

# Knoxville Regional Bicycle Plan 2009





Knoxville Regional Transportation Planning Organization

# 2009 Knoxville Regional Bicycle Plan

Adopted May 27, 2009 by the TPO Executive Board  
as part of the *2009-2034 Knoxville Regional Mobility Plan*

Adopted by the:  
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in cooperation with the  
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# Executive Summary

Whereas bicycling was once an extremely common way of getting around, today it's become the forgotten mode of transportation. Because motorized vehicles dominate the transportation system, bicycling is often perceived to be a dangerous and/or unimportant mode of travel. The truth is bicycling can bring great economic, environmental, social and health benefits to our region. And, on any given day, a motorist is many times more likely to be involved in a crash than a bicyclist. Raising public awareness about the importance and value of biking, and its legitimate place in the transportation system, must be an ongoing priority.

## Vision

We envision a convenient transportation system where people can bike safely to all destinations.

Objective #1: Provide safe and convenient bicycle accommodation in all transportation projects.

Objective #2: Maintain bicycle facilities for function and safety.

Objective #3: Achieve greater system continuity for bicycle travel.

Objective #4: Build all bicycle projects according to accepted design standards.

Objective #5: Develop and refine the regional bicycle network so that all jurisdictions understand, incorporate and implement their respective components of the regional system.

Objective #6: Educate the general public and public officials about the benefits of biking and encourage increased levels of biking.

Objective #7: Increase enforcement of traffic laws equally among bicyclists and motorists to increase safety and build mutual respect among all system users.

Objective #8: Support greater investment in bicycle projects.

Objective #9: Monitor the progress of the implementation of the bicycle plan, and assess the effects of project and program investments.

# Vision Statement

*We envision a convenient, efficient transportation system where people can bike safely to all destinations.*

## *Principle #1—All Bicyclists Are Different*

*Bicyclists have a variety of skill levels and needs. They ride for many different reasons, including commuting, running errands, recreation and exercise.*

## *Principle #2—Expect Bicycles on Every Street*

*Bicyclists want to go to the same places motorists want to go; therefore, bicyclists will ride on every road to some extent.*

## *Principle #3—It's More Than Just Getting There*

*Enforcement, encouragement and education are integral parts of a bicycle friendly community, along with facilities.*





# Background

In 1975, a Preliminary Bikeway Plan for Knoxville-Knox County was developed for the Metropolitan Planning Commission (MPC) with support from the Federal Highway Administration. The recommended bikeway network included 105 miles of trails as well as bike lanes on arterial streets. The network was intended to connect major residential and activity centers throughout the community.

In 1985, a Knoxville-Knox County Bikeway Plan Update was completed to determine current trends and problems, update bicycle use habits and trends, and identify strengths and weaknesses in the adopted plan network.

The Knoxville Regional Transportation Planning Organization (TPO) and a Bicycle Plan Committee developed the 1995 Bicycle Plan for the Knoxville Urban Area. It was adopted by the TPO Executive Board as part of the Long Range Transportation Plan in May 1995.

In 2001, the TPO Executive Board developed a citizen Bicycle Advisory Committee (BAC) with eleven members. The BAC had many duties: updating and maintaining the Bicycle Plan for the Knoxville Urban Area; making recommendations and encouraging the implementation of bicycle provisions and opportunities to the TPO Technical Committee, Executive Board and implementing agencies; and working with local businesses, agencies and organizations to encourage bicycling and promoting community investment in bicycle racks, signage and other facilities/programs. These duties continue today.

The 2002 Knoxville Regional Bicycle Plan, adopted as an amendment to the TPO Long-Range Transportation Plan, was a detailed plan with more than 80 action steps. Much progress has been made since then. This 2009 plan is intended as a supplement to the 2002 plan, and provides a succinct plan of action to guide the work of the TPO, BAC and local jurisdictions. It should be noted that this plan is subject to fiscal and policy decisions made by each local government.



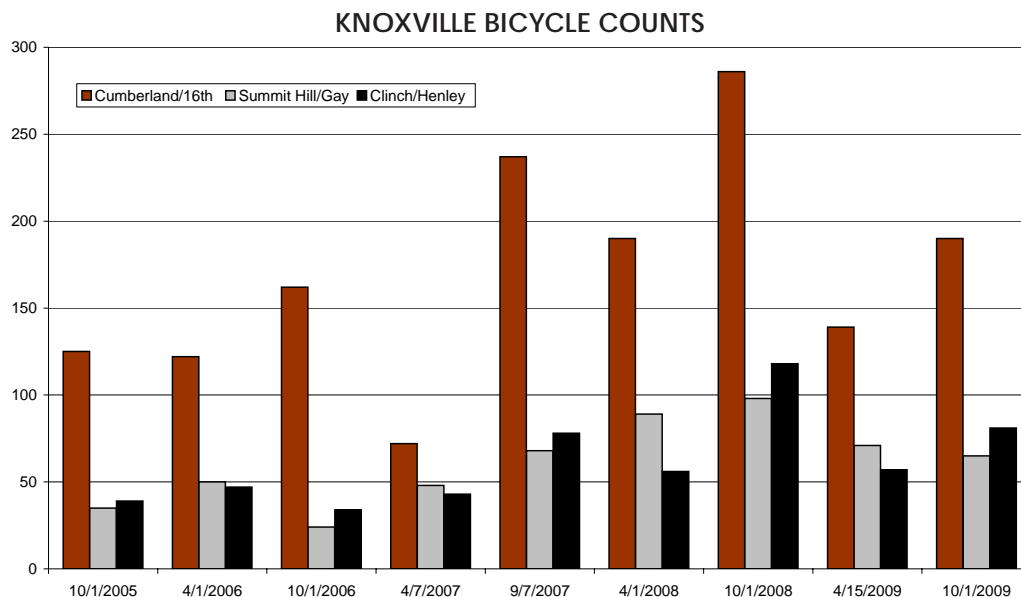
# Importance of Bicycling

Whereas bicycling was once an extremely common way of getting around, today it's become the forgotten mode of transportation. Because motorized vehicles dominate the transportation system, bicycling is often perceived to be a dangerous and/or unimportant mode of travel. The truth is bicycling can bring great economic, environmental, social and health benefits to our region. And, on any given day, a motorist is many times more likely to be involved in a crash than a bicyclist. Raising public awareness about the importance and value of biking, and its legitimate place in the transportation system, must be an ongoing priority.

