol contents.<sup>60</sup> To combat the problem, Baltimore is conducting research and developing countermeasures, including educational, design, and engineering approaches.

Time of day also plays a role in pedestrian accidents; more than half of all pedestrians are killed at nighttime. Cottrell and Pal indicate that in 2000, 64% of all pedestrian fatalities in the United States occurred between 6pm and 6am. Yet, they point out that better data are still needed on lighting, visibility of pedestrians by motorists, and pedestrian night travel patterns.<sup>61</sup> Importantly, even though so many fatalities occur in the overnight periods, the most common pedestrian counting times for the agencies participating in Cottrell's and Pal's study were between 7 and 9am and 4 and 6pm, with several agencies conducting midday counts as well.

**High-Risk Populations: Elderly, Children, People with Disabilities.** The elderly and children represent the highest risk pedestrian groups and, although they share some needs with other groups, they have some special needs as well. Cottrell and Pal point out that the pedestrian fatality rate is highest among the elderly for a number of reasons, including lower walking speeds, diminished sensory perception and cognitive skills, and lag in reflexive responses.<sup>62</sup> Additionally, because they are less physically resilient, pedestrians ages 65 and older are two to eight times more likely to die than younger people when struck by automobiles.<sup>63</sup> As the baby-boomers age, issues related specifically to elderly pedestrians are likely to become even more important.

In 2003, almost one-fifth (19%) of all children under the age of 16 killed in traffic accidents were pedestrians.<sup>64</sup> While, as was discussed previously, individuals 70 years and older are more likely to be injured or killed at intersections than those beneath the age of 70, the most prevalent type of child pedestrian injury or fatality occurs because of the "midblock dart-out," accounting for 38 percent of all serious pedestrian injuries.<sup>65</sup>

According to Census 2000, approximately 49.5 million people, aged 5 years or older, have a disability, which is roughly 19% of the national population aged 5 years or older.<sup>66</sup> Yet, research on transportation use by people with disabilities is another area of data that is critically lacking. The *2002 National Transportation Availability and Use Survey* revealed that 12% of people with disabilities have trouble accessing transportation.<sup>67</sup> However, the primary area of focus of this report is on accessibility to transportation overall, with little focus on pedestrian activities or on safety. Moreover, when discussions related to safety occur, the focus for persons with disabilities is usually on driving, not walking.

## ENCOURAGING PEDESTRIAN MOVEMENT – SAFETY, ACCESS, AND AESTHETICS

Beyond safety, encouraging more pedestrian activity is often cited as the next most important goal among transportation policymakers and planners. Addressing real and perceived concerns on safety, providing better access, and paying attention to aesthetics are all ways to address the factors that influence people's decisions on whether to walk or not.

<sup>60</sup> USDOT, NHTSA, *Walk Smart Baltimore*, p. 3, Accessed online 4/27/05, [www.nhtsa.dot.gov/people/injury/alcohol/PedestrianAccident/AppendixF.html](http://www.nhtsa.dot.gov/people/injury/alcohol/PedestrianAccident/AppendixF.html).

<sup>61</sup> Cottrell and Pal, *Evaluation of Pedestrian Data Needs and Collection Efforts*, p. 3.

<sup>62</sup> *Ibid.*, p. 2.

<sup>63</sup> USDOT, FHWA, *Focusing on the Senior Pedestrian*, Accessed online 2/1/05, [www.fhrc.gov/safety/pedbike/facts/oldped.htm](http://www.fhrc.gov/safety/pedbike/facts/oldped.htm).

<sup>64</sup> USDOT, NHTSA, NCSA, *Pedestrian Roadway Fatalities*, p. 5.

<sup>65</sup> USDOT, FHWA, *Focusing on the Child Pedestrian*, Accessed online 2/1/05, [www.fhrc.gov/safety/pedbike/facts/kidped.htm](http://www.fhrc.gov/safety/pedbike/facts/kidped.htm).

<sup>66</sup> US Census Bureau, "Census Profile 2000 – US Summary: 2000," C2KPROF/00-US, p. 3, Accessed online 6/9/05, <http://www.census.gov/prod/2002pubs/c2kprof00-us.pdf>.

<sup>67</sup> USDOT, BTS, *Freedom to Travel*, BTS 03-08 (Washington, DC: BTS, 2003), p. 5, Accessed online 6/9/05, [http://www.bts.gov/publications/freedom\\_to\\_travel/pdf/entire.pdf](http://www.bts.gov/publications/freedom_to_travel/pdf/entire.pdf).



## Safety

While safety was described in the last section, several additional points can be made here in terms of specific safety techniques that have been successfully used to address real and perceived safety concerns. Among them are: various traffic calming techniques, which can be particularly helpful at non-intersection locations; signal timing and push buttons as well as use of signal signs that count down the time left to cross intersections; pedestrian cross-walks and signs; refuge islands; and sidewalks.

**Sidewalks.** Sidewalks deserve some special attention since, while one might think they are a simple and relatively inexpensive way to address safety and access, this is not always the case. In fact, according to Emily Smith, in an article for the Partnership for a Walkable America, “many people claim...that putting in sidewalks and pedestrian paths involves complicated legal squabbles over land rights that local governments don’t have the time or finances to untangle.”<sup>68</sup> There is something to this as tort liability claims increase, and more lawsuits are filed, particularly since, as FHWA points out, the majority of highway professionals are not generally trained to design for pedestrians and bicyclists.<sup>69</sup>

Another important point related to sidewalks is that contrary to many planning and policy recommendations for building sidewalks, not every community is happy with them. Indeed, some people perceive sidewalks as undesirable features, unhappy about the legal and financial responsibilities involved in maintaining them and keeping them free of debris and other hazards. Also, some people view sidewalks as a means for those from outside their neighborhoods to enter their communities.

## Access

Walkability, according to Litman, refers to “the quality of walking conditions, including safety, comfort and convenience.”<sup>70</sup> PBIC further defines the term by noting that the following characteristics are present in walkable communities: closely spaced destinations; appropriately sited schools, parks, and public spaces; commercial districts that people can easily access and walk by foot or wheelchair; population densities that support transit; and mixed-use developments.<sup>71</sup>

With respect to pedestrians, walkability and access go hand-in-hand. For those who are transportation disadvantaged or have limited mobility, walkability and pedestrian access are of particular importance since they do not have access to other modes of travel.<sup>72</sup>

## Aesthetics and Amenities

There is evidence to support the addition of public amenities for pedestrians to increase more walking activity. According to FHWA, given appropriate amenities (e.g., sidewalks, traffic-calmed streets, safe and direct routes and crossings), and an aesthetically pleasing environment, most people are willing to walk longer distances to reach public transportation.<sup>73</sup>

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<sup>68</sup> Emily Smith, “Making America Walkable: It’s a Challenge We All Share,” pp. 1-2, Accessed online 2/1/05, <http://www.tfrc.gov/safety/pedbike/articles/walkable.htm>.

