Complete Streets Design Guidelines

July 2009

Prepared for:

TPO

by:

GS&P GRESHAM SMITH AND PARTNERS

This report was funded in part through grant(s) from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation and the Tennessee Department of Transportation. The views and opinions of the authors/Knoxville Regional Transportation Planning Organization expressed herein do not necessarily state or reflect those of the U.S. Department of Transportation and Tennessee Department of Transportation.

TABLE OF CONTENTS

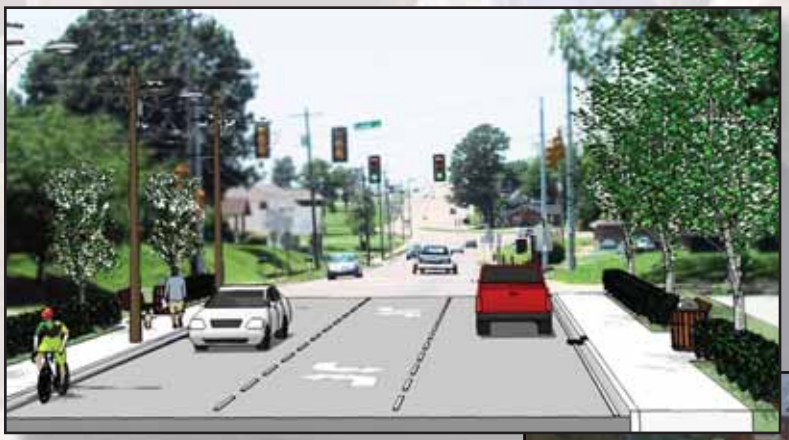
TABLES

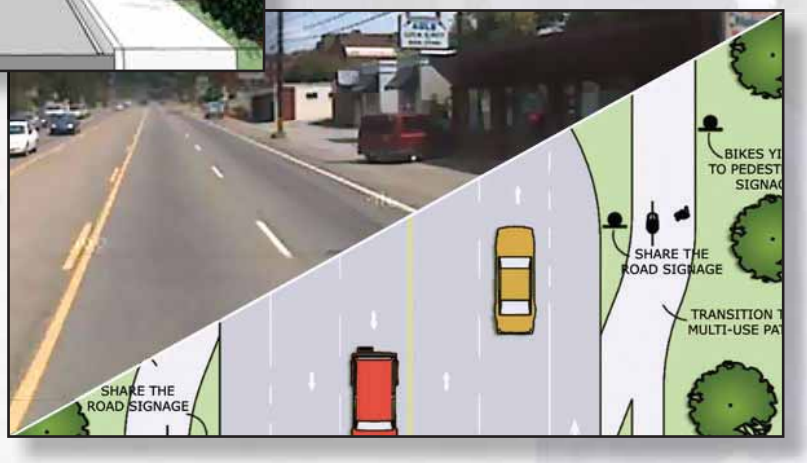
1. INTRODUCTION

During the latter half of 2008, the Knoxville Regional Transportation Planning Organization (TPO) embarked on a mission to make streets in the region more complete. The complete streets effort began with two separate studies that made recommendations on how to transform two suburban corridors into complete streets.

The guidelines presented in this document represent the next step in that effort. The guidelines build on the findings from the individual corridor studies, providing guidance and recommendations on how to transform other streets in the Knoxville region into complete streets.

This document is intended for use by the design professional and the layperson alike. In many cases, additional reference information is provided; the user is encouraged to seek out that reference material to get a better understanding of the concepts and guidance presented here. The designer should also be familiar with local ordinances and state laws that govern street design in their jurisdiction.





In urban planning and highway engineering, 'complete streets' are roadways designed and operated to enable safe, attractive, and comfortable access and travel for all users.

2. WHAT ARE COMPLETE STREETS?

Many streets are incomplete: they lack sidewalks and/or crosswalks, bicycle facilities and places to wait for transit.

The National Complete Streets Coalition states that "complete streets" are:

> *". . . designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and bus riders of all ages and abilities are able to safely move along and across a complete street."*

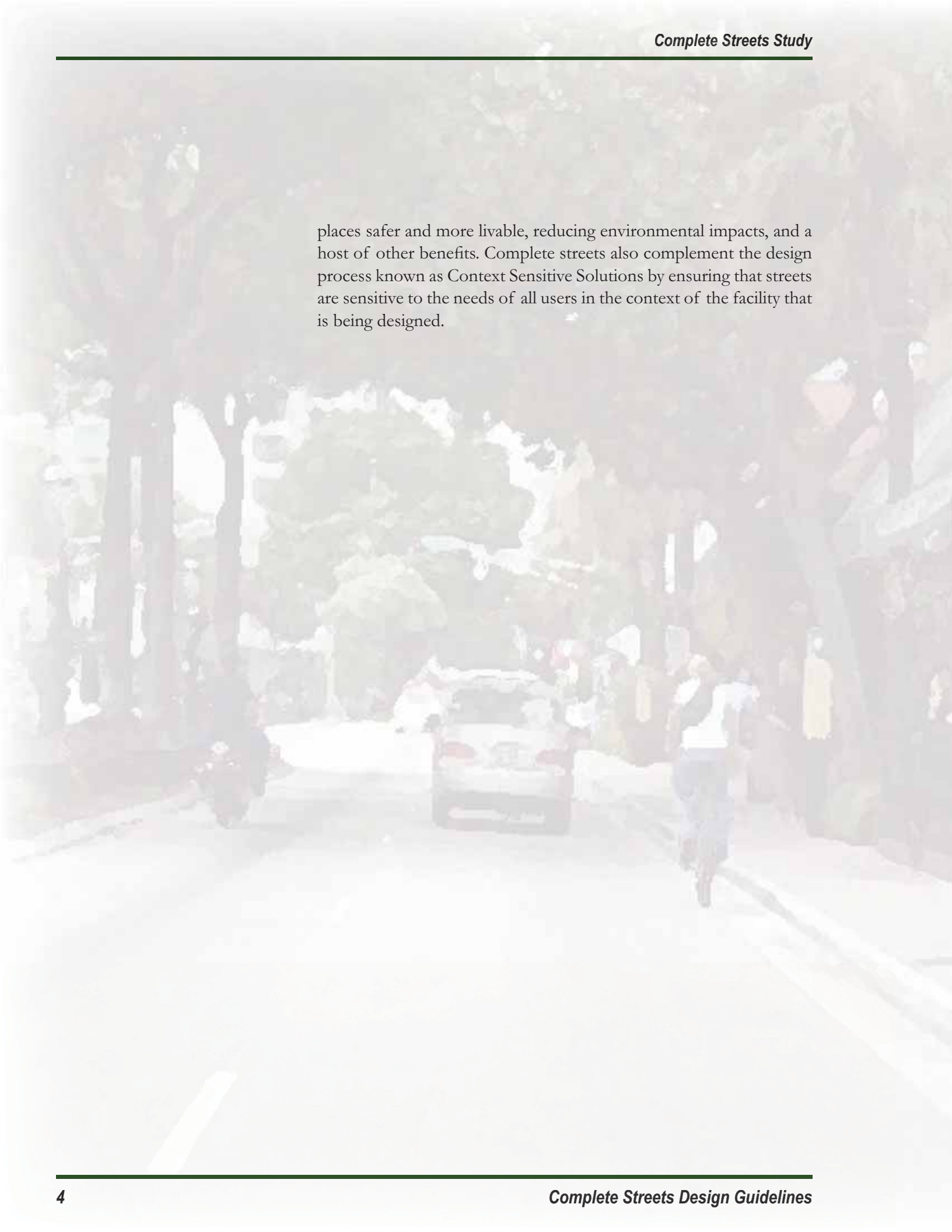
Close to 5,000 pedestrians and bicyclists die each year on U.S. roads. Unfortunately, these roads have characteristics with which we are all too familiar — a lack of sidewalks or crosswalks, vehicle lanes too narrow to share with bicyclists, little or no room for waiting transit riders, and poor accommodation for people with disabilities — essentially creating *incomplete* streets. Complete streets represents a *paradigm shift* in traditional road design philosophy.

Complete streets are intentionally designed around all potential users.

Simply stated, a complete street reflects a new way of thinking about how streets are designed. A complete street may be put together a number of different ways, so long as it is intentionally designed to serve all potential users. Complete streets are streets that work for all existing and future users, not just those using a motor vehicle. Street designers and transportation agencies have a responsibility to the public health, safety and welfare to design, operate, and maintain the entire right of way to enable safe access for drivers, transit users and vehicles, pedestrians, and bicyclists, as well as for older people, children, and people with disabilities.

"Complete Streets" is a national movement that includes the Federal Highway Administration (FHWA), state departments of transportation (DOTs), metropolitan planning organizations (MPOs), cities, counties, nonprofits and others. The movement is gathering momentum as more communities see complete streets as a valuable approach to providing alternatives to traffic congestion, making

places safer and more livable, reducing environmental impacts, and a host of other benefits. Complete streets also complement the design process known as Context Sensitive Solutions by ensuring that streets are sensitive to the needs of all users in the context of the facility that is being designed.



3. FLEXIBILITY IN DESIGN

There is no *one size fits all* design for complete streets. While the ultimate goal is to design a street that is convenient and safe for all users, every complete street design evolves from a process of evaluating a number of factors (some possibly competing) that influence the ultimate design of the street. These factors include, but are not limited to:

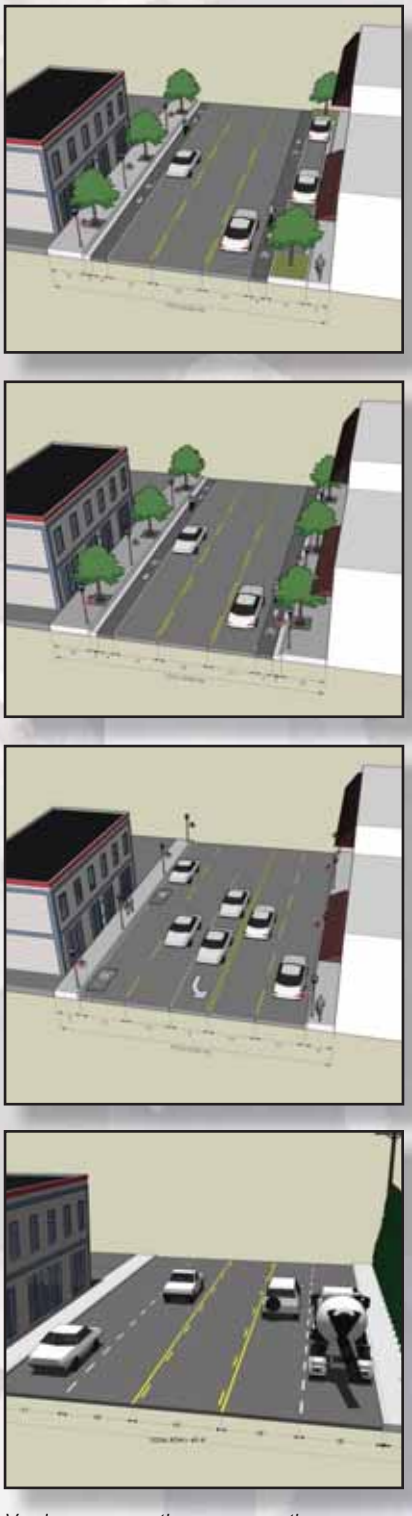
- Number and types of users;
- Available and planned right-of-way;
- Existing improvements;
- Existing and planned land use context;
- Community desires;
- Available budget;
- Parking needs;
- Utilities.

Applying flexibility in street design requires an understanding of the street's functional basis. It also requires an understanding of how altering, adding or eliminating any design element will affect different users of the street. Dimensions, whether for elements in the roadside, traveled way, or intersection, should not be applied arbitrarily. The complete street designer should understand the relationship between a recommended criterion and its impacts on safety and mobility for all user classes. The American Association of State Highway and Transportation Officials (AASHTO) recognizes the above requirement in the following quote from *A Guide for Achieving Flexibility in Highway Design*:

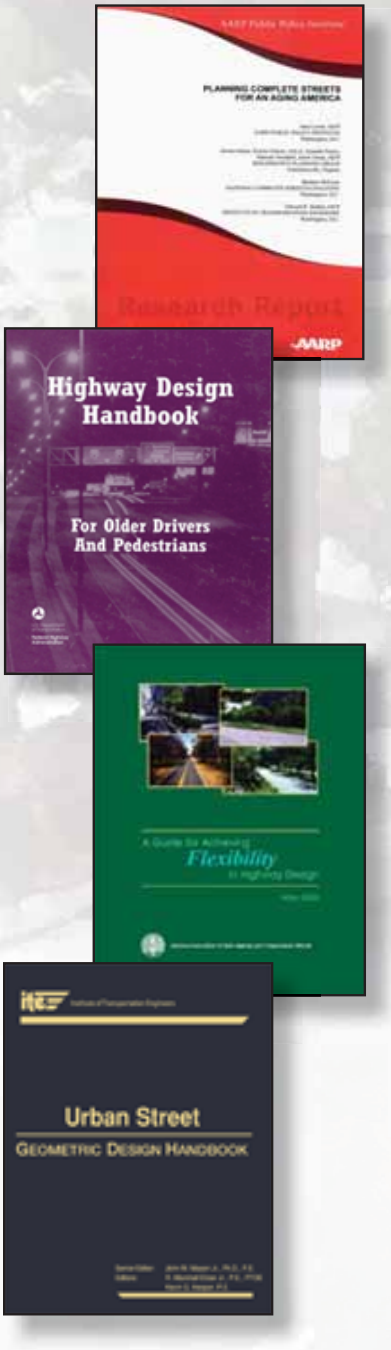
> *Only by understanding the actual functional basis of the criteria and design values can designers and transportation agencies recognize where, to what extent and under what conditions a design value outside the typical range can be accepted as reasonably safe and appropriate for the site-specific context.*

Designing complete streets often requires balancing user needs and prioritizing the design elements and emphasizing the higher-priority elements. Higher-priority design elements are those that help the street meet the vision and context-sensitive objectives of the community.

Often the available width of the public right-of-way is less than desirable and may vary along a street, making the job of the designer



Varying cross-sections are sometimes necessary to help prioritize design elements when right-of-way is limited.



even more challenging. When the width of the right-of-way is insufficient to meet all needs, it is useful to prioritize design elements and develop a series of varying cross sections and design features for consideration.

For instance, along a high-traffic-volume street in constrained conditions it might be tempting to maximize vehicle travel lanes and minimize the roadside width to provide only a minimum pedestrian throughway. In urban areas, however, it is often important to maintain at least a minimum roadside width that accommodates not only pedestrian travel but also furnishings such as trees and landscaping, street furniture, utilities and other amenities. Without this "furnishings" zone, trees, utilities, benches and shelters and other street paraphernalia might encroach into the throughway for pedestrians and also encroach into the minimum lateral offset area for the travel lanes.

In consideration of the above, the street designer is strongly encouraged to become familiar with the criteria, principles, design controls and functional basis for the guidance presented in this document and other design guidance, including the most current editions of these documents:

- *A Guide for Achieving Flexibility in Highway Design*, AASHTO,
- *Flexibility in Highway Design*, FHWA,
- *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*, ITE/CNU,
- *Urban Street Geometric Design Handbook*, ITE,
- *Planning Complete Streets for an Aging America,* AARP,
- *Highway Design Handbook for Older Drivers and Pedestrians,* FHWA,
- *A Policy on Geometric Design of Highways and Streets*, AASHTO (often referred to as the Green Book),
- *Guide for the Planning, Design and Operation of Pedestrian Facilities*, AASHTO,
- *Guide for the Development of Bicycle Facilities*, AASHTO, and
- *Roadside Design Guide*, AASHTO.