Regular physical activity is essential for a healthy life. People who exercise routinely live longer and better, according to the Centers for Disease Control and Prevention (CDC). Obesity among adults has increased by almost 60% since 1991. In 2005, nearly 30% of Tennesseans were classified as obese, compared to less than 15% in 1990.<sup>1</sup>

Nearly half of all car trips are shorter than 2 miles, which is just a 15- or 20-minute bike ride for most people.<sup>2</sup> Short car trips are also the most polluting, adding to our air quality problems. With safe, interconnected non-motorized facilities, children could walk or bicycle to school, soccer fields, the library and other destinations, without having to be driven.

Nationally, about 0.4% of workers commute by bicycle. In Knoxville, approximately 0.25% of workers commute by bicycle and in Knox County that number drops to 0.12%. Surrounding counties have similar, or lower, percentages to Knox County. However, counts of bicyclists conducted locally twice a year show that bicycling is on the rise. Bicycle counts conducted at locations since 2005 are up an average of 87.5%. Counts at locations conducted since 2007 are up an average of 41.5%.



<sup>1</sup>Obese is defined as about 30 pounds overweight.

<sup>2</sup>1995 Nationwide Personal Transportation Survey, FHWA, [www.cta.ornl.gov/npts/1995/Doc/trends\\_report.pdf](http://www.cta.ornl.gov/npts/1995/Doc/trends_report.pdf)

# Implementing Partners

The implementation of bicycle systems, and encouragement of their use, is a responsibility shared by all government agencies and jurisdictions in the region. It relies not only upon the development of good facility plans, but commitment at each level of government to support funding for good bicycle projects and programs. Whereas each agency has a different level of responsibility for building capital facilities, the implementation of education and encouragement programs is a responsibility shared fairly equally among all agencies.

## **Cities and Counties**

Because development of bicycle projects and programs occurs mainly at the city and county levels, local jurisdictions hold the greatest share of responsibility for implementing bicycle networks. Cities and counties need to recognize and plan for bicycle travel in transportation elements of comprehensive plans and to program projects into capital improvement programs. Law enforcement agencies have primary responsibility for implementing enforcement programs.

## **Knoxville Regional Transportation Planning Organization (TPO)**

The TPO is the federally designated Metropolitan Planning Organization for the urbanized portions of Knox, Blount, Sevier and Loudon counties. It is also responsible for long-range transportation planning for the non-attainment area. The TPO does not design or construct capital projects, but is responsible for allocating regionally managed federal funds. The TPO also oversees the Bicycle Program and Smart Trips, which promotes alternatives to driving alone. The TPO develops and adopts the Long Range Mobility Plan and the shorter-term Transportation Improvement Program (TIP).

## **Tennessee Department of Transportation (TDOT)**

Many state roadways are in need of bicycle improvements. TDOT can be a key partner in addressing regional bicycle and pedestrian needs through road projects, policies and maintenance.

## **Transit Agencies**

Improvements for bicyclists could be made at, and in the immediate vicinity of, transit/transfer stations, park-and-ride lots and transit stops. These improvements facilitate bicycle access to transit facilities and include bike parking and bike racks on buses.

## **Private Developers**

Private developers should be responsible for providing bicycle access in new developments. Their level of responsibility depends on each jurisdiction's codes and permitting requirements, which vary among municipalities. Developers are also responsible for providing supporting amenities at the workplace, such as bicycle parking, lockers, showers and changing rooms.

### **Bicycle Advisory Committee and advocates (BAC)**

A key part of this strategy is the education of the general public and public officials about the important role biking plays in the region, and encouraging increased levels of bicycling. The BAC and other advocates have a strong role in education and encouragement. They should also work collaboratively with public agencies during the planning, design and development of bicycle projects.

### **Public Health Agencies**

The link between public health and planning has become increasingly strong. “Active living by design” works to make it easier for people to include bicycling in their daily lives, such as walking to the park or biking to a friend’s house instead of driving. There is significant potential in partnering with health agencies on bicycling efforts.



# Capital Investments

## Roadway Design

Since bicyclists are expected on all roads, except interstates, all new and reconstructed roads should be designed to accommodate bicyclists. The TPO Executive Board adopted an accommodation policy stating this in 2002 (see p. 16), and TDOT adopted a similar policy in 2004.

*Objective #1: Provide safe and convenient bicycle accommodation in all transportation projects.*

### Suggested Actions:

1. Continue to follow the TPO Bicycle Accommodation Policy, adopted in 2002, and TDOT's current policy. (cities/towns, counties, TPO, TDOT, private developers)
2. Review and update local roadway design standards for appropriate bicycle accommodation. (cities/towns, counties, TDOT)

## Maintenance and Preservation

Responsible maintenance and preservation of all transportation facilities is the most cost-effective investment since it ensures efficient performance of the facility well into the future.

*Objective #2: Maintain bicycle facilities for function and safety.*

### Suggested Actions:

1. Develop facility management plans to assure proper maintenance of bicycle facilities. (cities/towns, counties, transit agencies, TDOT, private developers)
2. Keep existing bicycle facilities well maintained and free of debris and other potential hazards. (cities/towns, counties, transit agencies, TDOT, private developers)
3. Develop a policy requiring paved aprons on gravel roads to prevent loose gravel from being carried out onto the shoulders. (cities, counties)

## Barriers and Missing Links

Because the average bike trip is relatively short, bicycle travel is susceptible to being abandoned if there are system gaps or barriers that require lengthy diversions. The presence of a river, freeway or major arterial with no convenient crossing tends to deter most people from biking, even if the distance is close "as the crow flies." Shoulders and bike lanes that end without warning, forcing users into busy traffic, pose problems for bicyclists. In addition, the lack of safe bike access to bus stops and urban centers will likely deter potential transit and biking trips. Projects that remove barriers, fill system gaps, connect to public transit opportunities and urban centers, and develop system

continuity have the potential to result in a significant increase in biking and transit use for a relatively low cost.