<sup>69</sup> USDOT, FHWA, “Lesson 8: Tort Liability and Risk Management,” *FHWA Course on Bicycle and Pedestrian Transportation*, p. 8-5, Accessed online 5/4/05, [http://safety.fhwa.dot.gov/ped\\_bike/univcourse/swless08.htm](http://safety.fhwa.dot.gov/ped_bike/univcourse/swless08.htm).

<sup>70</sup> Todd Litman, “Economic Value of Walkability,” Compendium of Papers Presented at the TRB 82<sup>nd</sup> Annual Meeting, January 12-16, 2003 (Washington, DC: TRB, 2003), p.1.

<sup>71</sup> PBIC, WalkingInfo.org, PEDSAFE, Accessed 4/28/05, <http://www.walkinginfo.org/pedsafe/background.cfm>.

<sup>72</sup> Litman, “Economic Value of Walkability,” p. 10.

<sup>73</sup> USDOT, “Lesson 9: Bicycle and Pedestrian Connections to Transit,” *FHWA Course on Bicycle and Pedestrian Transportation*, p. 9-3, Accessed online 5/4/05, [http://safety.fhwa.dot.gov/ped\\_bike/univcourse/swless09.htm](http://safety.fhwa.dot.gov/ped_bike/univcourse/swless09.htm).

## IV. KEY BICYCLIST ISSUES

Where safety is the primary focus for policy and planning related to pedestrians, with increasing usage a secondary concern, for bicyclists planning and policy efforts are somewhat different in their emphasis. The primary focus here is often encouraging usage of bicycles. The issues that fall within this focus are lack of contiguous bike facilities, perceptions of safety, links to transit, and the need for facilities at the endpoints. With respect to some of the policy and planning difficulties faced, data is again a critical problem.

### BICYCLING AS A MODE OF TRANSPORT

Again, it is useful to begin with a brief discussion of the status of bicycling as a mode of transport across the United States. As with walking, national data on levels of bicycling are collected through the NPTS and the U.S. Census "Journey to Work" Survey and the data suffers from the same limitations. However, the gaps for bicycle data are even greater than the gaps for pedestrians in many cases. With that said, on a national basis, bicycling does appear to be on the increase, both as a percentage of trips taken and in real numbers of trips taken. Even so, bicycling trips still represented only 0.9% of all trips in 1995, up from 0.7% in 1990.<sup>74</sup>

In terms of bicycling for utilitarian purposes, Journey to Work data show no particular trend across metropolitan areas between 1990 and 2000 (Table 4), except to say that there are still relatively few workers who utilize bicycles as their primary mode of travel.<sup>75</sup> Some U.S. cities show increased bicycle usage, others decreased, and others remained the same. As with some of the pedestrian trends, because of data gaps, it is difficult to determine why usage has increased or decreased in certain locations.

**Table 4. % of Population Utilizing Bicycles as Their Primary Mode of Transport to Work, Selected Cities, 1990 and 2000**

Metropolitan Statistical Area	1990	2000
Boston	0.4	0.4
Chicago	0.2	0.3
Los Angeles	0.7	0.6
Philadelphia	0.3	0.3
Phoenix	1.4	0.9
New York	0.2	0.3
Sacramento	1.8	1.4
San Francisco	1.1	1.1
Seattle	0.5	0.6
Washington, DC	0.2	0.3

Source: Nancy McGuckin and Nanda Srinivasan, *Journey to Work Trends in the United States and its Major Metropolitan Areas, 1960-2000*, FHWA-EP-03-058, Ch. 4, <http://www.fhwa.dot.gov/ctpp/itw/itw4.htm>.

Compared to comparable cities in Canada, where bicycles were used for 1.2% of all work trips in 2001, the United States lags far behind.<sup>76</sup>

### Factors Influencing Whether an Individual Decides to Bicycle

The same three-tiered hierarchy of factors, identified by FHWA, that may influence a person's decision to walk, also influence their decision to bicycle rather than use another mode of transport: initial

<sup>74</sup> USDOT, FHWA, National Bicycling and Walking Study: Ten Year Status Report, p. 3.

<sup>75</sup> Nancy McGuckin and Nanda Srinivasan, *Journey to Work Trends in the United States and its Major Metropolitan Areas, 1960-2000*, Prepared for FHWA, FHWA-EP-03-058, Ch. 4, Accessed online 6/9/05, <http://www.fhwa.dot.gov/ctpp/itw/itw4.htm>.

<sup>76</sup> John Pucher, "Cycling Trends and Policies in Canadian Cities," (Victoria, BC: Victoria Transport Policy Institute, 23 April 2005), p. 3, Accessed online 5/16/05, [http://www.vtpi.org/pucher\\_canbike.pdf](http://www.vtpi.org/pucher_canbike.pdf).

considerations, trip barriers, and destination barriers.<sup>77</sup> However, as mentioned earlier, the final tier of factors – destination barriers – is particularly relevant for bicyclists.

Destination barriers for bicyclists include the following: lack of parking spaces where commuters can safely leave their bicycles; lack of personal care facilities (showers and changing rooms) where commuters can “freshen up” and put on their business attire; and lack of support from employers.<sup>78</sup> FHWA notes that the lack of safe and secure parking spaces, free not only from theft but from damage from the environment, is a “prerequisite” for bicycling, just as it is with motor vehicles.