Design Process in Constrained Right-of-Way

The nature of street design is balancing the desired design elements of the ideal street with right-of-way constraints. Designing streets in constrained rights-of-way requires prioritizing the design elements

and emphasizing the elements that are deemed to be higher priority. Higher-priority design elements are those that help the street meet the vision and context sensitive objectives of the project stakeholders and affected community. In the case of complete streets, this is to provide safe and convenient access for all users to travel along or across a street. Lower-priority elements have less influence on achieving the objectives and may be omitted in cases of insufficient right-of-way.

When the width of the right-of-way varies, it is often useful to prioritize design elements and develop a series of varying cross sections representing:

1. **Optimal conditions** — sections without right-of-way constraints that can accommodate all desirable elements;
2. **Predominant** — representing sections of the predominant right-of-way width in the corridor that accommodate all of the higher priority elements;
3. **Functional minimum** — representing a typically constrained section where most of the higher-priority elements can be accommodated; and
4. **Absolute minimum** — representing severely constrained sections where only the highest-priority design elements can be accommodated without changing the type of street.

If the vision for the corridor design is long range, then the design should consider the necessary right-of-way acquisition over time as the adjacent property redevelops. Under these circumstances the optimal complete street design can be phased in over time, beginning with the functional or absolute minimum design in the initial phase.

Conventional Street Design Versus Complete Street Design

There are fundamental differences in the approaches to street design that can result in different outcomes. Conventional street design is traditionally driven by motor vehicle traffic demand and level of service objectives. The first two critical design elements of a street are typically determined in the regional or community transportation planning process—functional classification and number of lanes. The outcome of this vehicle-mobility-focused process can greatly influence the rest of the design process, from working with stakeholders to the final design. A pre-determined outcome is often a source of conflict with stakeholders who desire to provide meaningful input into the design process before critical decisions are made. These situations

may delay or even stop design projects because the street design may not be considered compatible with its surroundings or does not address the critical concerns of the community and all facility users.

Complete street design also begins the transportation planning process with an emphasis on identifying critical factors and issues before establishing design criteria. Certainly functional classification, travel demand forecasts and levels of service are factors to consider in the design, and may be a high-priority objective under many circumstances. Through an interdisciplinary approach, including a full range of stakeholders, the complete street process seeks to identify the core issues/problems, develop a spectrum of alternatives and reach consensus on the best solution to provide a "complete" street considering the needs of all users. The process may determine that vehicular level of service needs are not the controlling factor and should be balanced along with qualitative service to other travel modes such as pedestrians, bicycles and transit vehicles. Environmental, historic preservation, aesthetic and economic development objectives may also be important to the community and justify additional design trade-offs. This process can result in a well thought out and rationalized design trade-off—the fundamental basis of designing complete streets.

An inclusive process is not a guarantee of success, but can result in early acceptance and community ownership of project design.

4. COMPLETE STREETS DESIGN GUIDELINES

Complete streets are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be able to safely move along and across a complete street. Creating complete streets often means that transportation agencies responsible for those streets must change their traditional design policies, practices and guidelines to effectively create a complete street environment. Complete street design guidelines must be comprehensive to ensure that the entire right of way is designed and operated to enable convenient and safe access for all users.

These Guidelines are intended to ensure a process that clearly, consistently, and comprehensively considers the needs of motorists, pedestrians, and bicyclists when planning and designing streets. All street designs should be evaluated in terms of how they serve and affect all potential user groups, including:

- Motorists,
- Pedestrians (including transit riders),
- Transit operators,
- Bicyclists, and
- People who live in, work in, or otherwise use the corridor.

Street Design Parameters

Functional Classification

Functional classification helps establish the street type and characteristics of the vehicular travel using the street (such as trip length and purpose). It provides information on whether the street is a primary inter or intra-city route, emergency response route, truck route, or major transit corridor. These factors are important in helping the designer consider the most appropriate traveled way elements such as lane widths, number of travel lanes, on-street parking, access control strategies and target speed.

Speed

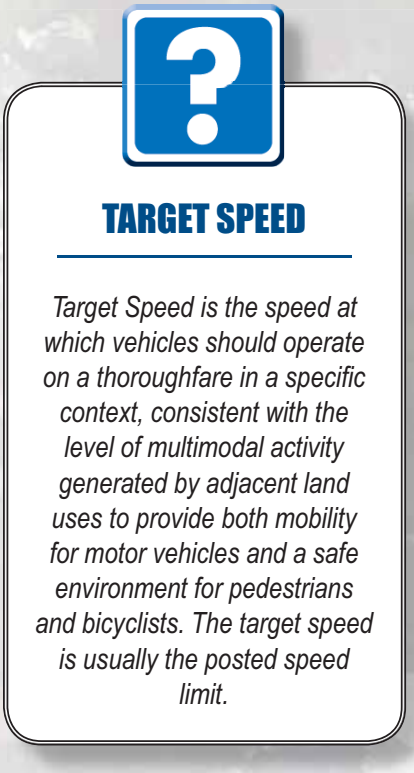
The most influential design control, and the design control that provides significant flexibility in urban areas, is speed. Street design

should ideally be based on both design speed and target speed. Design speed governs certain geometric features of a roadway, primarily horizontal curvature, vertical curvature, superelevation and sight distance.

The target speed, in contrast to operating speed, is the desirable speed at which vehicles should operate on a street in a specific context. Design speed should be no greater than 5 mph higher than the target speed, and may be equal to design speed in developed urban areas. Operating speed, as defined by AASHTO, is the observed speed under free-flow conditions, typically based on the 85th percentile speed (the speed below which 85% of vehicles are traveling). It is recommended to not use existing or projected operating speed as the basis for determining design speed since operating speed may be higher than desirable in an urban area with high levels of pedestrian and/or bicycle activity, particularly on existing roadways originally designed with high design speeds.

The designer should exercise sound judgment in the selection of an appropriate target and design speed based on a number of factors and reasonable driver and street user expectations. Factors in urban areas include transition from higher to lower speed roadways, terrain, available sight distance, intersection spacing, driveway frequency, level of pedestrian and bicycle users, transit operations, land use context, and possible median use. AASHTO's *A Guide for Achieving Flexibility in Highway Design* addresses the selection of design speed in urban areas:

> Complete street design should start with the selection of a target speed. The design speed (no more than 5 mph over the target speed) should be applied to those geometric design elements where speed is critical to safe vehicular operations, such as horizontal curvature and intersection sight distance. The target speed is not set arbitrarily, but achieved through a combination of measures that include:
>
> - Setting an appropriate and realistic speed limit;
> - Using physical measures such as curb extensions and medians to narrow the traveled way;
> - Setting signal timing for moderate progressive speeds between intersections;
> - Using narrower travel lanes that cause motorists to naturally slow; and



TARGET SPEED

Target Speed is the speed at which vehicles should operate on a thoroughfare in a specific context, consistent with the level of multimodal activity generated by adjacent land uses to provide both mobility for motor vehicles and a safe environment for pedestrians and bicyclists. The target speed is usually the posted speed limit.

Designing Walkable Urban Thoroughfares: A Context Sensitive Approach

- Using design elements such as on-street parking to create side friction.

A target speed range is initially identified based on the street type and context including whether the area is predominantly residential or commercial. The associated design speed then becomes the primary control for the purposes of determining critical traveled way design values, including intersection sight distance and horizontal and vertical alignment.

Capacity

The conventional design process typically uses traffic projections for a 20-year design horizon and strives to provide the highest practical "level of service" for the quantity of vehicular traffic. Processes are also available to calculate some aspects of capacity for non-motorized travelers such as pedestrians and bicyclists, although those processes are rarely used in traditional street design because the processes are evolving and the numbers of users are relatively low compared to motor vehicle users.

Traffic volume and level of service should be taken into account when selecting appropriate design treatments.

Complete street design should take vehicular traffic projections and level of service into account as well as the level and quality of service for other users, and then carefully balance the needs of all users, possibly emphasizing one user over another depending on the context and circumstances (e.g., reduced number of travel lanes to accommodate bike lanes or an exclusive busway). While capacity and vehicular level of service play a role in selecting design criteria, they are only two of many factors the designer should consider and prioritize in the design of complete streets. Often in urban and suburban areas, street capacity is a lower priority than other factors such as walkability, economic development or historic preservation, and lower levels of service and associated congestion may be considered acceptable.

Large trucks may use this street only a few times a year while pedestrians use it every day.

Design and Control Vehicle

The design vehicle plays a very important role in the complete street design process. The selection of key design criteria such as lane width and curb return radii are directly influenced by the design vehicle. Complete street design should employ careful thought and common sense when selecting a design vehicle. Careful thought includes understanding the trade-offs of selecting one design vehicle over another.

In urban and suburban areas it is not always practical or desirable to choose the largest design vehicle that might occasionally use the street being designed, because of the impacts to pedestrian crossing distances, speed of turning vehicles, etc. In contrast, selection of a small design vehicle in the design of a facility regularly used by large vehicles can invite serious operational problems with possible safety implications to all types of users.

The designer should select the largest design vehicle that will use the facility with considerable frequency (for example, bus on bus routes, semi-tractor trailer on primary freight routes or accessing loading docks, etc.). In general, consideration must be given to:

- **Design vehicle:** a vehicle that must be regularly accommodated without encroaching into the roadside or opposing traffic lanes, and
- **Control vehicle:** an infrequent vehicle that must be accommodated, but encroachment into the opposing traffic lanes, multiple-point turns, or minor encroachment into the roadside is considered acceptable.

If the control vehicle is larger than the design vehicle, and it often is on urban streets, the designer should carefully consider the potential ramifications to the street design and other element of design. An example is the use of local residential streets by large moving vans. These vehicles must somehow be accommodated in neighborhoods on an occasional basis, but using this vehicle as the design vehicle would result in local streets and intersections that are much too wide for neighborhood conditions.

The choice of design and control vehicles is particularly important in intersection design where vehicles, pedestrians and bicyclists routinely share the same space. Special consideration must also be given to design vehicle choices in the design of modern roundabouts.

Sight Distance

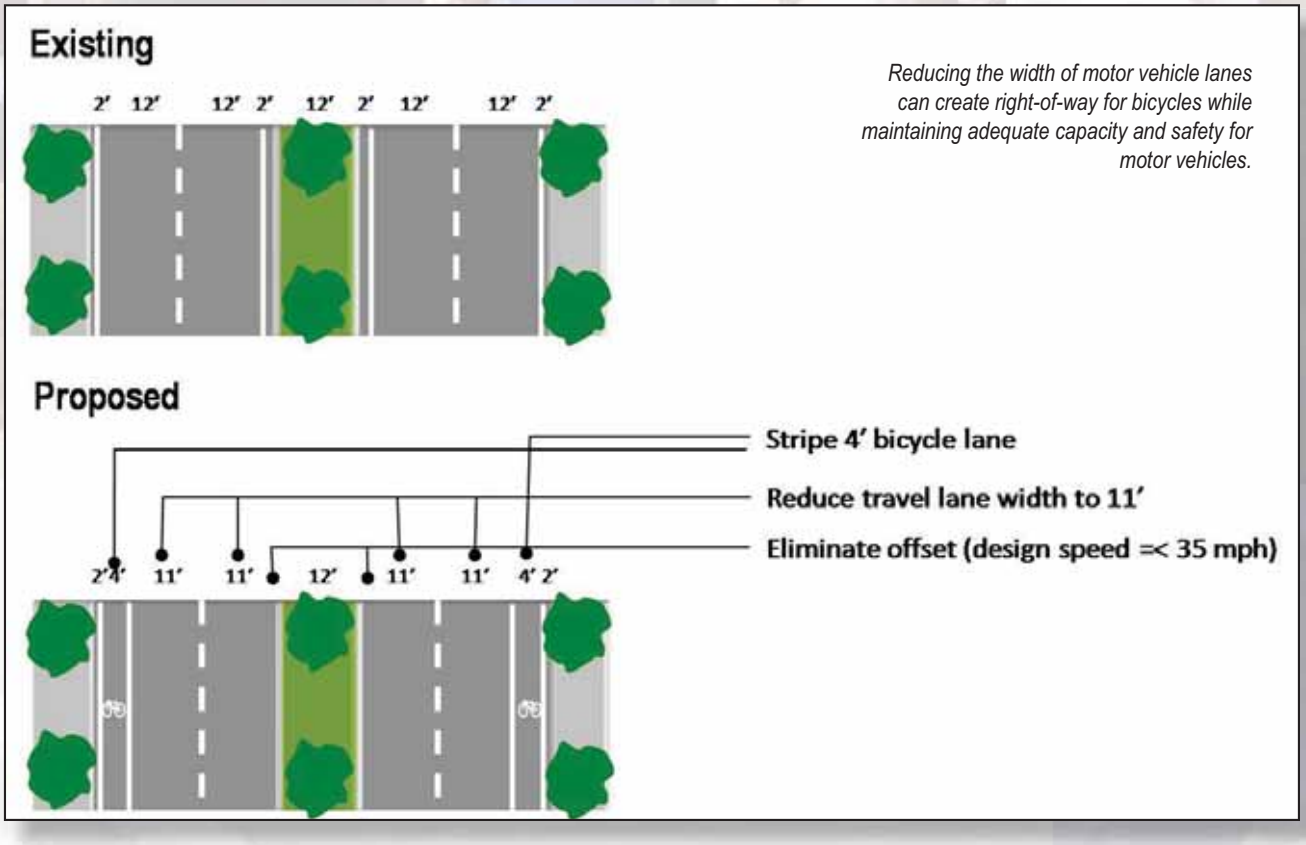
Sight distance is the distance that a driver can see ahead in order to observe and successfully react to a hazard, obstruction, decision point, or maneuver. Adequate sight lines are a fundamental requirement in the design of complete streets in order to provide reasonable levels of safety for all users. The criteria presented in the AASHTO Green Book for stopping sight distance and intersection sight distance as based on the design speed described above should normally be used in complete street design.

In constrained settings the desirable AASHTO criteria for sight distance may not be possible to attain. Under those conditions, the designer should evaluate and select other design criteria and features that will compensate for less than desirable sight distance. Those treatments could include both physical and physiological features such as narrow lanes, raised medians, special pavement surfaces, special pavement markings, reduced intersection corner radii, and so forth.

The design of horizontal and vertical curves is a controlling feature of a street's design. Curvature is affected by speed and affects speed. For urban streets, careful consideration must be given to the design of alignments to balance safe vehicular travel with a reasonable operating speed. The AASHTO Green Book provides guidance on the design of horizontal and vertical alignments for all types of streets under various design speed conditions.

Pedestrian and Bicyclist Requirements as Design Controls

Pedestrian and bicyclist requirements are often key considerations in the planned utilization of a complete street right-of-way. Streets



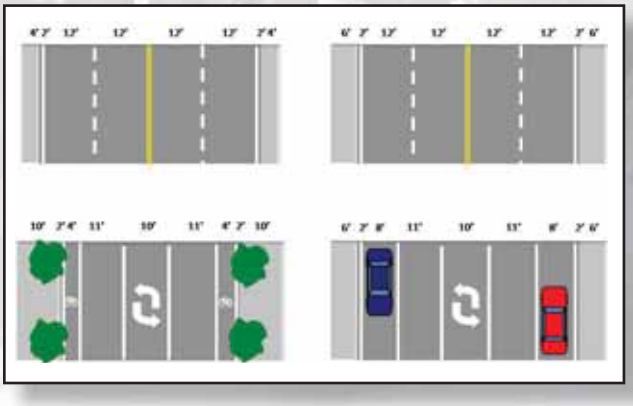
Reducing the width of motor vehicle lanes can create right-of-way for bicycles while maintaining adequate capacity and safety for motor vehicles.

with existing or desired high levels of pedestrian and bicycle usage require appropriate roadside and bicycle lane facilities to be included in project planning and design.