*Objective #3: Achieve greater system continuity for bicycle travel.*

**Suggested Actions:**

1. Add bicycle crossings over waterways, highways, major arterials and other obstacles where such crossings are inadequate. (cities/towns, counties, transit agencies, TDOT)
2. Give high priority to bicycle improvements that link existing facilities into a continuous network. (cities/towns, counties, transit agencies, TPO, TDOT, private developers)
3. Address regional bicycle “missing links” identified in the Bicycle Plan, the transportation element of local comprehensive plans, sector/subarea plans and corridor studies. (cities/towns, counties, TPO, TDOT)

**Bicycle Facility Design**

To the degree possible, uniform bicycle design and safety standards should be consistently applied to projects throughout the region to protect the safety of bicyclists and motorists alike. This would also result in the development of an integrated network with a coordinated design across jurisdictional boundaries.

*Objective #4: Build all bicycle projects according to accepted design standards.*

**Suggested Actions:**

1. Plan, design and build facilities in accordance with design and safety standards defined in the AASHTO Guide for the Development of Bicycle Facilities and other accepted documents. (cities/towns, counties, transit agencies, TPO, TDOT)
2. Educate transportation planners and engineers on how to safely and efficiently accommodate bicycle travel. (cities/towns, counties, TPO, TDOT, private developers)

*Objective #5: Develop and refine the regional bicycle network so that all jurisdictions understand, incorporate and implement their respective components of the regional system.*

**Suggested Actions:**

1. Develop effective criteria and planning guidelines for local jurisdictions to use when developing the bicycle components of their local comprehensive and transportation plans. (TPO, TDOT, cities/counties)
2. Collaborate to ensure that state, county and local transportation plans are in agreement, local needs are addressed in state plans and vice versa, and that bicycle corridors are continuous across jurisdictional boundaries. (cities/towns, counties, TPO, TDOT)
3. Assure that bicycle interests are incorporated into major studies from the planning stages through final design, and that non-motorized “missing links” are considered in final plans. (cities/towns, counties, TPO, TDOT)



# Education and Encouragement

Education and encouragement are essential to the success of bicycle systems. Building bike lanes, shared use paths, and other facilities is important, but the bottom line is getting the public to safely use the facilities by demonstrating that bicycle transportation provides real benefits and by teaching safe user skills. Strong efforts aimed at encouraging changes in travel behavior and educating system users about basic safety and traffic laws need to be made regularly to have an effect. Successfully raising public and government awareness about the importance of bicycle transportation, as well as how to best implement regional and local networks and safely use them, will rely upon ongoing collaboration between citizen interest groups and government agencies.

***Objective #6: Educate the general public and public officials about the benefits of biking and encourage increased levels of biking.***

## **Suggested Actions:**

1. Increase the use of media to educate the public about the benefits of bicycling and the need for investment in facilities and programs. (cities/towns, counties, transit agencies, TPO, public health agencies and interest groups, employers, school districts, BAC and advocates)
2. Integrate bicycle safety laws and regulations into driver's education classes and driver's license testing. (TN Dept of Safety, school districts, BAC and advocates)
3. Produce materials on bicyclist safety laws and distribute in a wide variety of venues. (cities/towns, counties, TPO, public health agencies and interest groups, school districts, BAC and advocates)
4. Develop and administer bicycle safety programs for bicyclists of all ages to build overall confidence and teach bicyclists how to effectively travel both on shared roadways and separated trails. (cities/towns, counties, TPO, BAC and advocates, law enforcement agencies, school districts)
5. Develop and implement "Safe Routes to School" programs to improve community opportunities to safely bicycle to schools. (cities/towns, counties, TPO, public health agencies and interest groups, school districts, BAC and advocates)
6. Produce, regularly update and distribute bicycle maps. (cities/towns, counties, TPO, public health agencies and interest groups, BAC and advocates)
7. Encourage increased levels of biking through the TPO Smart Trips program. (cities/towns, counties, transit agencies, TPO, TDOT, area employers, BAC and advocates)
8. Increase participation in and quality of special events and programs that encourage bicycling, including bicycle rides, Bike to Work and Smart Trips Month events. (TPO, BAC and advocates, public health agencies, universities and colleges)

# Enforcement

Greater enforcement of existing traffic laws is necessary to improve the mutual respect between motorists and bicyclists. Such stepped up enforcement is needed to change the behavior of bicyclists and motorists who sometimes flagrantly and dangerously ignore traffic regulations, creating unsafe conditions for all parties. Implementation of all these efforts will require collaborative participation among many diverse interests including transportation agencies, law enforcement agencies, non-profit advocacy groups, schools, public health agencies and interest groups, and others.

***Objective #7: Increase enforcement of traffic laws equally among bicyclists and motorists to increase safety and build mutual respect among all system users.***

## Suggested Actions:

1. Consistently enforce laws among motorists and bicyclists. (Law enforcement agencies)
2. Continue to educate and train law enforcement personnel in bicycle enforcement through recruit training, roll call training and/or in-service refresher courses. (TPO, BAC, enforcement agencies)





# Funding

The bicycle plan will be very difficult to implement without securing new revenues. As with any public revenue issue, increases in funding to support bicycle transportation hinges upon public support. Therefore, stronger partnerships among transportation, environmental, public health and other public and private groups that have an interest in improved mobility for bicyclists should be established. Such partnerships should collaborate to identify opportunities to develop new revenues for bicycle projects and programs.

*Objective #8: Support greater investment in bicycle projects.*

## **Suggested Actions:**

1. Support increased funding to implement and maintain transportation plans, including bicycle components. (cities/towns, counties, TPO, TDOT, State Legislature, BAC and advocates)
2. As new transportation funding sources are identified, assure that a share be provided for bicycle projects. (cities/towns, counties, TPO, TDOT, BAC and advocates)



# Monitoring Progress

It is important to evaluate the progress and results of regional plan and project implementation. Only by monitoring the effects of building bicycle facilities and measuring the results of public information programs can government agencies, citizens and public officials know and understand the benefits of such investments. Armed with solid objective data about the impacts and results of such investments, the public may be more supportive of future bicycle improvements and programs.