Jennifer Dill and Theresa Carr identify a somewhat different set of factors involved in individual decisions on whether to use a bicycle or not. They categorize factors as subjective or perception-based and objective or physical-based factors. Within the first category are such factors as distance, safety, cost, convenience, and values, such as value placed on time and value placed on exercise. The second category is comprised of factors such as climate, topography, and existence of facilities.<sup>79</sup>

**Existence of Facilities.** The remainder of Dill and Carr’s work focuses on the existence of facilities – a trip barrier in FHWA’s terms. Looking at both Class I (bicycle and shared-use paths that are physically separated from motorized vehicular traffic) and Class II (on-street bicycle lanes designated by striping, signage, and/or pavement markings) facilities, they find that “higher levels of bicycle infrastructure are positively and significantly correlated with higher rates of bicycle commuting.”<sup>80</sup> However, again because of data limitations, there is no indication of cause and effect (i.e., are people commuting more because infrastructure has been built or did a city build more infrastructure because it appeared that more people were commuting), nor is there a means for determining the relationship with non-commuting bicycling utilizing the data sets they employed.<sup>81</sup>

Some additional support for Dill and Carr’s findings comes from Canadian experiences where increased levels of bicycling and increased safety are also very much linked to additional facilities. In Quebec, between 1987 and 2000, the number of bicycles more than doubled and regular bicyclists increased by 50%. At the same time, however, fatalities fell by 42%, serious injuries decreased by 56%, and minor injuries were reduced by 38%. Since helmet use is not required, that is unlikely to be the cause of the improved safety. Instead, Pucher points to the expansion in off-road and on-road cycling facilities during this period. Between 1992 and 2000, 4,000km of new bikeways were built throughout the province, creating a total of 7,000km. Forty-one percent of bike trips occur on separate bicycle paths.<sup>82</sup> Again, additional data would be needed to show a definite causal relationship as well as the direction of that relationship. However, similar experiences have been seen in other Canadian cities as well as in U.S. cities. In the City of Philadelphia, for example, over 60 miles of bike lanes were installed in the 1990s and Census data show that the mode share for bicycles rose from 0.6 in 1990 to 0.9 in 2000.<sup>83</sup> Recent counts on the bridges leading into the Center City have also shown large increases in the number of people riding bicycles. In fact, according to a memo from the Bicycle Coalition of Greater Philadelphia, bicycle traffic during rush hour increased 89.5% in the fifteen years between 1990 and 2005.<sup>84</sup>

## LACK OF CONTINUITY, SPLIT RESPONSIBILITIES, AND LOCAL SOLUTIONS

A key difficulty with bicycling in many locations even where some bicycling infrastructure exists is the lack of continuous facilities. This occurs both with bicycle paths and with bicycle lanes and is immediately evident if one takes a look at various bicycle maps. If one looks at New York City’s 2005 Bicycle Map (Figure 2), for example, the bold red lines represent bike lanes on streets, while the bold dotted red lines represent recommended routes (those with sufficient width and/or light traffic). Bold green lines represent

<sup>77</sup> USDOT, FHWA, “Lesson 2: Bicycling and Walking in the United States Today,” *FHWA Course on Bicycle and Pedestrian Transportation*, pp. 2-3 to 2-4, Accessed online 5/4/05, [http://safety.fhwa.dot.gov/ped\\_bike/univcourse/swless02.htm](http://safety.fhwa.dot.gov/ped_bike/univcourse/swless02.htm).

<sup>78</sup> USDOT, FHWA, “Lesson 2: Bicycling and Walking in the United States Today,” pp. 2-5 to 2-6.

<sup>79</sup> Dill and Carr, “Bicycle Commuting and Facilities in Major US Cities,” p. 116.

<sup>80</sup> *Ibid.*, p. 122.

<sup>81</sup> *Ibid.*

<sup>82</sup> Pucher, “Cycling Trends and Policies in Canadian Cities,” p. 10.

<sup>83</sup> Census 2000; Note that these numbers refer specifically to the City of Philadelphia; the figures cited in Table 4 refer to the Philadelphia MSA.

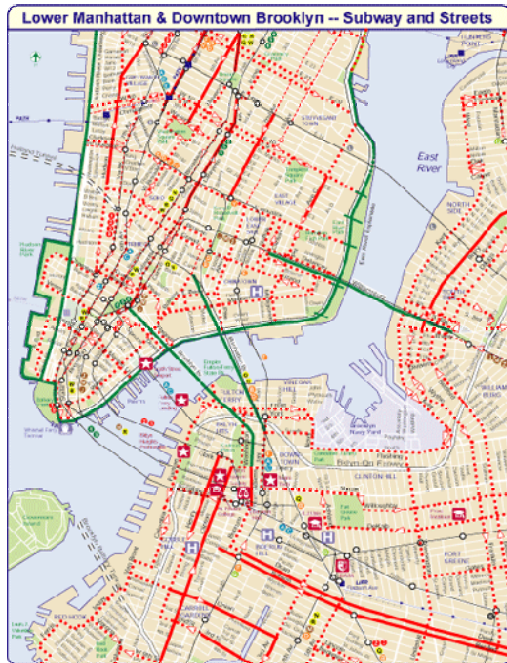
<sup>84</sup> Information supplied by Deborah Schaaf from the Bicycle Coalition of Greater Philadelphia, “Memo” July 22, 2005.



off-street or designated paths in parks. Even without being able to see the full detail, it is clear that there are some key gaps.

Not only is continuity lacking in on-street facilities, but often links between on-street facilities and off-street facilities, particularly those within parks and other recreational areas, are lacking. This is often the result of split responsibilities and funding. As was noted earlier, bicycle facilities related to transportation are

**Figure 2. 2005 NYC Bicycle Map – Inset of Lower Manhattan and Downtown Brooklyn**



funded out of different pots of money than those solely for recreation. Furthermore, responsibilities for them are also split, with departments of transportation responsible for the former and other agencies, like parks and recreational agencies responsible for the latter.<sup>85</sup>

According to Andy Clarke, Executive Director of the League of American Bicyclists, another obstacle to bicycling is posed by the fact that while the majority of bicycle trips are relatively short and affected by local traffic conditions, transportation funding and planning decisions are often made at the level of the region or state.<sup>86</sup> This echoes the previous points made by Litman and Ernst related to funding which noted that more local than state and federal funding is spent on pedestrian and bicycle projects. However, it is important to point out here that while this is seen as a barrier, it is unclear whether it is as significant as some might think.

If one looks to bicycling policies in Canada, there is no federal involvement in policies or funding and the extent of provincial involvement varies greatly. Quebec is very involved in a range of programs, for example, while Ontario provides no funding or planning. Yet, overall cities in Canada have much more bicycle usage than in the United States and their safety records have been improving as they have

expanded facilities.<sup>87</sup>

## ACCESS TO TRANSIT

Bicycle use can yield several transportation benefits: lower air pollution emissions with reduced use of single-occupancy vehicles, reduced highway congestion, and lower capital costs for park-and-ride facilities since fewer spaces are needed. According to Doolittle and Porter, linking bicycles with transit can accrue further benefits for both modes: transit enables bicyclists to take longer trips than they otherwise could and allows them to bypass topographical barriers; bicycle access enlarges the transit catchment area and provides transit with additional ridership.<sup>88</sup> However, according to Michael Replogle, while Europe and Japan have been encouraging people to walk or bike to transit, "the US has been investing in costly park-and-ride systems which have made transit increasingly dependent on the automobile...."<sup>89</sup>

Several accommodations for bicyclists are being made by U.S. transit agencies around the country. With respect to directly aiding in carrying bicycles, agencies may install bicycle racks on the exterior of vehicles to help carry the bicycles. Such racks are utilized by San Diego Transit, Tri-Met in Portland, Roaring Fork Transit Agency in Aspen, and Phoenix Transit, though the latter three utilize front-mounted racks and San Diego uses rear-mounted racks. Alternatively, agencies may allow bicycles to be carried within vehicles

<sup>85</sup> Andy Clarke, "Bicycling: Pathway to the Future," in *Transportation in the New Millennium: Bicycling*, TRB A3B07: Committee on Bicycling, 1999, p. 4, Accessed online 5/16/05, <http://gulliver.trb.org/publications/millennium/00011.pdf>.