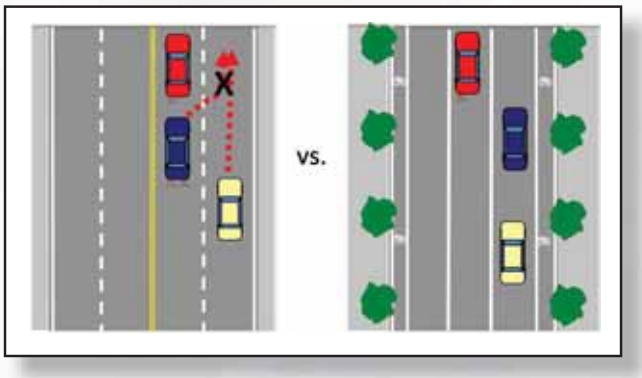
This requirement usually affects the design elements in the traveled way. Therefore, pedestrian and bicycle requirements function as design controls that influence decisions for the utilization and prioritization of the right-of-way.

For example, requirements for bicycle lanes might outweigh the need for additional travel lanes, or a median, resulting in a design that reduces the motor vehicle design elements to provide bicycle design elements. Complete street design solutions emphasize allocating right-of-way appropriately to all modes depending on their priority and as defined by the surrounding context and design process. This process results in a well thought out and rationalized design trade-off — the fundamental basis of complete street design.

Toolkit of Strategies



The classic road diet converts four lanes to three.



Converting a street from four lanes to three lanes may actually improve safety and capacity by eliminating potential motor vehicle conflicts.

The following is a toolkit of design treatments that should be considered as part of a comprehensive approach to creating a complete street. The guidelines presented here are based on interactions with professionals in the Knoxville transportation planning and engineering community and the public as well as prevailing knowledge of the current state of the practice in complete street design.

As noted previously, there is no *one size fits all* approach to the design of complete streets. Thus, the applicability of the strategies presented here should reflect due consideration of the unique context of a given street and the people who will use it.

Road Diets

A road diet is an approach to redesigning a street to shift the balance of right-of-way (ROW) from design elements for motor vehicle use — travel lanes, turn lanes, etc. — to design elements for other users (pedestrians, bicyclists, etc.). Many

roads are unnecessarily wide given the volume and character of motor vehicle traffic, thus the need for a "diet."

The result of a road diet is that ROW can be reclaimed for design elements that are supportive of non-motorized users, such as:

- Bicycle lanes;
- New or wider sidewalks;
- Street trees;
- On-street parking; and
- Wider medians/turn lane.

There are three basic approaches to a road diet:

- **The "classic" road diet** — converting a four-lane road to three lanes (two travel lanes and a center turn lane);
- **Lane reductions** — reducing the number of travel lanes on a multi-lane street; and
- **Lane width reduction** — reducing the width of individual travel lanes (but keeping the total number of lanes constant).

The road diet may range from a simple, lower-cost restriping to a more intensive reconstruction for hardscaping. Whatever approach is taken, the road diet must take into consideration the trade-offs between impacts to motor vehicle capacity and safety, and enhancements for all modes. The decisions must be based on a thoughtful analysis of the best available data.

Table 4.1 Road Diet Guidelines

Approach	Guideline
Four-lane to three-lane conversion	Should be considered for all four-lane streets. Must be based on analysis of traffic data. Case study research has found that replacing two travel lanes with a center turn lane can improve safety and reduce vehicular delay.
Lane reductions	Should be considered when traffic volumes warrant or all other reasonable options for reclaiming ROW have been exhausted. Must be based on analysis of traffic data. Lane reductions may be facilitated by a traffic shift to parallel streets.
Lane width reduction	See next section

Lane Width

Lane width reductions are a good strategy for reclaiming street ROW for non-motor vehicle uses and for encouraging appropriate motor vehicle operating speeds. For example, restriping travel lanes on a multi-lane street from 12 feet to 10 feet in width can create enough ROW to stripe 4-foot wide bicycle lanes adjacent to the gutter pan. On residential or commercial streets where motor vehicle speeding is an issue, striping narrower travel lanes is one way to encourage lower speeds.

Table 4.2 Relationship Between Lane Width and Capacity

Lane Width	Reduction in Saturation Flow Rate
12 feet	NA
11 feet	3 %
10 feet	7 %

Source: Highway Capacity Manual

A common perception is that wider motor vehicle lane widths provide more safety or capacity. Research has shown, however, that reducing lane width from 12 feet to 11 or 10 feet on surface streets in urban areas can be expected to have a marginal impact on motor vehicle flow rates, and that there is no indication that such lane reductions will lead to any increase in crash frequency or severity.

Table 4.3 Lane Width Guidelines

Allotment	Size	Guideline
Typical Maximum	11 feet	12 feet on rural arterials and heavy truck and bus traffic
Preferred in Walkable Areas	10 feet	Only where target speed is 35 mph or less and there is little to no truck or bus traffic.

Note: These widths are for motor vehicle lanes only. See further discussion below.

On lower-speed urban streets (target speeds of 35 mph or less), a range of lane widths from 10 to 12 feet on arterials and 10 to 11 feet on collectors is considered appropriate. On arterials with target speeds below 30 mph, widths in the lower end of the range are appropriate (10 to 11 feet). On collectors below 30 mph, 10 feet

would be appropriate. Turn lanes that are 10- to 11-feet wide are appropriate in urban areas with target speeds of 35 mph or less.

Vehicles such as transit buses or large tractor-trailers require wider lanes, particular in combination with higher design speeds if they frequently use the street. Modern buses can be 10.5 feet wide from mirror to mirror and justify a minimum 11 feet wide lane on roadways with 30 to 35 mph target speeds. Wider curb lanes, between 13 to 15 feet for short distances, should only be used to help buses negotiate bus stops and help trucks and buses negotiate right turns without encroaching into adjacent or opposing travel lanes.

The width of adjacent bicycle and parking lanes also influences the selection of lane width. If the adjacent bicycle or parking lane is narrower than recommended in the AASHTO bicycle design guide, the designer should first consider widening the bicycle lane. If a design vehicle or design speed justify, a wider travel lane should be designed to provide better separation between these lanes.

Missing or inadequate sidewalks make walking difficult, unsafe, and in some cases, impossible.

Sidewalks

Sidewalks make up the basic framework of the pedestrian realm and are an essential component of most complete streets. Typical suburban street design can often take a minimalistic approach to sidewalks, which can result in sidewalks as narrow as four or five feet in width with no buffer from adjacent travel lanes, obstacles such as sign posts and utilities, and no or poorly designed and located ramps, or no sidewalks at all.

By contrast, complete streets take into consideration the quality of sidewalks and the sense of comfort and safety their design provides for users. Wider sidewalks provide separation between pedestrians and adjacent travel lanes, create space for people to congregate, and allow the placement of fixed objects — street trees, lighting, street furniture, etc. In contexts where there is high pedestrian traffic, or where building facades and other elements are at the edge of the sidewalk, or the character of the street is one of high volume/high speed, particular care should be taken to make the sidewalk as wide as reasonably possible.

Sidewalks form the basic framework of the pedestrian realm.

For streets that currently do not have sidewalks, it may not be feasible from a cost standpoint to initially install sidewalks for the entire length of the streets. In these situations, it is best to focus on connecting the most critical links first and filling in the rest of the sidewalk network

When resources are limited, target the most critical sidewalk links for completion first.

gradually over time as funding becomes available or new development can provide the facilities.

Table 4.4 Sidewalk Guidelines

Width	Size	Guideline
Minimum Width	6 feet (separated)	With a minimum 3-foot planting strip between the sidewalk and curb (see section on fixed objects and horizontal clearances).
	8 feet (attached)	Minimum width to accommodate fixed objects at edge of curb.
Preferred Width in Highly Walkable Areas	10-12 feet	Could be greater based on context and available space (high pedestrian traffic, etc.).

A key resource in the design of pedestrian facilities is AASHTO's *Guide for the Planning, Design and Operation of Pedestrian Facilities*. The designer should also become familiar with the requirements for sidewalk accessibility design provided in the *Public Rights-of-Way Accessibility Guide* (PROWAG) developed by the US Access Board in 2005, and the supporting *Special Report: Access Public Rights-of-Way Planning and Designing for Alterations* document developed in 2007.

On-street Parking

On-street parking can be an important supporting element of a complete street. It provides an additional buffer between the sidewalk and travel lanes. Additionally, on-street parking encourages lower motor vehicle operating speeds (consistent with the target speed).

The preferred width of a parallel on-street parking lane is 8-feet on commercial streets or where there is an anticipated high turnover of parking, and 7-feet wide on residential streets. These dimensions are inclusive of the gutter pan.

On low-volume, low-speed streets in commercial main street areas, where sufficient curb-to-curb width is available, angled parking may be appropriate. Angled parking can create sight distance problems associated with vehicles backing out of parking spaces. The use of reverse (back-in) angled parking is desirable since it overcomes these sight distance concerns and is considered safer for bicyclists traveling adjacent to angled parking.

Table 4.5 Parking Lane Width Guidelines

Type	Size	Guideline
Parallel Parking	7 feet (minimum) 8 feet (preferred)	Appropriate on streets with operating speeds of 35 mph or less.
Angle Parking (45 degree)	17 feet, 8 inches in depth (perpendicular to curb)	Appropriate on low-volume, low-speed commercial "main streets"

Other guidelines regarding on-street parking include the following:

- On-street parking should be located based on the characteristics of the street, needs of the adjacent land uses, applicable local policies and plans for parking management.
- On-street parking should be primarily parallel parking on higher-volume urban arterial streets. Angled parking may be used on low-speed and low-volume collector streets with ground floor commercial uses, primarily those serving as main streets.
- On-street parking should generally be prohibited on streets with speeds greater than 35 mph due to potential hazards associated with door openings and maneuvering in and out of spaces.
- On-street parking should conform to local and PROWAG accessibility requirements and provide an appropriate number of accessible spaces.
- Where appropriate, metered or time-restricted parking should be used to provide reasonable short-term parking for retail customers and visitors while discouraging long-term parking.
- In developing and redeveloping areas, provide the amount of on-street parking for planned, rather than existing, land-use densities. If more parking is needed, consider public or shared parking structures, or integrate the design of parking facilities with adjacent land uses.
- A minimum 1.5-foot-wide operational offset should be provided between the face of curb and edge of potential obstructions such as trees and poles. This will allow the unobstructed opening of car doors.
- Parking should be prohibited within 10 feet of either side of fire hydrants (or per local code), at least 20 feet from nearside of mid-block crosswalks (those without curb extensions) and at least 20 feet from the curb return of intersections (30 feet from

On-street parking creates a buffer between motor vehicle lanes and the pedestrian realm.

Source: www.pedbikeimages.org/Dan Burden

Source: www.pedbikeimages.org/Dan Burden

On-street parking located in 'pockets,' where the gutter pan is located to the left of the driver's side door.

Separate facilities for bicyclists may be unnecessary on low-speed, low-volume urban streets.

an approach to a signalized intersection) unless curb extensions are provided.

- Reverse (back-in) angled parking requires a wider roadside due to the longer overhang at the rear of most vehicles. This extra width can be compensated by the narrower travel lane needed adjacent to parking for maneuvering and less depth for the parking stall since the longer overhang is over the curb.

Bicycle Facilities

Bicycle facilities provide safe, comfortable mobility opportunities for a range of users and are considered a fundamental part of a complete street. Additionally, facilities such as striped bicycle lanes contribute to the buffer between motor vehicle travel lanes and the adjacent sidewalk.

There are a number of different types of bicycle facilities to consider, including sidewalks, side paths, and striped bicycle lanes. The type of facility chosen depends on a number of contextual factors including the type of user, available ROW, pavement width and street volume/character.

Other general guidance related to accommodating bicycles in complete street design includes the following:

- As described in *Selecting Roadway Design Treatments to Accommodate Bicyclists* (FHWA, 1994) a "design bicyclist" refers to the skill level of the bicyclist and, along with the factors described above,

Table 4.6 Bicycle Facility Type Guidelines

Type	Appropriateness	Width
Side Path (Multi-use Path)	A parallel path may be appropriate if driveways and intersections are very limited, as along a riverfront or a limited-access roadway. See the Knoxville Regional Transportation Planning Organization's *Sidepath Tech Sheet* for more information.	12 feet minimum (for traffic in both directions)
Shared Facility/Shared Street	Low-speed, low-volume streets.	NA (travel lanes should be at least 10 feet in width)
Wide Outside Lane	Lower-speed streets with curb and gutter; not enough pavement width to stripe a full bicycle lane. (This is not a preferred design concept.)	13 feet minimum
Designated Bicycle Lane	Streets with curb and gutter.	4 feet minimum (excluding gutter); 6 feet next to on-street parking
Paved Shoulder	Rural roads with no curb and gutter	5 feet to 7 feet

affects decisions on implementation of bicycle lanes. The three types of bicyclists are defined as:

1. Advanced or experienced bicyclists (require facilities for directness and speed and are comfortable riding in traffic and shared lanes),
2. Basic or casual bicyclists (require comfortable and direct routes on lower-speed and lower-volume thoroughfares and preferring separated and delineated bicycle facilities), and
3. Children (require adult supervision and typically only travel on very low-volume and low-speed residential streets).

- Bicycle accommodation on urban streets should usually meet the needs of Group B, the basic or casual bicyclists.
- Availability of parallel trail facilities accessible to bicycles does not typically eliminate the need to have a bicycle lane on streets. Bicyclists need to access properties along corridors and they often benefit from traffic signals and other controls found on urban streets.
- Designated bicycle facilities adjacent to head-in angled parking are discouraged because of the lack of visibility between bicyclists and drivers backing out of spaces. Converting from angled to parallel parking provides width for bicycle lanes.
- Where possible on one-way streets, angled parking can be implemented on the left side of the street while the bicycle lane remains adjacent to parallel parking on the right side of the street. Some communities use reverse (back-in) angled parking, which improves driver visibility of bicyclists.
- Where curb parking is permitted, consider locating the gutter pan to the driver's side of the parking lane to increase separation between the bicycle travel path and an open car door. This is particularly useful on roadways that have curb extensions.
- Bicycle travel on sidewalks should be generally discouraged, even if the sidewalk width meets the width requirements of a shared multi-use path. Bicycles on sidewalks travel at higher speeds than pedestrians, creating the potential for serious injury. Bicyclists might collide with obstacles on sidewalks including street furniture, sign posts, etc. Additionally, drivers do not expect bicyclists on sidewalks, creating conflicts at intersections and driveways. Therefore it is important to provide convenient

Appropriately designated and marked bicycle lanes provide safe facilities for bicyclists.

alternatives that will limit the attractiveness of sidewalk riding. While on-street facilities designed to the guidelines above are preferred, alternative routes on parallel streets or a separated off-street multiuse path may be a better choice in some situations.

- AASHTO's *Guide for the Development of Bicycle Facilities* should be consulted for more detailed guidance on bicycle facility design.