*Objective #9: Monitor the progress of the implementation of the bicycle plan, and assess the effects of project and program investments.*

## Suggested Actions:

1. Conduct counts to measure changes in bicycle travel over time. (cities/towns, counties, transit agencies, TPO, BAC and advocates)
2. Conduct “before and after” studies to evaluate the impact of improved and expanded facilities. (cities/towns, counties, transit agencies, TPO, TDOT, BAC and advocates, public health agencies)
4. Develop tools to measure the effects of safety, education and encouragement programs. (cities/towns, counties, TDOT, law enforcement agencies, BAC and advocates, public health agencies)
5. Periodically inventory bicycle facilities in the region. (cities/towns, counties, TPO, TDOT)



# Implementation Challenges

Bicycle projects and programs share many common implementation challenges with other regional modal transportation programs. However, several challenges are somewhat unique to this issue and will likely take more effort and a longer time to overcome.

## Changing Land Use Patterns

Over the past five decades, prevalent land use patterns (i.e. spread out, suburban style development) have tended to favor automobile travel over other modes. Also, traditional transportation planning, which focused on increasing “vehicle throughput,” often resulted in the construction of wider, faster roads that lacked sidewalks, bike lanes or wide shoulders and are unsafe for bicyclists. Land uses were often segregated making jobs, housing and commercial services too far apart to be easily accessed by bicycle. This trend, however, seems to be reversing. Some mixed-use, transit and pedestrian-oriented developments are being implemented, and there is a growing government and public interest in creating density in urban centers and neighborhoods.

## Reducing Automobile Dependency

Since the 1950s, the automobile has been the U.S.’s primary mode of transportation. In most areas developed since the 1950s, it is usually the fastest and most convenient way to get around, and most households now own at least one and often two or three cars. Getting more people to bicycle instead of driving is a challenging cultural shift that will not be simple to achieve. Increasing levels of regional congestion, high gas prices and concerns over climate change and air quality have all begun to encourage many citizens to make a shift in the way they travel.

## Mainstreaming Bicycle Transportation

Bicycle transportation needs to be recognized as essential to the overall mobility and accessibility of the region before it will be allocated a higher proportion of revenues in transportation budgets. Currently bicycle facilities are often viewed as superfluous or “add-ons” rather than as integral parts of the regional transportation system that can bring great benefits. The federal government recognizes the integral role bicycle systems play in the larger transportation system, and encourages all levels of government to do the same. The FHWA’s Policy, Program and Design Guidance issued in 1999 makes a number of clear statements of intent about this, including:

- Congress clearly intends for bicyclists to have safe, convenient access to the transportation system and sees every transportation improvement as an opportunity to enhance the safety and convenience of the two modes.
- To varying extents, bicyclists will be present on all highways and transportation facilities where they are permitted and it is clearly the intent of TEA-21 (now SAFTEA-LU) that all new and improved transportation facilities be planned, designed



and constructed with this fact in mind.

- “Due consideration” of bicycle needs should include, at a minimum, a presumption that bicyclists will be accommodated in the design of new and improved transportation facilities.
- The decision not to accommodate bicyclists should be the exception rather than the rule. There must be exceptional circumstances for denying bicycle access.

Such mainstreaming of bicycle transportation can only be achieved with thorough, continued education of elected officials, government staffs and the general public about the necessity and importance of biking, and the important regional role this mode plays in transportation and land use policies. The TPO made a huge step toward this mainstreaming when it adopted FHWA’s recommended accommodation policy in 2002.

### **Increasing Public Awareness**

The fact that bicyclists have the same rights and responsibilities as motorists needs to be communicated more effectively. The benefit of bicycling for individuals and for the community is another key message. How to reach everyone with that message is a huge challenge, given limited funding and an ever-changing marketing environment.



## Next Steps

The TPO and the Bicycle Advisory Committee will oversee implementation of this bicycle plan. The first, and most vital, step is to coordinate with all the TPO member jurisdictions and to seek approval of this plan by city councils and county commissions. After that, it will take great cooperation and commitment to accomplish the action steps put forth in this plan. Every step forward is an investment in a future where bicycling is safe and convenient, giving people another choice for how they get around their communities.





# Appendix

## Accomplishments since 2002 Bicycle Plan

These progress report headings follow the format of the 2002 Bicycle Plan.

### Signage

- Share the Road signs were installed on Clinch Ave and Island Home Avenue, and in advance of narrow undercrossings on W. Blount Ave and 5th Ave.
- Warning signs about a skewed railroad crossing were installed on Neyland Drive.
- A comprehensive signage plan for the City greenway system was developed and Phase I of the plan is being implemented on Third Creek Greenway. Knoxville Parks and Recreation is providing the funding for this project, and Engineering is doing the installation. Phase II is underway.
- Bike routes have been developed between downtown and West Knoxville, North Knoxville, East Knoxville, South Knoxville and Ijams Nature Center. Funding has been requested from the City of Knoxville to sign these routes, and this should be done by summer 2009.

### Community Involvement

- Several different bike clubs are represented on the Bicycle Advisory Committee, and the bike clubs participate in various Bicycle Program efforts and events.
- The Bicycle Program and Smart Trips program are closely coordinated, and a list of bike commuters who log their commutes with Smart Trips is maintained.
- Coordination with UT is an on-going effort. The challenge of working within the university schedule is difficult.

### Transit

- Bike lockers were added at all KAT Park and Ride lots, and bike racks were installed at selected bus stops. This was done instead of adding racks that hold three bicycles, with the assumption that some people were bringing bicycles with them because there was not a safe place to leave the bicycle at the bus stop. A survey was conducted to assess where bike parking was desired.
- Discussions have been on-going about bicycle parking at the new transfer center. Bicycle lockers and bicycle racks are recommended, for long- and short-term parking.

### Trip Reduction

- The Bicycle Program and Smart Trips are closely coordinated, and a list of bike commuters who log their commutes with Smart Trips is maintained.
- Bike/Walk/Bus Week has expanded to be Smart Trips Month (including Bike to Work Week), with the Bicycle Program and Smart Trips working together.

### Bike Parking

- More than 400 bike racks and 6 bike lockers have been installed in the TPO area through the bike parking grant program.