<sup>86</sup> Clarke, "Bicycling," p. 4.

<sup>87</sup> Pucher, "Cycling Trends and Policies in Canadian Cities," p. 8.

<sup>88</sup> Doolittle and Porter, *Synthesis of Transit Practice 4*, p. 1.

<sup>89</sup> Michael Replogle, "Bicycle Access to Public Transportation: Learning from Abroad," *Institute for Transportation Engineers Journal* (December 1992): 1, Accessed online 6/8/05, [http://www.environmentaldefense.org/documents/2294\\_BikesJournal.pdf](http://www.environmentaldefense.org/documents/2294_BikesJournal.pdf).

as is done by Pierce Transit in Tacoma and the Metropolitan Transportation Authority in New York City. Caltrain's commuter rail has gone a step further and includes bike cars on each train.<sup>90</sup>

Other means for linking bicycling and transit include access improvements to help bicyclists negotiate stairs or tight spaces or to link with bicycle paths or lanes, and provision of parking equipment – either high-security protection against theft and weather (Class I), racks which secure bike frames and wheels (Class II), or racks that require user-supplied fastening devices (Class III).<sup>91</sup>

Doolittle and Porter identify three broad policy issues related to transit-bicycle programs:

1. Whether and how accommodating bicycles helps an agency achieve its overall operating objectives.
2. What the mechanics are of bicycle-transit programs and how they are established.
3. How best to determine if a bicycle-transit program is achieving the policy objectives it was designed to support.<sup>92</sup>

Addressing these policy concerns is critical, particularly since many transit managers are opposed to such programs, suggesting that they create negative impacts on operating speed, reliability, safety, security, and maintainability. To do this effectively, data are needed, but as noted earlier, it is sorely lacking; very little market research is performed prior to implementing programs and very little follow up occurs afterward. Even so, according to Doolittle and Porter, “anecdotal reports from operations and maintenance managers suggest that the programs attract a modest but significant number of users, but that the agencies have gained broad public support for taking the trouble to implement them.”<sup>93</sup>

Of importance for the large central cities, Doolittle's and Porter's findings suggest that the service area characteristics most conducive to successful transit-bicycle programs are the existence of low-density, non-urban settings in which there is extra capacity available on the system and the catchment area is broad. In fact, they note that congested urban areas and those with larger transit systems (along with areas prone to crime) pose the most challenges for success. In the case of the congested urban environment, crowded systems offer little excess capacity for bicyclists to share space with other commuters. Further, adding racks to buses in such environments is difficult because of limited space on the roadways and between vehicles. Larger transit systems pose a different challenge, namely a focus on operating rather than planning and a more complicated decision-making process that can make implementing bicycle-transit programs more difficult, particularly when little supporting data exists.<sup>94</sup>

According to Replogle, “a key factor supporting the Netherlands's high level of bicycle access to transit and the relatively low dependence on the automobile, despite high automobile ownership, is the great attention that has been given by local governments to making streets pedestrian and bicycle friendly.”<sup>95</sup> These safety measures have taken the form of widespread traffic calming in residential and commercial areas, and introduction of separate right-of-ways where traffic calming methods are not possible.

## **SAFETY**

As with pedestrians, perceived and actual safety concerns are also important for bicyclists. In 2002, 662 bicyclists were killed and 48,000 were injured in traffic accidents.<sup>96</sup> The number of fatalities was 8% lower than in 1992.<sup>97</sup> Similar to pedestrians, though not to the same extent, bicyclists are also disproportionately

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<sup>90</sup> League of American Bicyclists, *Bicycle Friendly Communities 2003: Enhancing Cities Through Cycling* (Washington, DC: LAB, 2003), p. 4, Accessed online 5/4/05, <http://www.bicyclefriendlycommunity.org/pdf/BFC%20case%20study.pdf>. In recent years, with the introduction of its “baby bullet” trains, the capacity of these cars has been greatly diminished from 32 bicycles per car to 16. See East Bay Bicycle Coalition, “Passenger Rail Issues: Caltrain,” Accessed online 6/9/05, <http://www.ebbc.org/rail/caltrain.html>.

<sup>91</sup> Doolittle and Porter, *Synthesis of Transit Practice 4*, p. 2.

<sup>92</sup> *Ibid.*, p. 5.

<sup>93</sup> *Ibid.*, p. 23.

<sup>94</sup> *Ibid.*, pp. 8-9.

<sup>95</sup> Replogle, “Bicycle Access to Public Transportation,” p. 3.

<sup>96</sup> USDOT, NHTSA, NCSA, *Traffic Safety Facts 2002: Pedalcyclists*, DOT HS 809 613 (Washington, DC: NCSA, 2002), p. 1.

<sup>97</sup> *Ibid.*

represented in such accidents – in 2002, bicyclist fatalities accounted for 2% of all traffic fatalities though ridership levels were below this.<sup>98</sup>

Many of the statistics related to safety mirror those for pedestrians but at much smaller overall numbers. As with pedestrians, the vast majority of bicyclist fatalities occur in urban areas (68%) and are not located at intersections (68%). Roughly one-fifth of all bicyclists killed in traffic accidents in 2002 were between 5 and 15 years old. And, roughly one-fourth of those bicyclists killed in traffic accidents were intoxicated.<sup>99</sup>

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<sup>98</sup> USDOT, NHTSA, NCSA, *Traffic Safety Facts 2002: Pedalcyclists*, p. 1.

<sup>99</sup> *Ibid.*, p. 2.