Transit

Well-planned and designed transit facilities provide safe, comfortable and intentional locations for riders to access transit. They send a message to all street users that transit is a legitimate and viable form of transportation.

Well-planned and designed transit facilities provide safe, comfortable, and intentional locations for riders to access transit.

Generally speaking, there are three levels of transit passenger facilities on complete streets:

- **Stops** – dedicated waiting areas with appropriate signage for passengers waiting to board a transit vehicle;
- **Benches** – dedicated seating for transit passengers; and
- **Shelters** – covered locations, usually with seating and other amenities, for transit passengers.

Source: www.pedbikeimages.org/Dan Burden

Bus bulb-outs are preferred over turn-outs because they provide higher visibility and do not require transit vehicles to exit and re-enter the traffic stream.

Ideally, passenger shelters should be located at occasional intervals along all transit routes and especially at stops with substantial passenger activity. However, factors such as cost and limited right-of-way may limit the placement of shelters. At stop locations with passenger activity throughout the day, a bench is recommended at minimum, while a shelter is preferred. Larger developments – shopping centers, office buildings, etc. – should be encouraged to build transit shelters concurrent with construction (this can be achieved through land development regulations).

Regardless of the facility type chosen, the transit stop should be located on a level surface, such as a concrete pad, that provides a safe

Table 4.7 Transit Facility Guidelines

Type	Appropriateness
Stop	Minimum for all transit routes. Should include appropriate signage and be located on a flat, dry surface with safe clearance from moving vehicles.
Bench	Minimum at locations serving multiple passengers throughout the day.
Shelter	Preferred at locations serving multiple passengers throughout the day.

distance from moving vehicles in the traveled way. The stop should be located to provide passengers convenient access to and from their likely destinations, particularly passengers with disabilities. Transit stops also should maintain a clear area for disabled access from the bus shelter to a waiting transit vehicle. This depends on a number of factors, including sidewalks and ramps, building placement and street crossing opportunities (both mid-block and at intersections).

Bus bulbouts are typically more pedestrian friendly than bus turnouts. Besides allowing for better visibility of transit riders waiting at stops, they can be an effective traffic calming strategy for traffic adjacent to the curb. Bus turnouts should be used only where there is ample opportunity for buses to re-enter the traffic stream, such as on the far side of a traffic signal.

Mid-block Pedestrian Crossing

Street intersections are typically considered the best locations (and, by law, the designated locations) for pedestrians to cross the street. However, in many situations, it may be necessary to address how pedestrians will cross the street away from intersections (i.e. mid-block crossing) in order to establish a complete street.

Pedestrians will begin to seek out mid-block crossing opportunities when intersection spacing exceeds 400 feet.

Installing mid-block crossings can: (1) help channel crossing pedestrians to the safest mid-block location, (2) provide visual cues to allow approaching motorists to anticipate pedestrian activity and stopped vehicles, and (3) provide pedestrians with reasonable opportunities to cross during heavy traffic periods when there are few natural gaps in the approaching traffic streams.

As a rule of thumb, pedestrians will not walk more than 200 feet laterally in order to cross a street, and pedestrians will begin to seek out mid-block crossing opportunities when intersection spacing exceeds 400 feet. The distance can be even less when two high-volume, complementary uses are located directly across the street from each other. It is at these locations that mid-block crossing treatments should be considered.

At a minimum, well-designed mid-block crossings provide better safety for pedestrians by reducing the likelihood of a motor vehicle collision. Beyond that, such crossings can support interplay between both sides of a street, which is essential to an active pedestrian street, and encourage appropriate motor vehicle operating speeds.

Mid-block crossings can be as simple as traffic signs and pavement markings or can include additional treatments such as raised refuge islands, curb extensions, warning flashers and signals.

On two-lane streets and low-volume multi-lane streets, simple pavement marking is typically sufficient for mid-block crossing. However, for higher-volume multi-lane streets, additional treatments are usually required.

For all multi-lane streets carrying 12,000 or more cars per day, a raised median should normally be provided to accommodate mid-block crossing. The raised median creates a safer refuge for pedestrians and breaks one long, complex crossing into two shorter ones.

Table 4.8 Mid-block Pedestrian Crossing Guidelines

Number of Lanes	Daily Traffic Volume	Pavement Marking	Median
2 Lanes	NA	Yes	NA
3 Lanes or more	< 12,000	Yes	Optional
3 Lanes or more	12,000 – 15,000	Yes	Required
3 Lanes or more	> 15,000	No	Required

Assumes a posted speed of less than 40 mph.

Source: www.pedbikeimages.org/Dan Burden

A 'Z' configuration causes pedestrians to face oncoming traffic at mid-block crossing locations.

Raised medians provide a safer refuge (compared to a flush median) for pedestrians and break one complex crossing into two simpler ones.

For all multi-lane streets carrying 15,000 or more cars per day, recent research indicates that it may be safer to leave the mid-block crossing unmarked, thereby encouraging the pedestrian to use a heightened level of caution when crossing.

Additional design considerations regarding mid-block crossings include:

- The designer should evaluate a number of factors when considering the installation of mid-block crosswalks, including proximity to other crossing points, sight distance, vehicle speed, crash records, illumination, traffic volumes, pedestrian volumes and nearby pedestrian generators and attractors.
- Appropriate stopping sight distance is a critical part of the design of mid-block crossings to ensure the safety of the pedestrian.

- Mid-block crossings should be identifiable to pedestrians with vision impairments. Where there is a signal, a locator tone at the pedestrian detector might be sufficient. A tactile strip across the width of the sidewalk at the curb line, and at pedestrian refuge islands, needs to be used so that pedestrians are alerted to the presence of the crossing.
- For a legal crosswalk to exist at a mid-block location, it should be a marked crosswalk according to the Manual on Uniform Traffic Control Devices (MUTCD). Mid-block crossing treatments to increase pedestrian safety do not necessarily constitute legal crosswalks.
- When an unsignalized mid-block crosswalk is installed, warning signs should be placed for both directions of traffic. A pedestrian warning sign with an AHEAD notice or a distance plaque should be placed in advance of the crossing, and a pedestrian warning sign with a downward diagonal arrow plaque should be placed at the crossing location. On multi-lane facilities an advanced stop bar should be considered.
- Unsignalized mid-block crosswalks should normally not be provided on streets where there are not gaps in the traffic stream long enough for a pedestrian to walk to the other side or to a median refuge. At locations with inadequate gaps that also meet MUTCD signalization warrants, consider a signalized mid-block crossing.
- Consider a signalized mid-block crosswalk (including locator tone and audio pedestrian signal output as well as visual pedestrian countdown signal heads) where pedestrians must wait more than an average of 60 seconds for an appropriate gap in the traffic stream. When average wait times exceed 60 seconds, pedestrians tend to become impatient and cross during inadequate gaps in traffic. If this initial threshold is met, check pedestrian signal warrants in the MUTCD.
- Provide overhead safety lighting on the approach sides of both ends of mid-block crossing treatments.
- Provide wheelchair ramps or at-grade channels at mid-block crossings with curbs and medians.
- Provide a raised median pedestrian refuge at mid-block crossings where the total crossing width is greater than 60 feet.
- Use high-visibility (ladder-style) crosswalk markings to increase visibility of crosswalks.

A well-marked mid-block crosswalk in downtown Knoxville.

Curb extensions are a good strategy for making intersections more walkable.

- Consider advance crosswalk warning signs for vehicle traffic.
- Consider curb extensions at mid-block crosswalks with illumination and signing to increase pedestrian and driver visibility.
- Consider "Z" crossing configurations for mid-block crossings with medians wherever possible. Provide an at-grade channel in median at a 45-degree angle toward advancing traffic to encourage pedestrians to look for oncoming traffic.

For additional information on the safety aspects of mid-block pedestrian crossings, the designer should consult the report *Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations Final Report and Recommended Guidelines* by FHWA.

Crosswalks and Pedestrian Indications

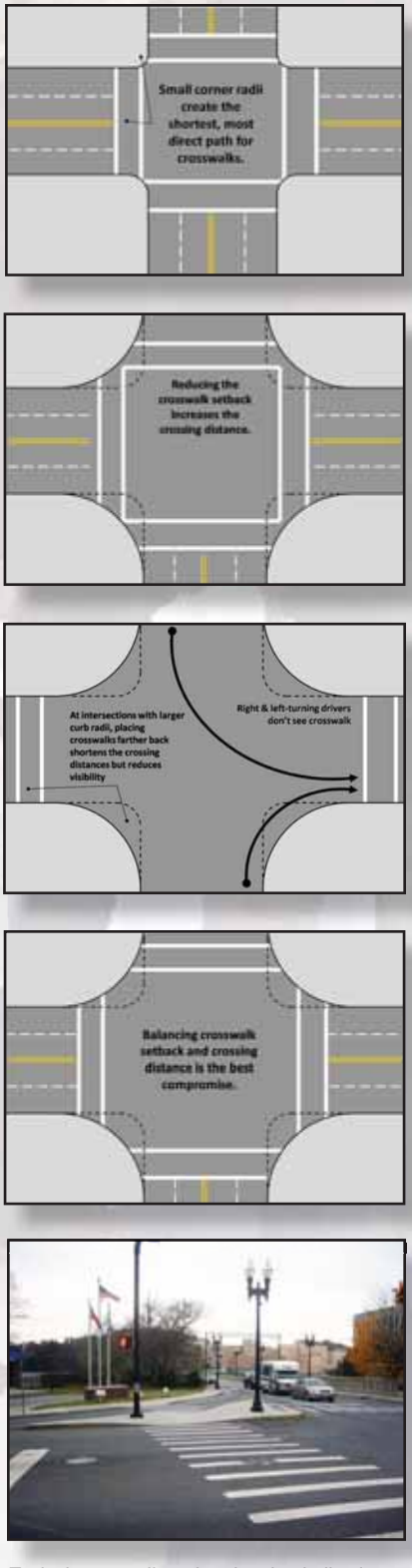
Crosswalks (marked or unmarked) are locations at street intersections where pedestrians cross. (Legal crosswalks can also be created at mid-block locations by the addition of crosswalk markings.) By law all street intersections in Tennessee are also legal pedestrian crosswalks. The placement of marked crosswalks at a given intersection is a balancing act that requires consideration of:

- Shortest crossing distance;
- Visibility between pedestrians and motorists; and
- Ramp placement.

For example, at intersections with large curb radii, the tendency is to place crosswalks farther back from the intersection to minimize crossing distance. However, the farther back the crosswalk, the less visibility exists between pedestrians and turning motorists.

The best crosswalk placement is one that minimizes crossing distance while maintaining good visibility and that allows the ramp to be placed entirely within the crosswalk. Smaller curb radii are ideal for crosswalk placement as they support minimal setbacks and encourage motorists to operate at speeds adequate for recognizing pedestrians in the crosswalk.

At a minimum, all signalized intersections should include marked crosswalks and pedestrian indications (see the section on traffic signals), and all four legs of an intersection should be open to pedestrians. When a median is present, it may be extended across the crosswalk to provide pedestrians protection from left turning vehicles.



Typical crosswalk and pedestrian indications.

Aligning curb extensions with raised median islands is an effective, low-cost strategy for creating safe crossing opportunities.

Curb Extensions

Where on-street parking and/or shoulders are present, curb extensions should be considered for intersections. Curb extensions reduce pedestrian cross times and exposure to motor vehicles, increase visibility and encourage appropriate motor vehicle operating speeds. Additionally, curb extensions create public space and enable placement of street furniture, essential elements for an active street life.

When located along a transit route, curb extensions should consider the inclusion of transit stops at the near side of an intersection. The curb extension allows transit vehicles to pick up passengers without leaving the travel lane, rapidly decreasing dwell times and eliminating operational conflicts.

Street Trees and Street Furniture

Streetscape elements such as street trees and street furniture (lighting, benches, etc.) provide many benefits for complete streets. They provide a buffer between the sidewalk and adjacent motor vehicle travel lanes; they add a frame of reference to the roadway, encouraging the driver to proceed at appropriate speeds; trees provide shade and gathering places.

For the safety of drivers, fixed objects such as trees and poles should be located an adequate distance from the traveled way. In most urban situations, 1.5 to 4 feet of distance from the face of the curb to the fixed object is sufficient. The designer should refer to AASHTO's *Roadside Design Guide* for further information and guidance on roadside design considerations for all types of roadways.

Typical sample of fixed-object clearances (for example., street trees, street furniture, poles, etc.)

Table 4.9 Fixed Object Clearance Guidelines

Type of Fixed Object	Minimum Clearance
• Tree • Signal or Light Pole • Signage • Other fixed objects	1.5 to 4 feet

Intersections

Intersections are one of the more critical elements of a complete street. They represent the convergence of all modes – cars and trucks,

bicycles, pedestrians – and have the greatest potential for conflict. A majority of automobile crashes occur at intersections.

Often, the design of an intersection will focus exclusively on the motor vehicle. The result is that intersections can become barriers for pedestrians, bicyclists and transit riders. A complete streets approach to intersection design should reflect careful consideration of the balance between modes. Below is guidance on the more critical elements of standard intersection design. For guidance on the design of modern roundabouts, which may also be a feasible alternative for a complete street, the designer should become familiar with *Roundabouts: An Informational Guide* by FHWA.

Corner Radii

Corner radii, when designed appropriately, result in smaller, more pedestrian-scaled intersections, reduce pedestrian cross times, encourage appropriate vehicular speeds and allow for proper placement of marked crosswalks. The tendency, however, is to design intersections with very large corner radii to accommodate higher-speed vehicle turn movements and larger vehicles, such as tractor trailers.

In a context sensitive, complete streets environment, the default design for corner radii should be optimized for pedestrians. Only if there are a high number of truck turning movements should the curb radii be larger. Where tractor trailers are the exception, it is acceptable for these vehicles to operate at crawl speeds and to encroach into multiple receiving lanes, opposing lanes and/or bicycle lanes and on-street parking.

Unnecessarily large curb radii result in longer pedestrian cross times, higher vehicle speeds, and reduced visibility.

It's OK to have smaller curb radii where larger vehicles do not turn often.

Source: www.pedbikeimages.org/Dan Burden

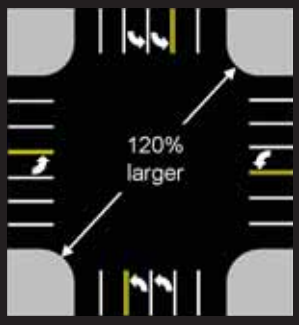
Channelizing islands improve pedestrian visibility and shorten crossing distances, but must be carefully designed so that they do not result in faster motor vehicle turn movements.

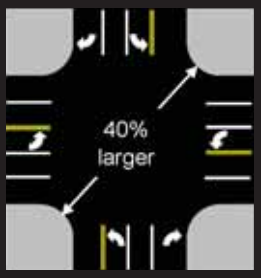
Table 4.10 Corner Radii Guidelines

Condition	Preferred Radii
Default (P - Passenger Car is the Design Vehicle)	10 to 15 feet
Bicycle Lane or On-street Parking is Present	5 feet
Design Vehicle is Larger than Passenger Car (P)	15 to 40 feet

Number and Design of Turn Lanes

Complete street intersection design should reflect careful consideration of the impact of turn lanes on the pedestrian-friendliness of an





Turn lanes, through lanes, and lane widths all have an impact on intersection size.

intersection. Each additional turn lane increases the size of an intersection and makes street crossing more difficult to navigate. Channelizing islands may improve pedestrian visibility and shorten crossing distances, but they may also encourage faster vehicle turning speeds. Where islands are used, they should be carefully designed to balance the needs of turning traffic with the safety and convenience of crossing pedestrians and bicyclists.