### Bicycle Counts

- Bicycle/pedestrian counts are conducted twice a year at various locations in Knoxville



and in Blount County. These began in October 2005 at 6 locations in Knoxville. The counts are done manually by volunteers and TPO/MPC staff.

### **Minor Repairs/Improvements**

- The City of Knoxville fixed several drainage grates along Central, patched a skewed pavement gap on 5th , and repaired the sidewalk near Tyson Park used by bicyclists to access Third Creek Greenway from Ft. Sanders. The City also responded and fixed several requests concerning loop detection of bicycles at intersections.

### **Enforcement**

- Issued a press release in 2004 with KPD, Knox County Sheriffs Department and UT Police about bicyclists' rights and responsibilities.
- Published an enforcement handbook that lists target areas for enforcement (the behaviors that cause most bike-motor vehicle crashes) and clarifies the rules of the road related to bicyclists.
- Attended roll call training for all Knoxville Police Department officers to distribute the handbook. Will repeat this in early 2009.
- Have attended roll call training for part of Knox County Sheriffs Department. Will be presenting at a supervisors' meeting in March 2009.
- Published a version of the handbook for the public, which is available on the website and at community events.
- Presented at inservice training for Blount County, Maryville and Alcoa enforcement officers in early 2009.

### **Education and Safety**

- A certification workshop was held in Knoxville and 8 locals were trained as League of American Bicyclists instructors.
- Street Skills for Bicyclist classes have been held about twice a year. More than 40 people have taken the class.
- A handout for parents about child bike safety was printed and is handed out at community events (was produced by the Active Living Resource Center).
- A brochure on helmet safety and fitting was produced and is available at community events.

### **Crashes**

- TPO staff have requested and gotten crash information from TDOT for Knox County, and are requesting it for other counties. Crash data in most counties is not computerized so getting a number of crashes involving bicyclists would be too labor intensive.
- TPO staff are working on a crash database based on reports from Knoxville Police Department. This work will result in a map showing locations of bicycle-motor vehicle crashes so priority locations can be identified.

### **Public Information**

- The Bicycle Commute Guide was produced initially in 2003 and was revised in 2007.
- The Center City Knoxville bike map was produced in 2005. This was expanded to

be the Knoxville-Knox County bicycle map in 2007, and revised in 2008. The Blount County bicycle map was produced in 2008.

- Share the Road commercials were produced by Fiveman Productions in 2006 and have run as PSAs on area television stations. They are also available on our website.
- The Bicycle Program website was substantially revamped in 2006 and includes all our materials and brochures, as well as information on our current efforts and programs. It is regularly updated by TPO and MPC staff.
- The bikeknoxville blog was created in 2008 and is maintained by TPO staff.

### **Programs/Special Events**

- The annual Neighborhood Bike Ride was started in 2001 and has grown each year. This year will be the 9th ride, averaging between 200 – 250 participants. The City of Knoxville sponsors the event each year.
- Knoxville By Cycle was a new summer bike ride series, with between 40-70 participants at each ride. This was done in 2007 and 2008.
- Bike Week (Smart Trips Week) has expanded to Smart Trips Month, and includes free roadside repair bike classes at all bike shops, a Pedal Vs Metal Race, and other events.
- Bike to Work Week was held for the first time in 2007 and was highly successful, with more than 140 people biking to work at least twice during the week.
- A Win-a-Bike Essay contest was held in 2006. The first place winner got a free bicycle, and second place won \$450 toward a new bike. Three runners up received \$100 gift certificates.
- The Safe Routes to School program within the TPO has established programs at five schools in Knoxville, in addition to advising Safe Routes program in other districts. As part of these programs, the TPO has helped organized annual Walk Our Children to School Day events and a Walk and Wheel to School Week at Fountain City Elementary that has contributed to an increase in the number of children walking and bicycling to school on a regular basis. The program has sought federal Safe Routes to School funding for infrastructure improvements and year-round biking and walking encouragement programs at four schools, one of which received a grant for \$250,000: Beaumont Elementary in Knoxville. As part of the Safe Routes program, the TPO also worked with City of Knoxville Parks and Recreation and Knox County Health Department to secure a grant for a greenway loop at Sarah Moore Greene Elementary.
- In 2008, the City of Oak Ridge received a \$239,079 Safe Routes to School grant to fund sidewalk and crosswalk improvements and traffic devices at Robertsville Middle School. The grant will also fund educational programs and promotional activities to encourage students to walk and bicycle to school.
- The City of Maryville received a Safe Routes to School grant in 2007. The \$208,767 grant is being used to pay for sidewalk construction, crosswalks, a speed trailer, signs, lights, and bike racks at Sam Houston Elementary School. Safe Routes funds will also provide educational programs and encouragement activities at the school.
- The Tour de Lights holiday ride began in 2007 with 250 participants and again in 2008 with 125 bicyclists (the weather was less than desirable that evening). It has proved to be very popular and the City of Knoxville is a co-sponsor.

### Community Services

- Free repair classes are held each spring during Smart Trips Month at all bike shops. These are publicized through our brochures, posters, emails and website.

### Workshops

- In March 2007, 45 engineers participated in a workshop on road design for bicyclists and pedestrians. TPO member jurisdictions were each able to send one engineer for free.



## **“Critical Gaps” Project List**

This list was developed by the Bicycle Advisory Committee in 2008. It should be updated regularly in conjunction with jurisdictions’ capital improvement programs. More detail on each of the projects needs to be developed. The task was only to identify projects that are relatively small and are significant gaps in the system.