## V. PEDESTRIAN AND BICYCLIST STANDARDS AND INNOVATIONS: NOTABLE EXAMPLES

While there are no national pedestrian and bicyclist design standards, particularly for urban areas, there are guidelines and some examples that can be drawn upon. With data and performance measures limited, it is not always clear to what extent such programs have been successful and whether they can and should be replicated elsewhere. With that said, however, it is still helpful to provide some short descriptions of several initiatives around the country and elsewhere. Except where otherwise noted, the following discussion is drawn from the presentations made during the peer-to-peer workshop in New York City.

### PEDESTRIANS

A number of cities are implementing measures to make their cities more pedestrian friendly. Among them are traffic calming techniques, making intersections easier and safer to navigate (by providing curb extensions, center medians, or mid-block crosswalks), adding new or widening existing sidewalks, clearly identifying a pedestrian network, and providing amenities (e.g., benches or ledges for resting) and pleasant aesthetics (e.g., trees, flowers, brick walkways).

#### **Incorporating Pedestrians into Larger City Goals: Portland**

Several cities around the United States have developed pedestrian master plans in recent years. Oakland, CA developed the first pedestrian-only master plan in California in November 2002. Among its goals are increased safety, increased access and links to other modes, streetscaping and land use changes to promote walking, education, and integration of pedestrian projects into federally-funded transportation projects.<sup>100</sup> The Maricopa Association of Governments, responding to concerns over pedestrian safety, also developed a pedestrian plan that was released in early 2000. Similar to that of Oakland, the plan's goals include promotion of land use conducive to pedestrians, increased public awareness, designing for people, linkages to other modes, and increased funding for pedestrian projects.<sup>101</sup>

The City of Portland, OR has taken its master plan even further. One of the most noted walkable cities in the United States, Portland's leadership has for many years placed a priority on creating pedestrian-friendly places. Under the *Portland Comprehensive Plan*, the City created the *System Transportation Plan*, and beneath that, a *Pedestrian Master Plan* with an accompanying *Pedestrian Design Guide*.<sup>102</sup> Thus, Portland's plans and designs for pedestrians are integrally linked with other transportation and non-transportation plans and goals.

Adopted in 1998, the pedestrian design included design features for sidewalk corridors, street corners, crosswalks, pathways, and stairs. They were initially implemented outside the central city, in areas where there were no special standards or guidelines in place, by developers, and by the City of Portland. In subsequent years, additional neighborhood plans have followed, identifying specific issue areas and improvement projects.

The City of Portland works with a Pedestrian Advisory Committee which reviews new projects, advocates and supports education and outreach for pedestrians, and helps develop policy and plans for pedestrians. Various efforts aimed at creating a safe and comfortable environment for pedestrians have been implemented, including design modifications like curb ramps and extensions, new technologies including audible signals and passive detection signal systems using radar and microwaves, and education and outreach initiatives (Figures 3 and 4).

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<sup>100</sup> City of Oakland, *Oakland Pedestrian Master Plan* (Oakland, CA; City of Oakland, November 2002), Accessed online 6/13/05, <http://www.oaklandnet.com/government/Pedestrian/index.html>.

<sup>101</sup> Maricopa Association of Governments (MAG), *Pedestrian Plan 2000* (Phoenix: MAG, December 1999), pp. 2-4, Accessed online 3/10/05, [http://www.mag.maricopa.gov/pdf/cms.resource/ped-plan2000sum-web\\_427.pdf](http://www.mag.maricopa.gov/pdf/cms.resource/ped-plan2000sum-web_427.pdf).

<sup>102</sup> City of Portland, "Pedestrian Update May 2001," Accessed online 6/13/05, <http://www.trans.ci.portland.or.us/pedestrians/AnnualReport.htm>. For a copy of the *Pedestrian Design Guide*, see <http://www.trans.ci.portland.or.us/DesignReferences/Pedestrian/default.htm>. For the *Portland Pedestrian Master Plan*, 3<sup>rd</sup> printing, see <http://www.trans.ci.portland.or.us/Plans/PedestrianMasterPlan/PedMasterPlan.pdf>.



**Figure 3. Design Changes at the Intersection of NW 23<sup>rd</sup> Street/Overton**



**Before**



**After**

*From: Presentation by April Bertelsen*

**Figure 4. Design Changes at Woodstock Mid-Block**



**Before**



**After**

*From: Presentation by April Bertelsen*

Landscaping in adjacent sidewalks is usually maintained by property owners, while landscaping in mid-block sections is maintained by the City of Portland, though April Bertelsen, Transportation Planner, Centers & Corridors, Portland Office of Transportation noted that the City is seeking business partners as has been done in Philadelphia. In addition to providing landscaping for aesthetic reasons, the City also recently undertook a demonstration project aimed at developing “green streets,” to help deal with flooding (Figure 5).

**Figure 5. Green Street Examples**



*From: Presentation by April Bertelsen*



### Using Traffic Calming Techniques: New York City

New York City has taken a different approach, relying more on traffic calming to encourage pedestrian usage and enhance safety, but the overall goal is the same – to encourage a pedestrian-friendly environment. Such efforts are found throughout all five boroughs of the City. In Central Park, for example, there are car free zones except for two hours twice a day. The City has also lowered the speed limit on the roadways within the park – a policy rather than an engineering decision – to make it easier for pedestrians and bicycles to coexist with automobile traffic. More recently, New York City has been exploring the possibility of lowering speed limits around schools, though, given the density of schools, the speed limits in some places would jump back and forth between 30 mph and 15 mph, making it difficult to enforce. Nevertheless, the City has begun a demonstration project with ten schools in the Bronx.

**Figure 6. Prospect Park Southwest, Brooklyn**



*From: Presentation by Gerard Soffian*

**Figure 7. Hicks Street, Brooklyn**



*From: Presentation by Gerard Soffian*

Another way that New York City deals with traffic calming is through the use of speed humps. Though they cannot be used on truck routes, bus routes, and emergency routes, and there must be evidence of speeding before one is placed, they are considered an effective and relatively inexpensive method. Chicago and Baltimore, it should be noted, also use this technique, though they have different mechanisms for approving their placement. In Chicago, the City relies on petitions from the community; in Baltimore a study is conducted and then 70% of the residents must support the placement of the speed hump.

New York also utilizes other traffic calming techniques, such as painted center medians (Figure 6) and road “diets,” where streets are narrowed by painting hatches on the sides (Figure 7). Philadelphia used to employ painted center medians, but in recent years, has shifted to adding bicycle lanes instead.

Along with these other methods, split phase signals and lead signals have been implemented around New York City. Such signals give pedestrians a walking signal before drivers get their green signal, allowing pedestrians to establish themselves in the crosswalk before a driver can begin turning.