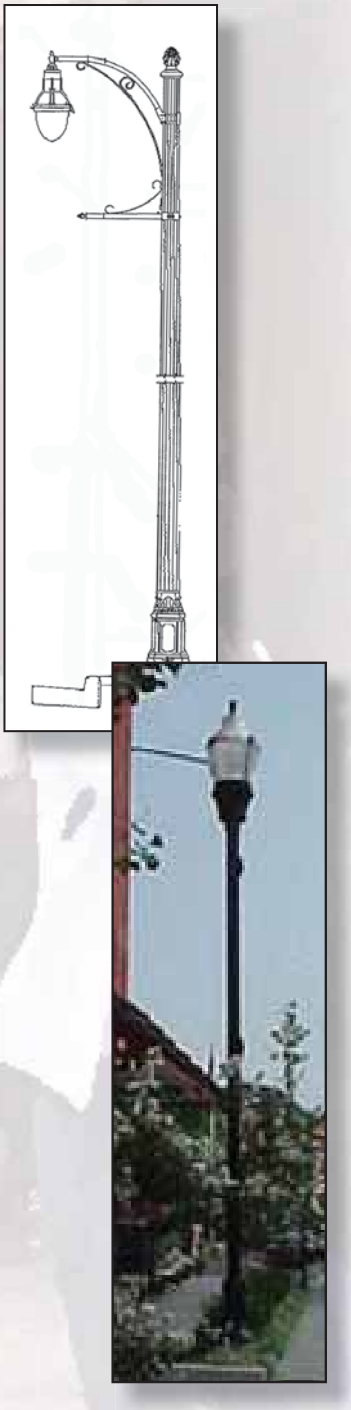
Traffic Signals

Traffic signals are typically not considered an element of complete street design, but have many components with direct implications for complete streets. In most urban settings, traffic signals should be designed with pedestrian indications, in conformance with the MUTCD. Where pedestrian indications are not provided, the signal should be timed to allow adequate time for pedestrian crossings. Traffic signal timing can be designed to control vehicle operating speeds along the street and to provide differing levels of protection for crossing pedestrians. They should also incorporate specialized indications for bicycles, transit buses and emergency vehicles as warranted.

Traffic Signal Treatments for Complete Streets

- Timing to minimize conflicts for crossing pedestrians with turning vehicles phases;
- Signal progression bands set to result in appropriate operating speeds along a corridor in non-peak conditions;
- Pedestrian-actuated crosswalk warning beacons, when warranted, to be used for mid-block pedestrian crossing;
- Pedestrian-actuated HAWK-style signals as a higher-level device for mid-block crossings (this device will be in the new Manual on Uniform Traffic Control Devices);
- Full signalization at warranted pedestrian crossings (note that all pedestrian signals should now be timed using the new MUTCD pedestrian walking speed of 3.5 feet per second to set the Flashing Don't Walk pedestrian clearance time and 3.0 feet per second to determine the total Walk/Flashing Don't Walk time);
- Pedestrian signal indication countdown clocks (note that the new MUTCD will not only require countdown clocks at all new pedestrian signal installations, but there will be a 10-year

compliance date for retrofitting all existing pedestrian signal locations).



Lighting

Studies have shown that the presence of lighting not only reduces the risk of traffic crashes, but also their severity. In most cases, roadway street lighting can be designed to illuminate the sidewalk area as well. The visibility needs of both pedestrian and motorist should be considered. In commercial or downtown areas and other areas of high pedestrian volumes, the addition of lower level, pedestrian-scale lighting to streetlights with emphasis on crossings and intersections may be employed to generate a desired ambiance. Lighting should provide both safety illumination of the traveled way and intersections, as well as pedestrian-scaled decorative light standards illuminating the pedestrian way where appropriate. Lighting should be carefully coordinated with landscaping design to ensure its effectiveness.

Street lighting should be installed at all street intersections. Mid-block street lighting should typically be installed on residential and collector streets in areas of high pedestrian or bicycle activity (such as schools, parks, transit stops and centers, access to transit, and commercial and recreational facilities that draw large numbers of pedestrians) and along all arterial streets.

There are many different types of lighting sources and fixtures available to the designer. Regardless of the lighting equipment used, the level and consistency of lighting provided by the design should normally conform to RP-8, "American National Standard Practice for Roadway Lighting," and guidance provided by the Illuminating Engineering Society of North America.

Complete street lighting designs should:

- Ensure pedestrian walkways and crossways are sufficiently lit;
- Consider adding pedestrian-level lighting in areas of higher pedestrian volumes, downtown, and at key intersections;
- Install lighting on both sides of streets in commercial districts; and
- Use uniform lighting levels.

Pavement Treatments

Pavement treatments, including colored or textured pavement, brick pavers, cobblestones, and granite curbs, represent a step up from

standard crosswalk treatments such as paint markings. Although usually more costly to implement and maintain, they can enhance a complete street by more visibly establishing spaces for bicycles and pedestrians.

Some treatments, such as a cobblestone mid-block pedestrian crossing, can also have traffic calming effects at key locations. Linking the design of these treatments with the architectural character of surrounding land uses creates an even more attractive and cohesive complete street corridor. Inserting artistic design treatments intermittently, rather than along the entire sidewalk, is also a cost-effective way to enhance the streetscape.

Treatments such as raised brick pavers or cobblestones should not be used in bicycle lanes, as they can be hazardous or uncomfortable for bicyclists to navigate. They should also be carefully evaluated in their use for pedestrian crosswalks to ensure they are not excessively slippery in wet conditions. Likewise, decorative sidewalk or crosswalk treatments should not interfere with ADA compliance.

Special Considerations for Younger, Older, and Disabled Pedestrians

When streets are designed primarily for vehicles, they become barriers for children, who cannot safely walk or bicycle along or across them. Pedestrian injury is a leading cause of unintentional, injury-related death among children age 5 to 14. The lack of complete streets is perhaps best illustrated by hazard busing for schoolchildren. In many communities students who ride the bus to school do so because it is considered too dangerous to walk along area streets between their home and school.

Even when streets have been designed with basic pedestrian facilities, they often do not fully consider the needs of the growing population of older Americans. Street crossings are often long, sidewalks are absent or blocked by fixed objects, and transit stops have no place to sit. Older Americans need the public right-of-way to better serve them by providing safe places to walk, bicycle, or board the bus, and by designing streets to better accommodate older drivers.

Incomplete streets are a constant source of frustration and danger for people with disabilities. They often are difficult to navigate for people who use wheelchairs, can't see well, or for older people who move more slowly.

Complete streets should be safe and comfortable for everyone to use – particularly for these younger, older and disabled people who cannot choose to drive.

Special Considerations for Emergency Access

Major streets are the primary conduits for emergency response vehicles including police, fire, and ambulance. When designing a complete street, take into consideration whether that street is intended for emergency vehicle access and incorporate the typical emergency response vehicle into the design. For example, intersections intended for emergency vehicle access should ensure that the curb radii can accommodate the appropriate emergency vehicle turning radius (encroachment is OK). Emergency response agencies should be included as stakeholders in the design process.

Design Factors that Affect Emergency Response Vehicles

- Width of street and travel lanes
- Number of travel lanes
- Geometric design of intersections
- Access management features, especially medians
- Signal timing, coordination and existence of emergency pre-emption devices

5. THE TRANSPORTATION AND LAND USE CONNECTION

Creating Supportive Environments for Walking, Bicycling, and Riding Transit

Just as important as the design of the street to making it "complete" is the nature of activities that take place around it. Although land use is beyond the scope of these guidelines, the transportation and land use connection is essential to complete streets and deserves mention.

The 3 D's: Density, Diversity & Design

There are a number of ways to describe how places are put together and their influence on transportation and complete streets. One of the more popular ways to describe the relationship is through the "three D's": density, diversity and design.

Density, mix of uses and building relationships all contribute to a rich, active and complete street.

Density

Density describes how close or far apart households are located to each other. The higher the density, the more households are located in close proximity to activities and each other. In the context of complete streets, there is a direct relationship between the level of density and the number of households within walking and bicycling distance of that street.

Table 5.1 Density and Walkability

Density (dwelling units per acre)	Number of Households Within Walking Distance* of a Mile-long Corridor
1	445
2	890
4	1,780
8	3,560
16	7,120

**Walking distance is defined as one-quarter mile.*

Diversity

Diversity refers to the mix of uses within a given place. Recent empirical research has shown that when you mix different, yet complementary, uses – shopping, restaurants, services, employment, homes, etc. – people are more likely to walk, bike and ride transit.

Design

Design addresses how places are put together in terms of the orientation of buildings, placement of parking and open space, etc. Thoughtful design along a complete street may include buildings at the edge of the street right of way, parking to the side and behind the buildings and strategic placement of public places for people to congregate.

Access Management

Multiple driveways create potential conflict points for bicycles, pedestrians and motor vehicles.

Properly locating and designing access is called access management, which provides access to adjoining properties in such a way as to minimize conflict points and preserve safety and reasonable traffic flow on the public street system. Effective access management includes setting access policies for street and abutting development, keying designs to these policies, having the access policies incorporated into legislation, and having the legislation upheld in the courts.

Good access management contributes to a complete street by minimizing potential conflict points, such as driveways and median openings. The fewer conflict points, the safer a street will become for bicycles, pedestrians, and motor vehicles.

Access management addresses the basic questions of when, where, and how access should be provided, and what legal or institutional provisions are needed to enforce these decisions. In a broad context, access management is resource management, since it is a way to anticipate and reduce crashes and congestion and to improve traffic flow. It has been shown that good access management can reduce crashes involving all users by 50 percent or more, depending on the condition and treatment used. The following principles define access management techniques:

- Classify the street system by function and land use or context,
- Establish standards or regulations for intersection spacing,
- Limit direct access to streets that primarily serve a vehicular mobility function,

- On streets that have a major access function (most urban/ suburban streets), locate driveways and major entrances away from intersections and away from each other to minimize interference with traffic operations, minimize crashes, and to provide for adequate storage lengths for turning vehicles,
- Use curbed medians and locate median openings to manage access and minimize conflicts, and
- Minimize driveways, driveway widths and driveway entry/ exit speeds to reduce conflicts between motor vehicles and pedestrians and bicyclists.

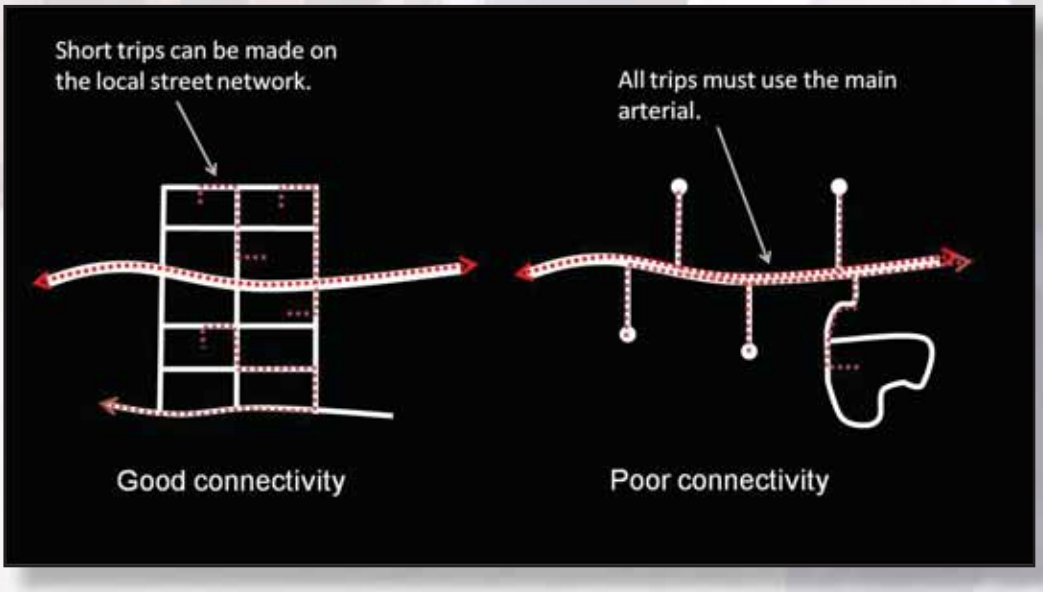
Source: www.pedbikeimages.org/Dan Burden

Networks and Connectivity

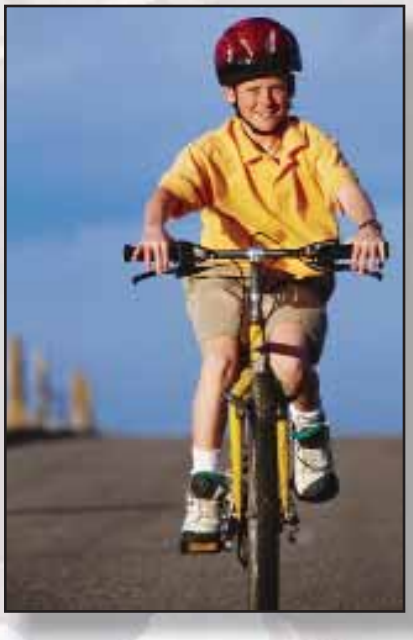
A closely related concept to access management is that of networks and connectivity. Networks disperse traffic over a connected system of streets so that every trip does not funnel to a single arterial. Interconnected networks provide two main benefits for complete streets:

1. Because they disperse traffic, networks preclude the need for large, congested multi-lane (6+ lane) arterials that do not provide a safe or comfortable experience for bicyclists, pedestrians or transit riders.
2. Connected street networks result in a highly walkable block network that provides direct routes instead of long, circuitous linear paths.

Good street connectivity disperses traffic, creates a walkable block system and results in smaller streets more suitable for walking and bicycling.



6. CHALLENGES



While the concept of complete streets and their benefits seems to be intuitive, the implementation of complete streets is not a straightforward process. There are several challenges that advocates will likely encounter as they begin to create complete streets in the Knoxville region. Two of the largest challenges are safety/liability concerns and cost.

Safety and Liability

Good street design can promote community livability by emphasizing local travel needs and creating a safe, inviting space for community activity. Street design elements such as sidewalks, crosswalks, landscaped sidewalk buffers, bikeways, on-street parking, street trees, landscaping, street lighting, bus shelters, benches and corner curb extensions provide an environment that is not only attractive, but can slow traffic and encourage walking, bicycling and use of transit – the primary goal of a complete street.

Streets without safe places to walk, cross, catch a bus, or bicycle put people and responsible agencies at risk. Statistics show that close to 5,000 pedestrians and bicyclists die each year on U.S. roads, and more than 70,000 are injured. Studies have shown that pedestrian crashes are more than twice as likely to occur in places without sidewalks; streets with sidewalks on both sides have the fewest crashes. Complete streets therefore improve safety by encouraging non-motorized travel and increasing the number of people bicycling and walking.

In designing a complete street, the designer should clearly be concerned about the safety of all users of the street. Safety concerns in urban areas are different than those in rural areas, where speeds are typically higher and nearly all travel is by motor vehicle. In designing a complete street in traditional urban areas, the designer is concerned about the safety of a wider range of users including the pedestrian on the sidewalk, and motorists, motorcyclists, and bicyclists using the traveled way. The designer should consider the context along the street including competing demands within limited right-of-way and time when the street space may be needed.