### **City of Knoxville**

- Bike/ped connection between Ft. Sanders and Tyson Park
- Connections between Ft Sanders and UT campus
- Connection along Broadway under I-640
- Connection between Jean Teague Greenway and Gallaher Greenway
- First Creek Greenway connection to Broadway Shopping Center and Broadway
- Connection from the underpass under Gallaher behind Wal-Mart/Sam’s Club
- Middlebrook Greenway connection across Liberty
- Northshore—the RR underpass near Kingston Pike
- Ft. Sanders east-west connections
- Pinch point on Broadway near Essary
- Connection from downtown to Mechanicsville;
- Connection from Ft Sanders to Mechanicsville
- UT campus
- Two bottlenecks on Chapman Hwy—the drop off at St Paul, and the rock face at Ft Dickerson
- Connection from Middlebrook Greenway from Prospect St to Western
- Connection between the greenway at Holston River Park and James White Greenway

### **Knox County**

- Pellissippi Parkway (I140) bridge over the Tennessee River

### **Blount County**

- Connection between Maryville College and parking lot on Broadway at Bicentennial Park
- Tie Maryville College pedestrian bridge (over 321) into greenway system near Montvale Rd

### **Anderson County**

- Improve Solway Bridge for bicyclists
- Add shoulder/bike lane to Bethel Valley Rd (portion that is Oak Ridge jurisdiction, not ORNL—that section already has a shoulder/bike lane)

## Accommodation Policy

1. Appropriate bicycle and pedestrian facilities shall be established in all new construction and reconstruction projects unless one or more of three conditions are met:
  - Bicyclists and pedestrians are prohibited by law from using the roadway (such as on interstates). In this instance, a greater effort may be necessary to accommodate bicyclists and pedestrians elsewhere within the right-of-way or within the same transportation corridor.
  - The cost of establishing bikeways or walkways would be excessively disproportionate to the need or probable use. Excessively disproportionate is defined as exceeding twenty percent of the cost of the larger transportation project.
  - Sparsity of population or other factors indicate an absence of need, including future needs.
2. In rural areas, paved shoulders should be included in all new construction and reconstruction projects on roadways used by more than 1,000 vehicles per day. Paved shoulders have safety and operational advantages for all road users in addition to providing a place for bicyclists and pedestrians to operate. Rumble strips or raised pavement markers are not recommended where shoulders are used by bicyclists unless there is a minimum clear width of 1' from the rumble strip to the traveled way and 4' from the rumble strip to the outside edge of the paved shoulder, or 5' to the adjacent guardrail or curb.
3. The design and development of the transportation infrastructure shall improve conditions for bicycling and walking through the following additional steps:
  - Planning projects for the long-term. Transportation facilities are long-term investments that remain in place for many years. The design and construction of new facilities that meet the criteria in item 1) above should anticipate likely future demand for bicycling and walking facilities and not preclude the provision of future improvements. For example, a bridge that is likely to remain in place for 50 years, might be built with sufficient width for safe bicycle and pedestrian use in anticipation that facilities will be available at either end of the bridge even if that is not currently the case.
  - Addressing the need for bicyclists and pedestrians to cross corridors as well as travel along them. Even where bicyclists and pedestrians may not commonly use a particular travel corridor that is being improved or constructed, they will likely need to be able to cross that corridor safely and conveniently. Therefore, the design of intersections and interchanges shall accommodate bicyclists and pedestrians in a manner that is safe, accessible and convenient.
  - Getting exceptions approved at a senior level. Exceptions for the non-inclusion of bikeways and walkways shall be approved by a senior manager and be documented with supporting data that indicates the basis for the decision.
  - Designing facilities to the best currently available standards and guidelines. The design of facilities for bicyclists should follow design guidelines and standards that are commonly used, such as the AASHTO Guide for the Development of Bicycle Facilities and AASHTO's A Policy on Geometric Design of Highways and Streets.



## Signage Policy

Part 9 of the Manual on Uniform Traffic Control Devices 2003 (MUTCD) shall be followed in providing traffic controls for bicycle facilities. Below is additional information to assist in determining placement of signs.

The “Bike Lane” signs (R3-17) shall be used only in conjunction with the Bicycle Lane Symbol pavement marking.



The “Bike Route” sign (D11-1) can be used for long distance touring routes primarily in rural areas, as well as for urban routes. Bike route signs should be supplemented with guide signs (D1-1) when located along routes leading to high demand destination (e.g. “To Downtown”). Signs should be provided at decision points along designated bicycle routes, including signs to inform bicyclists of route changes and confirmation signs for direction, distance and destination. Signs should be repeated at regular intervals to ensure that bicyclists entering from side streets know they are on a bicycle route. “Bike Route” signs should only be used on roads that have a Bicycle Compatibility Index rating of C or better. Coordination between jurisdictions should occur to ensure continuation of bike routes whenever possible. “Begin” and “End” bike route signs (M4-11, M4-12) should not be used to indicate county or city boundaries.



On narrow rural roads commonly used by cyclists, it may be helpful to install bike warning signs (W11-1) with the rider ON ROADWAY or ON BRIDGE, where there is insufficient shoulder width for a significant distance. Signs should be placed in advance of the roadway condition. If the roadway condition is continuous, an additional rider “NEXT XX MILES” may be used.



Where a shared roadway, shoulder bikeway, bike lane or shared-use path crosses a railway at an unfavorable crossing angle, or if the crossing surface is rough, a warning sign may be used (W10-12 and W11-1).



“Shared lane” pavement markings may be used to improve bicyclists’ positioning on roadways, encourage bicycling in the correct direction, discourage bicycling on sidewalks, and to decrease motor vehicle/bicycle conflicts by informing motorists where to expect bicyclists, especially on urban and suburban roadways with narrow curb lanes. These pavement markings are proposed in the draft MUTCD, expected to be adopted in 2009/2010.



The “Bicycles May Use Full Lane” (R4-11) sign (see Figure 9B-2) may be used on roadways with no bicycle lanes or adjacent shoulders usable by bicyclists and where travel lanes are too narrow for bicyclists and motor vehicles to operate side by side. The Bicycles May Use Full Lane sign may be used in locations where it is important to inform road users that bicyclists may occupy the travel lane in order to prevent unsafe passing. This sign is proposed in the draft MUTCD, expected to be adopted in 2009/2010.



Special signs may be created to guide bicyclists along touring routes. These signs should be used sparingly, mainly at intersections to guide bicyclists along the route.

## **Glossary**

### **Bicycle (or "Bike")**

A vehicle propelled by human power upon which any person may ride, having two tandem wheels, except scooters and similar devices. The term also applies to three- and four-wheeled human-powered vehicles.

### **Bicycle Facilities**

A general term denoting improvements and provisions made by public agencies to accommodate or encourage bicycling, including parking and storage facilities, bike lanes, paved shoulders and wide outside lanes.