Finally, New York has added a number of signs around the City in an effort not only to notify pedestrians and

drivers of specific regulations, but also to warn them of particularly dangerous intersections (Figure 8). While Gerard Soffian, Director, Division of Signs & Markings, New York City Department of Transportation, notes that there has not been any tracking to see if people are paying attention and if the signs make a difference, they are still thought to be an important component of the overall effort at increasing pedestrian safety.

**Figure 8. Queens Blvd., Queens**



*From: Presentation by Gerard Soffian*

### BICYCLES

As with pedestrians, there are a number of initiatives around the United States and Canada aimed at increasing bicycle usage, improving access to transit, collecting data, and standardizing designs. The



following paragraphs offer a selection of innovations that speak to these and other issues.

### Design Innovations and Regional Standards: Quebec and Montréal, Canada

Among the notable examples of cities that are focusing on bicycle programs are Montréal and Quebec City in Quebec, Canada. In 1995, the province of Quebec adopted an official Bicycle Policy that set goals for increased use of bicycles at the same time as increasing safety. In addition to requiring all provincial infrastructure projects to include bicyclist needs in their designs, the Policy also introduced uniform bikeway design and traffic control standards.<sup>103</sup> The result of the Policy and the related infrastructure changes was that the number of adult Quebecois who bicycle weekly doubled between 1991 and 2000.<sup>104</sup> Further, bicycle studies are now conducted every 5 years in the Province of Quebec and, in each of the cities, bicycling and safety has increased since the Policy was instituted.<sup>105</sup>

**Figure 9. Bi-Directional Bicycle Path**



From: *Out-There: Quebec Bike Paths*, [www.out-there.com/bkp\\_pq01.htm](http://www.out-there.com/bkp_pq01.htm)

Currently, roughly half of all bicycle facilities in Quebec City and Montréal consist of separate bicycle paths and lanes. Indeed, the emphasis with respect to safety in these two cities has been on separate right of ways, rather than on traffic calming techniques as are used in other Canadian cities (most notably Vancouver and Victoria in the province of British Columbia).<sup>106</sup> Montréal has 210 km of separate bicycle paths, 95 km of bicycle lanes, and 66 km of bicycle routes on light-traffic roadways.

Quebec City has 220 km of separate bicycle paths, 121 km of bicycle lanes, and 66 km of bicycle routes. A distinct feature of both cities is bi-directional bicycle paths (Figure 9) and bi-directional on-street bicycle lanes (Figure 10).<sup>107</sup>

**Figure 10. Bi-Directional Bicycle Lane**



From: *Presentation by Marc Jolicoeur*

**Figure 11. Physically Separated Bi-Directional Bicycle Lane**



From: *Presentation by Marc Jolicoeur*

As Marc Jolicoeur, Engineer and Research Coordinator for Vélo Québec in Montréal, explains, these bi-directional lanes do not work in every location, and are rarely used in the U.S. Such lanes work best on one-way streets with large spaces between intersections or when there is one side of the street without any intersections. He adds that full physical separation between the bike and car lanes is preferable (Figure 11).

In 2002, the City of Montréal took an additional step, working together with Vélo Québec, to develop the “Plan for Bicycle Accessibility and Mobility in Downtown Montréal.” The plan proposes a series of options, including permanently open bikeways and routes, contraflow bike lanes, and roadway markings for bicyclists.

<sup>103</sup> Pucher, “Cycling Trends and Policies in Canadian Cities,” p. 8.

<sup>104</sup> Ibid.

<sup>105</sup> Ibid., p. 10.

<sup>106</sup> Ibid., pp. 10 and 17-18

<sup>107</sup> Ibid., p. 10.

### Transit Links: Palo Alto and Phoenix

A number of cities have recognized the importance of linking bicycling with transit. In Washington, DC the Washington Metropolitan Area Transit Authority (WMATA) has made bicycle access a formal component of all rail system planning.<sup>108</sup> Another example is provided by Palo Alto, CA, where according to the 2000 Census, 5.6% of the resident population commutes to work by bicycle.<sup>109</sup> While much smaller than the large central cities, it is still worth mentioning with respect to its bicycle-transit linkages. Over the past thirty-five years, Palo Alto has instituted a number of transit-bicycle projects, including installation of bicycle lockers at the City's Caltrain commuter rail stations. It has also adopted zoning ordinance requirements for new development projects to provide on-site bicycle racks and lockers. In 1999, the City opened the first "Bikestation" at the Palo Alto Caltrain station, which provides free, valet bicycle parking, bicycle servicing and other amenities.<sup>110</sup>

Phoenix, Arizona offers another excellent example of several steps that can be taken to improve bicycling facilities and link them with transit. In 1987, the City of Phoenix developed a plan for a bikeway system, approving the development of 600 miles of on-street and off-street bicycle lanes and paths in a city that, at the time, had roughly 75 miles of bikeways. In 1988 a resolution was approved, allowing \$3 million in bonds to build the backbone of the system. With the support of bicycle advocates, communities, and policymakers, the funding allowed the City to construct 360 miles of new bicycle facilities within 5 years. When the bond monies ran out, the City committed \$500,000/annually to continue the building of the system and, to date, there are over 500 miles built. The bikeway system now consists of the Arizona Canal, Grand Canal, and CAP Canal, as well as the Phoenix Sonoran Bikeway, and the Rio Salado Pathway, the last of which is currently being constructed. Additionally, in 1994, the City mandated that all new developments need bicycle lanes adjacent to the properties.

**Figure 12. Bicycle Locker at Park-and-Ride Facility**



*From: Presentation by Briiana Leon*

**Figure 13. Bicycle Rack on Rail**



*From: Presentation by Briiana Leon*

During this same period, in 1991, the City of Phoenix began a 6-month demonstration project for a program developed in-house that would link transit and bicycling. Though the transit agency was not eager for the project, the City obtained a grant from the Arizona Department of Environmental Quality (ADEQ) to place bicycle racks on 45 buses on three different routes. Each rack was able to support two bicycles. In the first month of the demonstration, there were 153 bicycle boardings. That figure climbed to 1,500 by the sixth month, and the program was expanded in 1992 to include all 350 buses on all routes. To date, there are now 600 buses in the City, all of which are equipped with bicycle racks. All Park and Ride facilities are also equipped with secure lockers (Figure 12). With 100,000 bicycle boardings for each 4.3 million monthly boardings (2.3%), the effort is deemed a success.

Finally, Phoenix is currently constructing a light rail system. Phase 1 consists of 20 miles and will open in 2008. Plans are already in place to include four bicycle racks per car as well as lockers and racks at each station (Figure 13).