Safety in urban areas is achieved by separating modes of different speeds and vulnerabilities to the extent possible by both space and

time – bicyclists from pedestrians and pedestrians from vehicles – informing all users of the presence and mix of travel modes, and through provision of adequate sight distance. The difficulty for the designer is developing solutions to resolve the inherent conflicts where modes of travel cross paths.

Safety for the users of the street in traditional urban areas focuses on meeting user expectations, providing uniform and predictable designs and traffic control, managing hazardous roadside obstacles, and establishing an appropriate design speed, which in turn controls the speed-related geometric design elements of the street.

Strategies to minimize or avoid conflict can result in designs that favor one mode over others. For example, choosing not to mark crosswalks at urban intersections as a strategy to minimize conflicts will not stop pedestrians from crossing and will place them in greater danger. Instead, designers should normally use marked crosswalks on all approaches and provide additional safety features that encourage pedestrian activity.

In designs along major streets with a high priority on motor vehicle level of service, intersection designs should incorporate mitigating measures such as curb extensions to reduce crossing distances, pedestrian countdown signals, pedestrian refuge islands, and low-speed right turns.

When addressing intersection safety in the design process, it is important that the measures that are used to improve vehicle traffic flow or reduce vehicle crashes not compromise pedestrian and bicycle safety. The following considerations are important when addressing intersection safety design and operation:

- Eliminate vehicle and pedestrian conflicts without reducing accessibility or mobility for any of the various types of users.
- When it is not possible to eliminate all conflicts, reduce the number of conflict points to reduce the chances of collisions.
- Design intersections so that when collisions do occur, they are less severe.

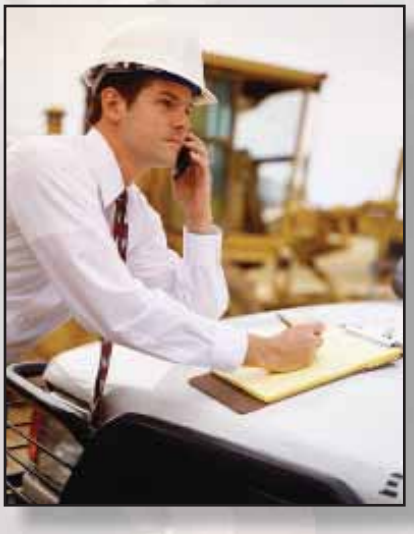
Cost

Integrating sidewalks, bike lanes, transit amenities, and safe crossings into the initial design of a project spares the expense of retrofits later. Considering the needs of transit and all non-motorized travelers

(pedestrians, bicyclists, and persons with disabilities) early in the life of a design project can minimize the costs associated with including facilities for these street users in subsequent projects.

A balanced transportation system that includes complete streets can bolster economic growth and stability by providing accessible and efficient connections between residences, schools, parks, public transportation, offices, and retail destinations. Complete streets can contribute to reducing transportation costs and travel time while increasing local property values and job growth. Research has shown that building walkable streets and lowering automobile speeds can improve economic conditions for both residents and business owners, and opinions are that home values often increase on streets that have received complete streets treatments.

7. GETTING IT DONE: TOOLS FOR IMPLEMENTATION



Creating complete streets in the Knoxville region will require patience, diligence, and hard work. This section provides a series of suggested tools for transportation professionals and complete streets advocates to implement the guidelines and strategies described in this document.

Setting the Vision

In many cases, a conventional street cannot be transformed into a complete street overnight, but rather the result of a longer process where each element comes into place gradually and incrementally over time. There must be a vision in place so that all can see what "finished" looks like and to gather and maintain support for the long-term process.

Today, it might be restriping a street to include a bicycle lane. But 10 years from now, that street may ultimately be transformed into a balanced, robust corridor complete with wide sidewalks, street trees and furniture, on-street parking and transit shelters. It is only through setting a long-term vision can this end result be achieved.

Supporting Policies, Ordinances and Resolutions

The United States Department of Transportation (USDOT) has developed a Design Guidance Policy Statement document titled *Accommodating Bicycle and Pedestrian Travel: A Recommended Approach: Integrating Bicycling and Walking into Transportation Infrastructure* that is provided in Appendix A. This guidance can form the foundation from which state and local governments can adopt their own complete streets policies followed by supporting ordinances, regulations and standards.

The USDOT Policy Statement states that manuals that are commonly used by highway designers covering roadway geometrics, roadside safety, and bridges should incorporate design information that integrates safe and convenient facilities for bicyclists and pedestrians – including people with disabilities – into all new highway construction and reconstruction projects.

The Tennessee Department of Transportation has also developed a *Bicycle and Pedestrian Policy* that is provided in Appendix B. The stated purpose of the Department's policy is "to promote and facilitate the increased use of non-motorized modes of transportation, including developing facilities for the use of pedestrians and bicyclists and promoting public education, and safety programs for using such facilities."

These manuals may be supplemented by stand-alone bicycle and pedestrian facility planning and design manuals that provide detailed design information addressing on-street bicycle facilities, fully accessible sidewalks, crosswalks, and shared-use paths, and other improvements.

Considering the above federal guidance, a good complete streets policy:

- Includes a vision for how and why the community wants to complete its streets.
- Specifies that "all users" includes pedestrians, bicyclists, and public transportation passengers of all ages and abilities, as well as trucks, buses, and automobiles.
- Encourages street connectivity and aims to create a comprehensive, integrated, connected network for all modes.
- Is adoptable by all agencies to cover all roads.
- Applies to both new and retrofit projects, including design, planning, maintenance, and operations, for the entire right of way.
- Makes any exceptions specific and sets a clear procedure that requires high-level approval of exceptions.
- Directs the use of the latest and best design standards while recognizing the need for flexibility in balancing user needs.
- Directs that complete streets solutions complement the context of the community.
- Establishes performance standards with measurable outcomes.
- Includes specific next steps for implementation of the policy.

An effective complete streets policy should prompt transportation agencies to:

- Restructure their procedures to accommodate all users on every project.

- Re-write their design manuals to encompass the safety of all users.
- Re-train planners and engineers in balancing the needs of diverse users.
- Create new data collection procedures to track how well the streets are serving all users.

Examples of Complete Streets policies are provided in Appendix C.

Public Participation and Stakeholder Involvement

Engaging the community through public meetings.

The guidelines presented in this document prescribe a "context-sensitive" approach to creating complete streets. The only way to truly understand the context of a street is to fully engage the surrounding community through an effective and meaningful public participation and stakeholder involvement process. The public includes anyone with a direct or indirect interest in a complete street. Stakeholders refer to those with a more specific stake in the outcome; this may include elected officials, regulatory agencies, emergency service providers, advocacy groups, neighborhood associations, etc.

There are many different ways to engage the public and stakeholders, including:

- Interactive public workshops and open houses
- Presentations at agency and other group meetings
- Interactive web sites
- Newsletters
- Questionnaires and other survey approaches
- Personal interviews

Interdisciplinary Team Approach

An interdisciplinary approach to planning and design complete streets incorporates the viewpoints of the various agencies, stakeholders and professionals who have roles or areas of concern in the project design. The different viewpoints allow coordination between different activities and resolution of competing interests. An interdisciplinary team approach can also result in a broader range of potential alternatives that meet multiple complete streets objectives. The makeup of planning and design teams can vary significantly depending on the nature of the project and can include anyone or any

organization connected with the project, including, but not limited to, the following:

- Transportation planners
- Roadway design engineers
- Traffic engineers
- Environmental scientists
- Land use planners
- Urban designers and architects
- Landscape architects, urban foresters
- Property owners
- Utility owners/operators
- Transit operators
- Roadway maintenance operators
- Community leaders/representatives
- Elected or appointed officials
- Fire, police, and other emergency responders

Land development ordinances can support the creation various complete streets design elements – sidewalks, on-street parking, transit facilities, etc.

Policy and Regulatory Changes

Beyond policy language that supports complete streets, there are several public policy tools that can be used to help create complete streets. These include:

- **Urban design overlays and form-based code** – These are land development regulations that guide, among other things, the development of a site. These tools can be used to prescribe various streetscape elements – building orientation, sidewalks, street trees and furniture, on-street parking, etc. The City of Knoxville is in the process of implementing form-based code in several districts within the city.
- **Connectivity ordinances** – Connectivity ordinances are also typically modifications to land development regulations. They can use a number of methods to prescribe the development of an interconnected network that results in a system of pedestrian-scaled blocks and smaller streets that are safe and comfortable to walk and bicycle on.
- **Adequate public facility ordinances** – Adequate public facility ordinances describe specific types of improvements that must be made by new development to help mitigate its impact. They

may be used to implement complete streets elements such as sidewalks, transit stops and bicycle facilities. These ordinances are generally stronger if they reinforce an overall plan or vision for a street.

"Tag Along" Projects

One of the most cost-effective ways to implement complete streets is to "tag along" on pre-existing projects. For example, a drainage or sanitary sewer project along a street will likely involve tearing up all or a portion of a road. This represents an excellent opportunity to implement new or wider sidewalks concurrent with reconstruction, at little or no marginal cost. Another such example is re-striping a road to add bicycle lanes or revise lane widths concurrent with a road resurfacing projects.

Complete streets design elements can be incorporated into other street projects at little or no additional cost.

Complete streets advocates should seek out opportunities for "tag along" projects. In the Knoxville region, these opportunities may be found within:

- City and County capital improvements plans (CIP)
- The Tennessee Department of Transportation's (TDOT) Three-Year Work Program
- The Knoxville Regional TPO's Transportation Improvement Program (TIP)

The opportunities should be sought out as early as possible in the programming process so that complete streets enhancements can be incorporated into the design with minimal disruption.

Public Financing

Complete street design is about balancing a transportation system that may have emphasized motor vehicle movement to the exclusion of other, existing users of the roadway. In many cases, those other users – bicyclists, pedestrians, transit riders – have been there all along, but their needs have not been fully considered and accommodated in the design process. Adequate complete streets policies and procedures recognize and correct this, but they do not guarantee investment in improvements for other modes. Designing streets for all users does not automatically mean spending large sums of money, and including such features from the beginning can make any additional costs negligible.

Local agencies can use local funds but often secure federal funding for multimodal complete streets projects through the metropolitan planning organization (MPO) competitive TIP process. (The Knoxville Regional TPO is the MPO for the Knoxville area.) This is done through funding categories for congested regional corridors, STP, CMAQ (where available), and Transportation Enhancements. Local MPO project eligibility standards and the scoring process should be structured to support multimodal (complete street) investments. Funding may also be available for bicycle/pedestrian improvements through the Federal Safe Routes to School program. Local agencies can also pursue federal earmarks for complete streets projects through their Congressional delegation.

Some agencies also use private funds for complete street projects. In areas anticipated for significant change through new development or redevelopment, transportation network plans have been developed to provide a detailed plan for where new streets and bicycle and pedestrian facilities are required. Through the development regulation and approval process, applicants may be required at a minimum to reserve the necessary right-of-way and to build their share of these multi-modal facilities.

8. SUMMARY

Complete streets provide a full menu of transportation options to meet the needs of everyone using the road. Children are able to safely travel to school, those on foot and bicycle have convenient routes to their destinations, and public transportation is accessible by all users.

Complete streets designs are cost effective because they save money on retrofits by building more effective streets the first time and can reduce congestion by providing more transportation options. Creating complete streets has been shown to spur economic development by improving conditions for existing businesses and attracting new development.

Complete streets help to fight climate change and reduce our dependence on foreign oil by providing transportation choices and allowing people to leave the car at home – they can play an important in helping people drive less and save money on gas. Complete streets can improve safety for everyone using the road and encourage healthy and active lifestyles.

9. REFERENCES

A Guide for Achieving Flexibility in Highway Design, AASHTO

Flexibility in Highway Design, FHWA

Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, ITE/CNU

Urban Street Geometric Design Handbook, ITE

Planning Complete Streets for an Aging America, AARP

Highway Design Handbook for Older Drivers and Pedestrians, FHWA

A Policy on Geometric Design of Highways and Streets, AASHTO (the Green Book)

Guide for the Planning, Design and Operation of Pedestrian Facilities, AASHTO

Guide for the Development of Bicycle Facilities, AASHTO

Roadside Design Guide, AASHTO

Public Rights-of-Way Accessibility Guide (PROWAG), US Access Board

Special Report: Access Public Rights-of-Way Planning and Designing for Alterations, US Access Board

Selecting Roadway Design Treatments to Accommodate Bicyclists, FHWA

Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations Final Report and Recommended Guidelines, FHWA

Manual on Uniform Traffic Control Devices (MUTCD), FHWA

Roundabouts: An Informational Guide, FHWA

American National Standard Practice for Roadway Lighting (RP-8), Illuminating Engineering Society of North America

Accommodating Bicycle and Pedestrian Travel: A Recommended Approach: Integrating Bicycling and Walking into Transportation Infrastructure, U.S. DOT

Highway Capacity Manual, TRB

APPENDIX A

USDOT Bicycle and Pedestrian Design Guidance Policy Statement

Source: www.pedbikeimages.org/Dan Burden

Design Guidance
Accommodating Bicycle and Pedestrian Travel:
A Recommended Approach

A US DOT Policy Statement
Integrating Bicycling and Walking into Transportation Infrastructure

Purpose

Accommodating Bicycle and Pedestrian Travel: A Recommended Approach is a policy statement adopted by the United States Department of Transportation. USDOT hopes that public agencies, professional associations, advocacy groups, and others adopt this approach as a way of committing themselves to integrating bicycling and walking into the transportation mainstream.

The Design Guidance incorporates three key principles:

1. a policy statement that bicycling and walking facilities will be incorporated into all transportation projects unless exceptional circumstances exist;

2. an approach to achieving this policy that has already worked in State and local agencies; and

3. a series of action items that a public agency, professional association, or advocacy group can take to achieve the overriding goal of improving conditions for bicycling and walking.

The Policy Statement was drafted by the U.S. Department of Transportation in response to Section 1202 (b) of the Transportation Equity Act for the 21st Century (TEA-21) with the input and assistance of public agencies, professional associations and advocacy groups.

Introduction

Bicycling and walking issues have grown in significance throughout the 1990s. As the new millennium dawns public agencies and public interest groups alike are striving to define the most appropriate way in which to accommodate the two modes within the overall transportation system so that those who walk or ride bicycles can safely, conveniently, and comfortably access every destination within a community.

Public support and advocacy for improved conditions for bicycling and walking has created a widespread acceptance that more should be done to enhance the safety, comfort, and convenience of the nonmotorized traveler. Public opinion surveys throughout the 1990s have demonstrated strong support for increased planning, funding and implementation of shared use paths, sidewalks and on-street facilities.

At the same time, public agencies have become considerably better equipped to respond to this demand. Research and practical experience in designing facilities for

bicyclists and pedestrians has generated numerous national, State and local design manuals and resources. An increasing number of professional planners and engineers are familiar with this material and are applying this knowledge in towns and cities across the country.

The 1990 Americans with Disabilities Act, building on an earlier law requiring curb ramps in new, altered, and existing sidewalks, added impetus to improving conditions for sidewalk users. People with disabilities rely on the pedestrian and transit infrastructure, and the links between them, for access and mobility.

Congress and many State legislatures have made it considerably easier in recent years to fund nonmotorized projects and programs (for example, the Intermodal Surface Transportation Efficiency Act and the Transportation Equity Act for the 21st Century), and a number of laws and regulations now mandate certain planning activities and design standards to guarantee the inclusion of bicyclists and pedestrians.