### **Bicycle Lane ("Bike Lane")**

A portion of a roadway that has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists.

### **Bicycle Path ("Bike Path")**

See Shared Use Path

### **Bicycle System**

A system of bikeways designated by the jurisdiction having authority with appropriate directional and informational signage. Bicycle systems should establish a continuous routing, but may be a combination of any and all types of bikeways.

### **Right-of-Way**

A general term denoting land, property or interest therein, usually in a strip, acquired for or devoted to transportation purposes.

### **Right of Way**

The right of one vehicle or pedestrian to proceed in a lawful manner in preference to another vehicle or pedestrian.

### **Rumble Strips**

A textured or grooved pavement sometimes used on or along shoulders of highways to alert motorists who stray onto the shoulder.

### **Shared Roadway**

A roadway that is open to both bicycle and motor vehicle travel. This may be an existing roadway, street with wide curb lanes or road with paved shoulders.

### **Shared Use Path**

A trail or path physically separated from motorized vehicular traffic by an open space or barrier and either within the roadway right-of-way or within an independent right-of-way. Shared use paths may also be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users.



**Shoulder**

The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use. Bicyclists also use the shoulder, if it is swept regularly. In rural areas, this portion may also be used for pedestrian travel.

**Signed Shared Roadway (Signed Bike Route)**

A shared roadway that has been designated by signing as a preferred route for bicycle use.



## Sidepath Tech Sheet

This Tech Sheet has been developed by the Knoxville Regional Transportation Planning Organization, based on Chicagoland Bicycle Federation's Tech Sheet. A sidepath is a shared use facility that runs parallel to a roadway. Many people think that sidepaths are a good idea because they provide separation between bicyclists and motorized traffic. However, studies have shown that bicycling on sidepaths is more dangerous than riding on the roadway. The risk of injuries on sidepaths compared to roadways has been calculated as 40%, 80%, and 260% higher.<sup>3</sup>

The operational problems with this type of facility are noted in the 1999 AASHTO<sup>4</sup> Guide for the Development of Bicycle Facilities, and the Institute of Traffic Engineer's 2001 Traffic Control Devices Handbook.

The AASHTO guide says that shared-use paths operate best when they offer opportunities not provided by the road network and have continuous separation from traffic (i.e. along a river or railroad corridor). The guide lists these operational problems with paths along roadways:

- When the path ends, bicyclists going against traffic will tend to continue to travel on the wrong side of the street. Likewise, bicyclists approaching the path will often travel on the wrong side of the street to get to the path. Wrong-way travel by bicyclists is a major cause of crashes.
- Bicyclists coming from the right will not be noticed by drivers emerging from or entering cross streets and driveways, who are not expecting contra-flow vehicles.
- Signs posted for roadway users are backwards for contra-flow bicycle traffic.
- Although the shared-use path should be given the same priority through intersections as the parallel highway, motorists falsely expect bicyclists to stop or yield at all cross-streets and driveways. Efforts to require or encourage bicyclists to yield or stop at each driveway and cross-street are inappropriate and frequently ignored by bicyclists.
- Many bicyclists will use the roadway instead of the sidepath because they have found the highway to be safer, more convenient, or better maintained.

The AASHTO guide recommends that if such a facility is built, there should be wide separation between the roadway and the path to demonstrate to bicyclists and motorists that the path functions as an independent facility.

Before proceeding with plans for a sidepath, there is a need to assess whether such a facility is warranted, what other design options are available and which design will best serve the intended users.

<sup>3</sup>Moritz, William E. 1998. Adult Bicyclists in the United States—Characteristics and Riding Experience. Transportation Research Board. 77th Annual Meeting; Aultman-Hall, Lisa and M. Georgina Kaltenecker. 1998. Toronto Bicycle Commuter Safety Rates. Paper presented at the Transportation Research Board. 77th Annual Meeting; Kaplan, Jerald A. 1976. Characteristics of the Regular Adult Bicycle User. FHWA. National Technical Information Service. Washington, DC.

<sup>4</sup>American Association of State Highway and Transportation Officials

To assist with this process, consider the factors presented in this Tech Sheet, consult the recommended references and use site-specific engineering judgment to develop a design that works best for bicyclists, pedestrians and motorists.

### Quick Check for Sidepath Facilities

**Does the combination of roadway traffic volumes, speeds and curb lane widths create poor conditions for bicycling?**

**Is it impossible to create wider outside lanes or slow traffic to improve bicycling on the road?**

**Are a majority of destinations located on the same side of the roadway as the proposed path?**

**Will the path cross few driveways and/or street intersections?**

**Is there at least 16 feet of right-of-way width available for a sidepath?**

**Can changes be made to signal timing and turning movements to allow bicyclists adequate crossing time across intersections without causing traffic congestion?**

**Can the areas around all driveways and intersections be cleared of visual obstructions?**

**Can bicyclists safely transition to other bikeways where the sidepath begins and ends?**

If you answered NO to two or more of the above questions, it is advisable to reassess the feasibility of constructing a sidepath.

This online calculator can help you determine is a sidepath is suitable for your project.  
<http://www.bikelib.org/roads/blos/sidepathform.htm>

### 1. Can Bicyclists Safely Use the Roadway?

For a particular segment, please enter the information below.

Length of segment in miles	<input type="text"/>
Residential Driveway Crossings	<input type="text"/>
Minor (ADT<1000) commercial and road crossings:	<input type="text"/>
Major (ADT>1000) commercial and road crossings:	<input type="text"/>
Speed Limit of Parallel Road:	30 mph or less ▾
Traffic Volume of Parallel Road:	ADT<2000 ▾
Level of pedestrian use:	Low (rarely seen) ▾
Width of sidewalk/sidepath:	5 ft. or less ▾
Are there any major gaps or abrupt ends?	No ▾
Are there any missing curb cuts at intersections?	No ▾
Are crosswalks appropriately visible?	Crosswalks needed but absent ▾
Are all crossings brought close to parallel road?	In front of stopline, but not close enough ▾
	<input type="button" value="Calculate"/> <input type="button" value="Reset"/>

**Note:** Results will pop up in a new window.

Bicycles are considered vehicles, and bicyclists have the same rights and responsibilities as other drivers. However, a bicyclist's comfort level and perceived safety when using a roadway are influenced by these factors: traffic volumes, traffic speeds, and curb lane width/presence of a shoulder or bike lane.