<sup>108</sup> Doolittle and Porter, *Synthesis of Transit Practice 4: Integration of Bicycles and Transit*, pp. 5 and 14.

<sup>109</sup> City of Palo Alto, "Bicycling," Accessed online 6/13/05, <http://www.cityofpaloalto.org/transportation/bike/>.

<sup>110</sup> Ibid.



### Safe Routes to School: Chicago

In 2001, Chicago Department of Transportation (CDOT) obtained a Highway Traffic Safety Grant to implement a Safe Routes to School program for biking and pedestrians. The goal of the program is to reduce the incidence of traffic fatalities and serious injuries among child pedestrians and cyclists. Additional potential benefits, according to Trisha Sternberg, Project Coordinator, City of Chicago Department of Transportation, are health improvements, obesity reduction, increased academic performance, less congestion, better air quality, less reliance on automobiles, community building, and better quality of life.

Chicago's bicycle and pedestrian programs focus on four "E's" – Enforcement, Engineering, Encouragement, and Education. Enforcement is both passive (e.g., red light cameras) and active (e.g. ticketing bike lane violations). Engineering and design is supported by \$1 million in CMAQ funds; 10,000 bike racks, 100 miles bike lanes and 200 miles of signed routes have been installed under the program. People are encouraged to walk and bike through a number of efforts, but most notably through "Bike Chicago" and "Walk Chicago" events. Finally, education is carried out in a number of ways. The City distributes safety coloring books in Spanish and English, the police department conducts bicycle rodeos, and Mayor Daley has instituted his Safe Routes Ambassadors, often college students who are formally trained and evaluated on performance, who are teamed in groups of two to six individuals to attend events and schools.

Multiple approaches are utilized by the Safe Routes Ambassadors as well. They do in-class safety presentations at schools, where they also often end up working with the students to help them fix their bikes and learn how to better take care of them. There are also bike training days to teach children to ride and, as noted above, Chicago participates in the International Bike and Walk to School days. Additionally, CDOT reaches out to schools to install bicycle racks near school premises to help accommodate students who might be bicycling.

The Ambassadors program has been such a success that the City is now training Junior Ambassadors in a 16-week program (eight weeks on bike mechanics and eight weeks on presenting safety). After the training period, the Junior Ambassadors are hired by the Park District and supervised by the more senior ambassadors. The Ambassadors, both senior and junior, not only help children learn about bicycling and bicycle safety, they also perform an important function in changing perceptions of bicycling since children perceive them as "cool" and want to try to emulate them.

The key ingredients to the safe routes to school program, according to Sternberg have been partnerships and effective marketing through the use of posters, postcards, a website, handouts, and formal outreach to the schools (Figure 14).

Figure 14. Marketing Materials



From: Presentation by Trisha Sternberg

## **VI. POLICY CHALLENGES AND APPROACHES**

In addition to the challenges faced by large central cities that were previously described and discussed in earlier sections, the city representatives at the peer-to-peer session noted several additional policy challenges that they face on a daily basis. They also identified several approaches that could be used to meet some of these challenges. These approaches are briefly described in the following paragraphs.

### **DEVELOPING CLEAR POLICY PRIORITIES IS IMPORTANT**

One of the most difficult challenges, perhaps, according to Bertelsen, is “balancing the need for connectivity with building to full standards.” Often, a city may have the ability to have full connectivity, but because of space constraints, right of way issues, and funding, can only do this if the facility is left sub-standard in locations. Both Los Angeles and Portland described instances in which bump-outs were added for pedestrians but the result was partial or full elimination of a route for bicyclists. Trying to determine when one should opt for one alternative or another is difficult since when trying to balance policies and priorities, there is rarely guidance on which takes precedence when faced with competing concerns. The result, unfortunately, is that guidelines are often applied inconsistently. Bertelsen noted that at least in Portland, they have been collecting and assessing data to allow a good understanding of the entire network so that at least they can show that when compromises are made in one area, alternatives are provided elsewhere.

However, such data is not always available and challenges exist in dealing with priorities on a number of pedestrian and bicyclist issues. Crossing guards, for example, are sometimes assigned based more on past demand than on current need. Philadelphia is addressing this specific issue through the development of a system for prioritizing crossing guard locations that rates all existing and newly requested locations. Over time, there will be a graduate reassignment of guards to higher priority locations.

### **INCREASING AWARENESS AND ACCEPTANCE IS NECESSARY**

Awareness and acceptance are crucial to establish bicycling and pedestrian activities as parts of the U.S. overall transportation system, and not just “add-ons.” Such acceptance is, in turn, key to ensuring funding and long-term success of programs. Education and enforcement both provide important tools for increasing awareness and acceptance, though in very different ways.

#### **Education**

One of the most obvious ways to increase awareness and acceptance of walking and bicycling is through education. In addition to Chicago, a number of cities have undertaken educational programs aimed at improving safety as well as encouraging walking and bicycling. Maryland, for example had a state-wide campaign on pedestrian safety that focused on education and Baltimore has partnered with its Office of Neighborhoods to translate materials into multiple languages to reach a broader audience. New York City, Chicago, and Baltimore have employed “Safety Cities” to help teach children, utilizing either life-sized or scaled models.

A number of workshop participants pointed out that most educational efforts focus on pedestrians rather than on drivers and that enforcement among drivers remains a key issue. The only time that drivers are given similar attention is when they are initially going through the requirements for their drivers licenses or when they are attending a class to reduce their insurance costs or because they have already had a moving violation on their record. A few cities have reached out to drivers in one way or another. New York City has been coordinating with the American Automobile Association’s (AAA) New York Chapter and Los Angeles recently partnered with its local AAA chapter, the California Highway Patrol, other cities, and transit to launch a “Watch the Road” initiative which features public service announcements on the radio in multiple languages urging people to slow down and drive more responsibly.

## **Enforcement**

Enforcement is another important tool for encouraging pedestrian and bicycling activity and for increasing safety. However, while many cities have examples of educational efforts related to pedestrians and bicyclists, enforcement is often lacking, particularly in those cities where other safety concerns like criminal activity outweigh accidents. In such cities, it can be difficult to get law enforcement officials to focus on the former.

Nevertheless, some cities have taken measures to increase enforcement, often through the use of police “sting” operations or through more passive means such as red-light cameras, the latter of which, it was pointed out, can also serve as a tremendous source of revenues. Interestingly, while most educational efforts are focused on pedestrians, most enforcement efforts focus on drivers, with the exception of Seattle which enforces the laws for pedestrians and bicyclists as well. In fact, Gray noted that in Seattle, more tickets are issued for pedestrians than drivers in crosswalks.