Despite these many advances, injury and fatality numbers for bicyclists and pedestrians remain stubbornly high, levels of bicycling and walking remain frustratingly low, and most communities continue to grow in ways that make travel by means other than the private automobile quite challenging. Failure to provide an accessible pedestrian network for people with disabilities often requires the provision of costly paratransit service. Ongoing investment in the Nation's transportation infrastructure is still more likely to overlook rather than integrate bicyclists and pedestrians.

In response to demands from user groups that every transportation project include a bicycle and pedestrian element, Congress asked the Federal Highway Administration (FHWA) to study various approaches to accommodating the two modes. The Transportation Equity Act for the 21st Century (TEA-21) instructs the Secretary to work with professional groups such as AASHTO, ITE, and other interested parties to recommend policies and standards that might achieve the overall goal of fully integrating bicyclists and pedestrians into the transportation system.

TEA-21 also says that, "Bicycle transportation facilities and pedestrian walkways shall be considered, where appropriate, in conjunction with all new construction and reconstruction of transportation projects, except where bicycle and pedestrian use are not permitted." (Section 1202)

> **SEC. 1202. BICYCLE TRANSPORTATION AND PEDESTRIAN WALKWAYS.**
>
> (b) Design Guidance.-
>
> (1) In general.-In implementing section 217(g) of title 23, United States Code, the Secretary, in cooperation with the American Association of State Highway and Transportation Officials, the Institute of Transportation Engineers, and other interested organizations, shall develop guidance on the various approaches to accommodating bicycles and pedestrian travel.

(2) Issues to be addressed. -The guidance shall address issues such as the level and nature of the demand, volume, and speed of motor vehicle traffic, safety, terrain, cost, and sight distance.

(3) Recommendations. -The guidance shall include recommendations on amending and updating the policies of the American Association of State Highway and Transportation Officials relating to highway and street design standards to accommodate bicyclists and pedestrians.

(4) Time period for development. -The guidance shall be developed within 18 months after the date of enactment of this Act.

In August 1998, FHWA convened a Task Force comprising representatives from FHWA, AASHTO, ITE, bicycle and pedestrian user groups, State and local agencies, the U.S. Access Board and representatives of disability organizations to seek advice on how to proceed with developing this guidance. The Task Force reviewed existing and proposed information on the planning and technical design of facilities for bicyclists and pedestrians and concluded that these made creation of another design manual unnecessary. For example, AASHTO published a bicycle design manual in 1999 and is working on a pedestrian facility manual.

The area where information and guidance was most lacking was in determining when to include designated or special facilities for bicyclists and pedestrians in transportation projects. There can also be uncertainty about the type of facility to provide, and the design elements that are required to ensure accessibility.

For example, when a new suburban arterial road is planned and designed, what facilities for bicyclists and pedestrians should be provided? The task force felt that once the decision to provide a particular facility was made, the specific information on designing that facility is generally available. However, the decision on whether to provide sidewalks on neither, one or both sides of the road, or a shoulder, striped bike lane, wide outside lane or separate trail for bicyclists is usually made with little guidance or help.

After a second meeting with the Task Force in January 1999, FHWA agreed to develop a Policy Statement on Accommodating Bicyclists and Pedestrians in Transportation Projects to guide State and local agencies in answering these questions. Task Force members recommended against trying to create specific warrants for different facilities (warrants leave little room for engineering judgement and have often been used to avoid providing facilities for bicycling and walking). Instead, the purpose of the Policy Statement is to provide a recommended approach to the accommodation of bicyclists and pedestrians that can be adopted by State and local agencies (as well as professional societies and associations, advocacy groups, and Federal agencies) as a commitment to developing a transportation infrastructure that is safe, convenient, accessible, and attractive to motorized AND nonmotorized users alike. The Policy Statement has four elements:

1. an acknowledgment of the issues associated with balancing the competing interests of motorized and nonmotorized users;

2. a recommended policy approach to accommodating bicyclists and pedestrians (including people with disabilities) that can be adopted by an agency or organizations as a statement of policy to be implemented or a target to be reached in the future;

3. a list of recommended actions that can be taken to implement the solutions and approaches described above; and

4. further information and resources on the planning, design, operation, and maintenance of facilities for bicyclists and pedestrians.

The Challenge: Balancing Competing Interests

For most of the second half of the 20th Century, the transportation, traffic engineering and highway professions in the United States were synonymous. They shared a singular purpose: building a transportation system that promoted the safety, convenience and comfort of motor vehicles. The post-war boom in car and home ownership, the growth of suburban America, the challenge of completing the Interstate System, and the continued availability of cheap gasoline all fueled the development of a transportation infrastructure focused almost exclusively on the private motor car and commercial truck.

Initially, there were few constraints on the traffic engineer and highway designer. Starting at the centerline, highways were developed according to the number of motor vehicle travel lanes that were needed well into the future, as well as providing space for breakdowns. Beyond that, facilities for bicyclists and pedestrians, environmental mitigation, accessibility, community preservation, and aesthetics were at best an afterthought, often simply overlooked, and, at worst, rejected as unnecessary, costly, and regressive. Many States passed laws preventing the use of State gas tax funds on anything other than motor vehicle lanes and facilities. The resulting highway environment discourages bicycling and walking and has made the two modes more dangerous. Further, the ability of pedestrians with disabilities to travel independently and safely has been compromised, especially for those with vision impairments.

Over time, the task of designing and building highways has become more complex and challenging. Traffic engineers now have to integrate accessibility, utilities, landscaping, community preservation, wetland mitigation, historic preservation, and a host of other concerns into their plans and designs - and yet they often have less space and resources within which to operate and traffic volumes continue to grow.

The additional "burden" of having to find space for pedestrians and bicyclists was 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.

By contrast, bicycle and pedestrian user groups argue the roadway designer should design highways from the right-of-way limits in, rather than the centerline out. They advocate beginning the design of a highway with the sidewalk and/or trail, including a buffer before the paved shoulder or bike lane, and then allocating the remaining space for motor vehicles. Through this approach, walking and bicycling are positively encouraged, made safer, and included as a critical element in every transportation project rather than as an afterthought in a handful of unconnected and arbitrary locations within a community.

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.

During the 1990s, Congress spearheaded a movement towards a transportation system that favors people and goods over motor vehicles with passage of the Intermodal Surface Transportation Efficiency Act (1991) and the Transportation Equity Act for the 21st Century (1998). The call for more walkable, liveable, and accessible communities, has seen bicycling and walking emerge as an "indicator species" for the health and well-being of a community. People want to live and work in places where they can safely and conveniently walk and/or bicycle and not always have to deal with worsening traffic congestion, road rage and the fight for a parking space. Vice President Gore launched a Livability Initiative in 1999 with the ironic statement that "a gallon of gas can be used up just driving to get a gallon of milk."

The challenge for transportation planners, highway engineers and bicycle and pedestrian user groups, therefore, is to balance their competing interest in a limited amount of right-of-way, and to develop a transportation infrastructure that provides access for all, a real choice of modes, and safety in equal measure for each mode of travel.

This task is made more challenging by the widely divergent character of our nation's highways and byways. Traffic speeds and volumes, topography, land use, the mix of road users, and many other factors mean that a four-lane highway in rural North Carolina cannot be designed in the same way as a four-lane highway in New York City, a dirt road in Utah or an Interstate highway in Southern California. In addition, many different agencies are responsible for the development, management, and operation of the transportation system.

In a recent memorandum transmitting Program Guidance on bicycle and pedestrian issues to FHWA Division Offices, the Federal Highway Administrator wrote that "We expect every transportation agency to make accommodation for bicycling and walking a routine part of their planning, design, construction, operations and maintenance activities." The Program Guidance itself makes a number of clear statements of intent:

Congress clearly intends for bicyclists and pedestrians 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.

"Due consideration" of bicycle and pedestrian needs should include, at a minimum, a presumption that bicyclists and pedestrians will be accommodated in the design of new and improved transportation facilities.

To varying extents, bicyclists and pedestrians will be present on all highways and transportation facilities where they are permitted and it is clearly the intent of TEA-21 that all new and improved transportation facilities be planned, designed and constructed with this fact in mind.

The decision not to accommodate [bicyclists and pedestrians] should be the exception rather than the rule. There must be exceptional circumstances for denying bicycle and pedestrian access either by prohibition or by designing highways that are incompatible with safe, convenient walking and bicycling.

The Program Guidance defers a suggested definition of what constitutes "exceptional circumstances" until this Policy Statement is completed. However, it does offer interim guidance that includes controlled access highways and projects where the cost of accommodating bicyclists and pedestrians is high in relation to the overall project costs and likely level of use by nonmotorized travelers.

Providing access for people with disabilities is a civil rights mandate that is not subject to limitation by project costs, levels of use, or "exceptional circumstances". While the Americans with Disabillities Act doesn't require pedestrian facilities in the absence of a pedestrian route, it does require that pedestrian facilities, when newly constructed or altered, be accessible.

Policy Statement

1. Bicycle and pedestrian ways shall be established in new construction and reconstruction projects in all urbanized areas unless one or more of three conditions are met:
    - bicyclists and pedestrians are prohibited by law from using the roadway. In this instance, a greater effort may be necessary to accommodate bicyclists and pedestrians elsewhere within the right of way or within the same transportation corridor.

    - the cost of establishing bikeways or walkways would be excessively disproportionate to the need or probable use. Excessively disproportionate is defined as exceeding twenty percent of the cost of the larger transportation project.

    - where sparsity of population or other factors indicate an absence of need. For example, the Portland Pedestrian Guide requires "all construction of new public streets" to include sidewalk improvements on both sides, unless the street is a cul-de-sac with four or fewer dwellings or the street has severe topographic or natural resource constraints.

2. In rural areas, paved shoulders should be included in all new construction and reconstruction projects on roadways used by more than 1,000 vehicles per day, as in States such as Wisconsin. Paved shoulders have safety and operational advantages for all road users in addition to providing a place for bicyclists and pedestrians to operate.

Rumble strips are not recommended where shoulders are used by bicyclists unless there is a minimum clear path of four feet in which a bicycle may safely operate.

3. Sidewalks, shared use paths, street crossings (including over- and undercrossings), pedestrian signals, signs, street furniture, transit stops and facilities, and all connecting pathways shall be designed, constructed, operated and maintained so that all pedestrians, including people with disabilities, can travel safely and independently.

4. The design and development of the transportation infrastructure shall improve conditions for bicycling and walking through the following additional steps:

    - planning projects for the long-term. Transportation facilities are long-term investments that remain in place for many years. The design and construction of new facilities that meet the criteria in item 1) above should anticipate likely future demand for bicycling and walking facilities and not preclude the provision of future improvements. For example, a bridge that is likely to remain in place for 50 years, might be built with sufficient width for safe bicycle and pedestrian use in anticipation that facilities will be available at either end of the bridge even if that is not currently the case

    - addressing the need for bicyclists and pedestrians to cross corridors as well as travel along them. Even where bicyclists and pedestrians may not commonly use a particular travel corridor that is being improved or constructed, they will likely need to be able to cross that corridor safely and conveniently. Therefore, the design of intersections and interchanges shall accommodate bicyclists and pedestrians in a manner that is safe, accessible and convenient.

    - getting exceptions approved at a senior level. Exceptions for the non-inclusion of bikeways and walkways shall be approved by a senior manager and be documented with supporting data that indicates the basis for the decision.

    - designing facilities to the best currently available standards and guidelines. The design of facilities for bicyclists and pedestrians should follow design guidelines and standards that are commonly used, such as the AASHTO Guide for the Development of Bicycle Facilities, AASHTO's A Policy on Geometric Design of Highways and Streets, and the ITE Recommended Practice "Design and Safety of Pedestrian Facilities".

Policy Approach
"Rewrite the Manuals" Approach

Manuals that are commonly used by highway designers covering roadway geometrics, roadside safety, and bridges should incorporate design information that integrates safe and convenient facilities for bicyclists and pedestrians -- including people with disabilities - into all new highway construction and reconstruction projects.

In addition to incorporating detailed design information - such as the installation of safe and accessible crossing facilities for pedestrians, or intersections that are safe and convenient for bicyclists - these manuals should also be amended to provide flexibility to the highway designer to develop facilities that are in keeping with transportation needs, accessibility, community values, and aesthetics. For example, the Portland Pedestrian Design Guide (June 1998) applies to every project that is designed and built in the city, but the Guide also notes that:

"Site conditions and circumstances often make applying a specific solution difficult. The Pedestrian Design Guide should reduce the need for ad hoc decision by providing a published set of guidelines that are applicable to most situations. Throughout the guidelines, however, care has been taken to provide flexibility to the designer so she or he can tailor the standards to unique circumstances. Even when the specific guideline cannot be met, the designer should attempt to find the solution that best meets the pedestrian design principles described [on the previous page]"

In the interim, these manuals may be supplemented by stand-alone bicycle and pedestrian facility manuals that provide detailed design information addressing on-street bicycle facilities, fully accessible sidewalks, crosswalks, and shared use paths, and other improvements.

Examples: Florida DOT has integrated bicycle and pedestrian facility design information into its standard highway design manuals and New Jersey DOT is in the process of doing so. Many States and localities have developed their own bicycle and pedestrian facility design manuals, some of which are listed in the final section of this document.

Applying Engineering Judgement to Roadway Design

In rewriting manuals and developing standards for the accommodation of bicyclists and pedestrians, there is a temptation to adopt "typical sections" that are applied to roadways without regard to travel speeds, lane widths, vehicle mix, adjacent land uses, traffic volumes and other critical factors. This approach can lead to inadequate provision on major roads (e.g. a four foot bike lane or four foot sidewalk on a six lane high-speed urban arterial) and the over-design of local and neighborhood streets (e.g. striping bike lanes on low volume residential roads) , and leaves little room for engineering judgement.

After adopting the policy that bicyclists and pedestrians (including people with disabilities) will be fully integrated into the transportation system, State and local governments should encourage engineering judgement in the application of the range of available treatments.

For example:

Collector and arterial streets shall typically have a minimum of a four foot wide striped bicycle lane, however wider lanes are often necessary in locations with parking, curb and gutter, heavier and/or faster traffic.

Collector and arterial streets shall typically have a minimum of a five foot sidewalk on both sides of the street, however wider sidewalks and landscaped buffers are necessary in locations with higher pedestrian or traffic volumes, and/or higher vehicle speeds. At intersections, sidewalks may need to be wider to accommodate accessible curb ramps.

Rural arterials shall typically have a minimum of a four foot paved shoulder, however wider shoulders (or marked bike lanes) and accessible sidewalks and crosswalks are necessary within rural communities and where traffic volumes and speeds increase.

This approach also allows the highway engineer to achieve the performance goal of providing safe, convenient, and comfortable travel for bicyclists and pedestrians by other means. For example, if it would be inappropriate to add width to an existing roadway to stripe a bike lane or widen a sidewalk, traffic calming measures can be employed to reduce motor vehicle speeds to levels more compatible with bicycling and walking.

Actions

The United States Department of Transportation encourages States, local governments, professional associations, other government agencies and community organizations to adopt this Policy Statement as an indication of their commitment to accommodating bicyclists and pedestrians as an integral element of the transportation system. By so doing, the organization or agency should explicitly adopt one, all, or a combination of the various approaches described above AND should be committed to taking some or all of the actions listed below as appropriate for their situation.

Define the exceptional circumstances in which facilities for bicyclists and pedestrians will NOT be required in all transportation projects.