Neighborhood streets and minor collector roads are usually compatible for bicycling because of low traffic volumes and/or low speeds. Sidepaths are usually not needed along such streets and investments to improve bicycling would be better used in areas of greater need.

Bicycle Compatibility Index<sup>5</sup> analysis can be done to determine the bicycle level of service on a corridor. If the road scores poorly, then some type of improvement is needed.

## **2. Can the Roadway Be Improved?**

Explore whether it may be more desirable or cost effective to accommodate bicycles on the roadway with other vehicles than to construct a separate path.

AASHTO has established guidelines for three basic types of on-road improvements:

- Wide outside lane: where the right lane is a min. of 14' wide (excluding curb and gutter)
- Bicycle lanes: signed and striped lane for bicycle use, min. of 5' wide from face of curb to bike lane stripe, located on both sides of the street
- Paved shoulders: 4' to 6' wide.

Modifying roadway cross-sections by shifting lane striping, reconfiguring center turn lanes, moving on-street parking and/or adding extra pavement width can provide space for on-street bicycle accommodations. Lowering speeds through design can also make a roadway more compatible for bicycling.

Examine your alternatives to see how each can affect bicyclist comfort level. If other options effectively meet bicyclists' needs within the corridor, you may find that a sidepath is not needed.

## **3. Access to Destinations**

Bicyclists have both mobility and access needs. Sidepaths may improve mobility but do little to improve access to businesses and other destinations within the corridor.

When destinations are located on the opposite side of the road from a sidepath, bicyclists must often double back, hop curbs and cross mid-block, or ride in the street against traffic in order to get where they want to go. Such practices should be discouraged because unexpected bicycle movements and wrong-way riding are major causes of bicycle/motor vehicle crashes.

<sup>5</sup><http://safety.fhwa.dot.gov/tools/docs/techbrief0799.pdf>



By comparison, bicyclists riding in the street have the ability to predictably merge lanes and complete turning movements just as other vehicles do. Therefore, planners and engineers need to assess the adjacent land uses to determine whether a sidepath adequately accommodates bicycle access needs.

#### **4. Conflicts at Intersections**

Studies show that bicyclists who ride on sidewalks or sidepaths incur a greater risk of being involved in a collision with a motor vehicle than those who ride on the roadway. Intersections are especially hazardous for wrong-way riders. Motorists are normally looking for moving vehicles on intersecting roadways.

A motorist making a right turn is only looking for traffic from the left. A motorist making a left turn is only looking for traffic ahead or from the left on the roadway. A bicyclist riding on a sidepath from the left is outside the driver's focus or may not even be seen. Bicyclists are traveling much faster than pedestrians. A bicyclist riding from the right (riding against traffic) is completely unexpected for a motorist.

The more often a bike path crosses a driveway or street intersection, the more risk exposures for users of the facility. Commercial strips with multiple driveways and a lot of turn movements are particularly dangerous corridors for sidepaths. Planners must use engineering judgment to determine if a sidepath is feasible based on the number and type of intersections.

#### **5. Right-of-way Considerations**

A final physical constraint that may limit the ability to construct a sidepath within a roadway corridor is the amount of space available. According to AASHTO guidelines, a sidepath should be horizontally separated from the roadway to demonstrate to bicyclists and motorists that the path functions as a separate facility. When this is not possible, bikeways located less than 5' from the roadway should be protected by a suitable physical barrier of no less than 42" high.

To facilitate safe two-way bicycle travel and allow for shared use with pedestrians and others, paths should be a minimum of 10' wide and have an additional 3' of clearance on each side to lateral obstructions such as signs, fences, trees, and buildings. This demands a total sidepath right-of-way width of no less than 16'.

Full details of bike path design and right-of-way requirements are presented in the AASHTO Guide already referenced.

#### **6. Adequate Signal Timing**

Modifying signal phases may be required to provide safe bicycle access where a path crosses a signalized intersection. Conflicts may be especially prevalent at crossings where the path is controlled by a "walk/don't walk" signal phase with the parallel roadway. The sidepath user may be given a false sense of security by a "walk" signal while turning motorists from the parallel roadway simultaneously have a green light. Right turns on red present another hazard, as do large turning radii that encourage fast turning traffic.

Another important conflict to resolve is created by a left turning motorist whose attention is focused on gaps in approaching traffic. Upon finding a gap, the motorist often accelerates through the turn and is then faced with an unexpected path crossing. Design solutions to these problems include use of appropriate warning signs, all red signal phases (a “green” for just the pathway), right-on-red prohibitions, and traffic signal cycles that allow adequate time for bicyclists and pedestrians to cross.

## **7 . Sight Triangles and Crossing Placement**

Safety at intersections will be improved if bicyclists are able to see approaching cars, and motorists are able to see bicyclists and pedestrians on the path. This is best accomplished by providing an area free from visual obstructions at each corner of all driveway and street intersections. The minimum size of the sight triangle may be determined by the AASHTO stop control intersection recommendation of 20' back from the edge of a travelway. No signs, structures, parked cars or vegetation which blocks views should be permitted in this area. Parallel arterials and rural areas with high travel speeds will require larger sight triangles based upon drivers' stopping distances as per AASHTO guidelines.

More information on intersection design is available in the AASHTO Guide as well as Florida DOT's *Trail Intersection Design Handbook*.<sup>6</sup>

## **8. The End**

How bicyclists enter and exit the sidepath must be considered. The design of the transition must encourage bicyclists to approach and leave the path traveling on the correct side of the roadway, riding with the traffic flow. Wrong-way bicycle riding is a major cause of bicycle/motor vehicle crashes and should always be discouraged. Safe transitions to an on-road facility or bicycle-compatible street route require appropriate signing, curb cuts and merge areas.

<sup>6</sup>[http://www.dot.state.fl.us/safety/ped\\_bike/handbooks\\_and\\_research/TRAILINT.PDF](http://www.dot.state.fl.us/safety/ped_bike/handbooks_and_research/TRAILINT.PDF)

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