## **LEADERSHIP AND PARTNERSHIPS ARE ESSENTIAL**

All of the city representatives mentioned the importance of strong leadership, both in the public sector and in the civic community. Barbara Gray explained that in Seattle, an “action-oriented mayor and forward thinking City Council” have been critical to the success of the City in addressing pedestrian and bicyclist issues. Seattle actively seeks opportunities for high quality pedestrian and bicycle facilities in both large and small projects, and the Mayor’s Environmental Action agenda includes Smart Mobility as one of four top priorities.

This public leadership is complemented by strong citizen advocacy groups, and Seattle works closely with a Pedestrian Advisory Board and Bicycle Advisory Board. Similar mixes of leadership and advocacy groups are seen in Chicago with Mayor Daley’s initiatives, in Portland where pedestrian plans have been formally and explicitly included as part of the overall plan for the city, and in Philadelphia and Phoenix, where decisions were made at the top to develop the bicycle networks. In the former, Mayor John Street recently established a new Bicycling Task Force to build on the success of the bike lane network.

Leadership is of particular importance given the challenges faced when trying to implement pedestrian and bicyclist policies and programs or design features. Of note, several city representatives pointed out that often such leaders are individuals who bicycle or walk themselves. Without sufficient data and broad public and policymaker acceptance, whether or not pedestrian and bicyclist programs are successful is often related to whether there is strong leadership willing to undertake policy decisions or implement demonstration projects backed by adequate funding levels even without statistical “proof” that they will meet specific goals.

Strong leadership is also essential for building and maintaining strong partnerships, a key feature of successful bicycle and pedestrian programs. Whether with other public agencies, private companies, advocacy groups, community groups, schools, or other types of institutions, partnerships bring multiple opportunities for funding, education and awareness, political support, and so on. John Fegan, Bicycle and Pedestrian Program Manager at the Federal Highway Administration, took this notion of partnerships a step further, pointing out that positioning bicycle and pedestrian programs in a way that helps solve larger issues may prove particularly effective for increasing awareness and acceptance, as well as for leveraging funding. Bicycle and pedestrian programs provide transportation modal alternatives and can help reduce congestion, but they also have the potential to provide various health benefits and aid in improving air quality. There is a tremendous opportunity here to partner with environmental and public health groups as a means to find additional funding and to better generate and track data. Similarly, partnerships with universities could aid in developing better metrics and benchmarks. Finally, business district improvement associations often have untapped data and might be interested in demonstrating the positive effects of bicyclist- and pedestrian-friendly practices on real estate values and small businesses.

## VII. CONCLUDING THOUGHTS

Pedestrian and bicyclist issues do not exist in a bubble. Though at times there appears to be a tendency to treat them as afterthoughts, they are integral to the overall transportation system, particularly in large central cities. In the Fall of 2005, the NYU Wagner Rudin Center for Transportation Policy and Management hosted a discussion with renowned Architect and Urban Designer, Jan Gehl.

In speaking about the design of public space and its relationship to the pedestrian and bicyclist, Gehl suggested that architects and designers commonly neglect the very people for whom they build public spaces. For example, Brasilia was planned from 5,000 meters above ground; in neglecting the human scale, short-distance travel such as walking and bicycling was thus discouraged.

Effecting changes that promote non-motorized travel takes not only education, enforcement, and leadership but a collaborative, interdisciplinary approach. There is tremendous opportunity for partnerships to meet the unique needs of pedestrians and bicyclists in large central cities. To borrow Gehl's observation that "architecture and planning should fit man and man should not try to fit planning and architecture," perhaps the same analogy can be made for pedestrians and bicyclists: transportation planning in large central cities should fit pedestrians and bicyclists and pedestrians and bicyclists should not try to fit transportation planning.

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**APPENDIX A. TEA-21 BICYCLE/PEDESTRIAN FUNDING OPPORTUNITIES**

TEA-21 Bicycle/Pedestrian Funding Opportunities																
	NHS	STP	HEP	RHC	TEA	CMAQ	RTP	FTA	TE	BRI	402	PLA	TCSP	JOBS	FLH	BYW
Bicycle and pedestrian plan		*				*						*	*			
Bicycle lanes on roadway	*	*	*	*	*	*		*	*	*					*	*
Paved Shoulders	*	*	*	*	*	*				*					*	*
Signed bike route	*	*			*	*									*	*
Shared-use path/trail	*	*			*	*	*			*					*	*
Single track hike/bike trail							*									
Spot improvement program		*	*		*	*										
Maps		*				*					*					
Bike racks on buses		*			*	*		*	*							
Bicycle parking facilities		*			*	*		*	*							*
Trail/highway intersection	*	*	*		*	*	*								*	*
Bicycle storage/service center		*			*	*		*	*			*	*			
Sidewalks, new or retrofit	*	*	*	*	*	*		*	*	*					*	*
Crosswalks, new or retrofit	*	*	*	*	*	*		*	*						*	*
Signal improvements	*	*	*	*	*	*										
Curb cuts and ramps	*	*	*	*	*	*										
Traffic calming		*	*	*		*							*			
Coordinator position		*				*							*			
Safety/education position		*				*					*					
Police Patrol		*				*					*					
Helmet Promotion		*			*						*					
Safety brochure/book		*			*	*					*					
Training						*					*					

**KEY**

NHS	National Highway System	BRI	Bridge
STP	Surface Transportation Program	402	State and Community Traffic Safety Program
HEP	Hazard Elimination Program	PLA	State/Metropolitan Planning Funds
RHC	Railway-Highway Crossing Program	TCSP	Transportation and Community and System Preservation Pilot Program
TEA	Transportation Enhancement Activities	JOBS	Access to Jobs/Reverse Commute Program
CMAQ	Congestion Mitigation/Air Quality Program	RTP	Recreational Trails Program
FLH	Federal Lands Highways Program	FTA	Federal Transit Capital, Urban & Rural Funds
BYW	Scenic Byways	TE	Transit Enhancements

From: USDOT, FHWA, FHWA-Guidance: Bicycle and Pedestrian Provisions of Federal Transportation Legislation, (February 24, 1999), Accessed online 6/7/05, <http://www.fhwa.dot.gov/environment/bikeped/BP-Guid.htm#App-2>. Note that at the time this report was completed, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was just recently signed. Thus, the discussion in this report regarding federal involvement with bicycling and pedestrians relates to the prior authorizing legislation.

## APPENDIX B. PARTICIPANTS IN THE PEER-TO-PEER WORKSHOP, SEPTEMBER 23, 2005

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