Adopt new manuals, or amend existing manuals, covering the geometric design of streets, the development of roadside safety facilities, and design of bridges and their approaches so that they comprehensively address the development of bicycle and pedestrian facilities as an integral element of the design of all new and reconstructed roadways.

Adopt stand-alone bicycle and pedestrian facility design manuals as an interim step towards the adoption of new typical sections or manuals covering the design of streets and highways.

Initiate an intensive re-tooling and re-education of transportation planners and engineers to make them conversant with the new information required to accommodate bicyclists and pedestrians. Training should be made available for, if not required of, agency traffic engineers and consultants who perform work in this field.

Conclusion

There is no question that conditions for bicycling and walking need to be improved in every community in the United States; it is no longer acceptable that 6,000 bicyclists and pedestrians are killed in traffic every year, that people with disabilities cannot travel without encountering barriers, and that two desirable and efficient modes of travel have been made difficult and uncomfortable.

Every transportation agency has the responsibility and the opportunity to make a difference to the bicycle-friendliness and walkability of our communities. The design information to accommodate bicyclists and pedestrians is available, as is the funding. The United States Department of Transportation is committed to doing all it can to improve conditions for bicycling and walking and to make them safer ways to travel.

Further Information and Resources

General Design Resources

A Policy on Geometric Design of Highways and Streets, 1994 (The Green Book). American Association of State Highway and Transportation Officials (AASHTO), P.O. Box 96716, Washington, DC, 20090-6716, Phone: (888) 227-4860.

Highway Capacity Manual, Special Report 209, 1994. Transportation Research Board, Box 289, Washington, DC 20055, Phone: (202) 334-3214. Next Edition: FHWA Research Program project has identified changes to HCM related to bicycle and pedestrian design.

Manual on Uniform Traffic Control Devices, 1988. Federal Highway Administration (FHWA), Superintendent of Documents. P.O. Box 371954, Pittsburgh, PA 15250-7954. Next Edition: 2000, will incorporate changes to Part IX that will soon be subject of Notice of Proposed Rulemaking.

Flexibility in Highway Design, 1997. FHWA. HEP 30, 400 Seventh Street SW, Washington, DC 20590.

Pedestrian Facility Design Resources

Design and Safety of Pedestrian Facilities, A Recommended Practice, 1998. Institute of Transportation Engineers, 525 School Street, S.W, Suite 410, Washington, DC 20024-2729, Phone: (202) 554-8050.

Pedestrian Compatible Roadways-Planning and Design Guidelines, 1995. Bicycle / Pedestrian Transportation Master Plan, Bicycle and Pedestrian Advocate, New Jersey Department of Transportation, 1035 Parkway Avenue, Trenton, NJ 08625, Phone: (609) 530-4578.

Improving Pedestrian Access to Transit: An Advocacy Handbook, 1998. Federal Transit Administration / WalkBoston. NTIS, 5285 Port Royal Road, Springfield, VA 22161.

Planning and Implementing Pedestrian Facilities in Suburban and Developing Rural Areas, Report No. 294A, Transportation Research Board, Box 289, Washington, DC 20055, Phone: (202) 334-3214.

Pedestrian Facilities Guidebook, 1997. Washington State Department of Transportation, Bicycle and Pedestrian Program, P.O. Box 47393, Olympia, WA 98504.

Portland Pedestrian Design Guide, 1998. Portland Pedestrian Program, 1120 SW Fifth Ave, Room 802; Portland, OR 97210. (503) 823-7004.

* Implementing Pedestrian Improvements at the Local Level, 1999. FHWA, HSR 20, 6300 Georgetown Pike, McLean, VA .

* AASHTO Guide to the Development of Pedestrian Facilities, 2000. AASHTO. (currently under discussion)

Bicycle Facility Design Resources

Guide for the Development of Bicycle Facilities, 1999., American Association of State Highway and Transportation Officials (AASHTO), P.O. Box 96716, Washington, DC, 20090-6716, Phone: (888) 227-4860.

Implementing Bicycle Improvements at the Local Level, (1998), FHWA, HSR 20, 6300 Georgetown Pike, McLean, VA .

Bicycle Facility Design Standards, 1998. City of Philadelphia Streets Department, 1401 JFK Boulevard, Philadelphia, PA 19103.

Selecting Roadway Design Treatments to Accommodate Bicyclists, 1993. FHWA, R&T Report Center, 9701 Philadelphia Ct, Unit Q; Lanham, MD 20706. (301) 577-1421 (fax only)

North Carolina Bicycle Facilities Planning and Design Guidelines, 1994. North Carolina DOT, P.O. Box 25201, Raleigh, NC 27611. (919) 733-2804.

Bicycle Facility Planning, 1995. Pinsof & Musser. American Planning Association, Planning Advisory Service Report # 459. American Planning Association, 122 S. Michigan Ave, Suite 1600; Chicago, IL 60603.

Florida Bicycle Facilities Planning and Design Manual, 1994. Florida DOT, Pedestrian and Bicycle Safety Office, 605 Suwannee Street, Tallahassee, FL 32399.

Evaluation of Shared-use Facilities for Bicycles and Motor Vehicles, 1996. Florida DOT, Pedestrian and Bicycle Safety Office, 605 Suwannee Street, Tallahassee, FL 32399.

Bicycle and Pedestrian Design Resources

Oregon Bicycle and Pedestrian Plan, 1995. Oregon Department of Transportation, Bicycle and Pedestrian Program, Room 210, Transportation Building, Salem, OR 97310, Phone: (503) 986-3555

Improving Conditions for Bicyclists and Pedestrians, A Best Practices Report, 1998. FHWA, HEP 10, 400 Seventh Street SW, Washington, DC 20590.

Traffic Calming Design Resources

Traffic Calming: State of the Practice. 1999. Institute of Transportation Engineers, 525 School Street, SW, Suite 410; Washington, DC 20024.

Florida Department of Transportation's Roundabout Guide. Florida Department of Transportation, 605 Suwannee St., MS-82, Tallahassee, FL 23299-0450.

National Bicycling and Walking Study. Case Study # 19, Traffic Calming and Auto-Restricted Zones and other Traffic Management Techniques-Their Effects on Bicycling and Pedestrians, Federal Highway Administration (FHWA).

Traffic Calming (1995), American Planning Association, 122 South Michigan Avenue, Chicago, IL 60603

Traditional Neighborhood Development Street Design Guidelines, 1997. Proposed Recommended Practice, Institute of Transportation Engineers, 525 School Street, SW, Suite 410; Washington, DC 20024.

Making Streets that Work, City of Seattle, 600 Fourth Ave., 12th Floor, Seattle, WA 98104-1873, Phone: (206) 684-4000, Fax: (206) 684-5360.

Traffic Control Manual for In-Street Work, 1994. Seattle Engineering Department, City of Seattle, 600 4th Avenue, Seattle, WA 98104-6967, Phone: (206) 684-5108.

ADA-related Design Resources

Accessible Pedestrian Signals, 1998. U.S. Access Board 1331 F Street NW, Suite 1000; Washington, DC 20004. (800) 872-2253.

Accessible Rights of Way: A Design Manual,1999. U.S. Access Board, 1331 F Street NW, Suite 1000; Washington, DC 20004. (800) 872-2253.

Designing Sidewalks and Trails for Access, Part One. 1999. FHWA, HEPH-30, 400 Seventh Street SW, Washington, DC 20590.

ADA Accessibility Guidelines for Buildings and Facilities, 1998 (ADAAG). U.S. Access Board, 1331 F Street NW, Suite 1000; Washington, DC 20004. (800) 872-2253.

Uniform Federal Accessibility Standards, 1984 (UFAS), available from the U.S. Access Board, 1331 F Street NW, Suite 1000; Washington, DC 20004. (800) 872-2253

Universal Access to Outdoor Recreation: A Design Guide, 1993. PLAE, Inc, MIG Communications, 1802 Fifth Street, Berkeley, CA 94710. (510) 845-0953.

Recommended Street Design Guidelines for People Who Are Blind or Visually Impaired. American Council of the Blind, 1155 15th Street NW, Suite 720; Washington, DC 20005. (202) 467-5081.

Trail Design Resources

Trails for the 21st Century, 1993. Rails to Trails Conservancy, 1100 17th Street NW, 10th Floor, Washington DC 20036. (202) 331-9696.

Greenways: A Guide to Planning, Design, and Development, 1993. The Conservation Fund. Island Press, 1718 Connecticut Ave NW, Suite 300; Washington, DC 20009.

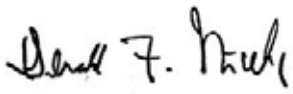
Trail Intersection Design Guidelines, 1996. Florida Department of Transportation, 605 Suwannee St., MS-82, Tallahassee, FL 23299-0450.

* Indicates publication not yet available

APPENDIX B

TDOT's Bicycle and Pedestrian Policy

Source: www.pedbikeimages.org/Dan Burden

TDOT **DEPARTMENTAL POLICY** **State of Tennessee** **Department of Transportation**	**Policy Number : 530-01** **Effective Date:** **September 1, 2004**
Approved By: 	**Supersedes:**
SUBJECT: Bicycle and Pedestrian Policy	

RESPONSIBLE OFFICE: Planning Division, Bicycle and Pedestrian Coordinator

AUTHORITY: TCA 4-3-2303

If any portion of this policy conflicts with applicable state or federal laws or regulations, that portion shall be considered void. The remainder of this policy shall not be affected thereby and shall remain in full force and effect.

PURPOSE: It is the intent of the Department of Transportation to promote and facilitate the increased use of non-motorized modes of transportation, including developing facilities for the use of pedestrians and bicyclists and promoting public education, and safety programs for using such facilities.

APPLICATION: Department of Transportation employees involved in the planning, design and construction of projects, as well as, consultants and contractors participating in the same.

DEFINITIONS: None

POLICY:
The policy of the Department of Transportation is to routinely integrate bicycling and walking options into the transportation system as a means to improve mobility and safety of non-motorized traffic. This policy pertains to both bicycle and pedestrian facilities.

Bicycle:
TDOT is committed to the development of the transportation infrastructure, improving conditions for bicycling through the following actions:

- Provisions for bicycles will be integrated into new construction and reconstruction of roadway projects through design features appropriate for the context and function of the transportation facility.

- The design and construction of new facilities should anticipate likely future demand for bicycling facilities and not preclude the provision of future improvements.
- Addressing the need for bicyclists to cross corridors as well as travel along them, the design of intersections and interchanges should accommodate bicyclists in a manner that is accessible and convenient.
- The design of facilities for bicyclists will follow design guidelines and standards as developed by the department.
- The measurement of usable shoulder width does not include the width of a gutter pan.
- Where shoulders with rumble strips are installed, a minimum clear path of 4 feet of smooth shoulder is to be provided.
- In cases where a minimum shoulder width of 4 feet cannot be obtained, such as in restrictive urban areas, an increased curb lane width will better accommodate bicycles and motor vehicles within the shared roadway. The recommended width for shared use in a wide curb lane is 14 feet.

Pedestrian:

TDOT is committed to the development of the transportation infrastructure, improving conditions for walking through the following actions:

- In urbanized areas, sidewalks or other types of pedestrian travel ways should be established in new construction or reconstruction projects, unless one or more of the conditions for exception are met as described in this policy.
- The design and construction of new facilities should anticipate likely future demand for walking facilities and not preclude the provision of future improvements.
- Addressing the need for pedestrians to cross corridors as well as travel along them, the design of intersections and interchanges should accommodate pedestrians in a manner that is accessible and convenient.
- The design of facilities for pedestrians will follow design guidelines and standards as developed by the department.
- Provisions for pedestrians will be integrated into new construction and reconstruction projects through design features appropriate for the context and function of the transportation facility.
- Pedestrian facilities must be designed to accommodate persons with disabilities in accordance with the access standards required by the Americans with Disabilities Act (ADA). Sidewalks, shared use paths, street crossings (including over- and under-crossings) and other infrastructure must be constructed so that all pedestrians, including people with disabilities, can travel independently.

Exceptions:

There are conditions where it is generally inappropriate to provide bicycle and pedestrian facilities. These instances include:

1. Facilities where bicyclists and pedestrians are prohibited by law, such as interstates, from using the roadway. In this instance, a greater effort may be necessary to accommodate bicyclists elsewhere within the same transportation corridor.

2. The cost of providing bicycle and pedestrian facilities would be excessively disproportionate to the need or probable use. Excessively disproportionate is defined as exceeding twenty (20%) of the cost of the project.
3. Bridge Replacement/ Rehabilitation projects funded with Highway Bridge Replacement and Rehabilitation Program (HBRRP) funds on routes where no pedestrian or bicycle facilities have been identified in a plan advanced to the stage of having engineering drawings nor any state bridge maintenance funded projects.

4. Other factors where there is a demonstrated absence of need or prudence.
   Exceptions for not accommodating bicyclists and pedestrians in accordance with this policy will be documented describing the basis for the exception. For exceptions on Federal-aid highway projects, concurrence from the Federal Highway Administration must be obtained.

5. Facilities for bicyclists and pedestrians which conflict with local municipality plans to accommodate bicycles and pedestrians or as requested by the Commissioner of the Department of Transportation.

APPENDIX C
Sample Complete Street Policies

Complete Streets Resolution

In communities across the country, a movement is growing to ***complete the streets***. States, cities and towns are asking their planners, engineers and designers to build road networks that welcome all citizens.

COMPLETE STREETS are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and bus riders of all ages and abilities are able to safely move along and across a complete street, which is part of an integrated and connected network.

WHEREAS, the Federal Highway Administration (FHWA) in its February 24, 1999 Policy statement, "Guidance on the Bicycle and Pedestrian Provisions of the Federal-Aid Program," urges states to include bicycle and pedestrian accommodations routinely in their programmed highway projects; and

WHEREAS, bicycle and pedestrian projects and programs are eligible for funding from almost all of the major Federal-aid transportation funding programs; and

WHEREAS, the recently signed federal transportation bill (SAFETEA - LU) calls for the mainstreaming of bicycle and pedestrian projects into the planning, design and operation of our Nation's transportation system;

WHEREAS, the 2005 Jackson Community Comprehensive Plan encourages all communities to be walkable and bike-friendly; and

WHEREAS, in 2004 crashes involving bicyclists and pedestrians represented nearly 13 percent of the traffic fatalities in the U.S.; and

WHEREAS, the City of Jackson is strongly committed to improving conditions for walking and bicycling; and

WHEREAS, walking and bicycling are excellent forms of recreation that can lead to improved health and physical fitness; and

WHEREAS, walking and bicycling and transit are environmentally sound and offer the potential for cleaner air, reduced traffic congestion and noise; and

WHEREAS, walking and bicycling and transit are affordable forms of transportation that are less reliant on fossil fuels;

NOW, THEREFORE, BE IT RESOLVED that the Jackson City Council, in meeting duly assembled this __ day of _____ 2006, affirms that bicycling and walking accommodations using the latest design standards should be a routine part of the City's planning, design, construction, maintenance, and operating activities, and will be included in the everyday operations of our transportation system.

RESOLUTION NO. 2008- 49

A RESOLUTION

TO ENDORSE AND SUPPORT A COMPLETE STREETS POLICY TO PROVIDE SAFE AND CONVENIENT ACCESS FOR ALL USERS OF STREETS.

WHEREAS, on April 24th, 2006, Resolution 2006-32, Greenville City Council adopted the "Action Plan" to make the City of Greenville a "Bicycle Friendly Community"; and

WHEREAS, increasing walking and bicycling offers the potential for cleaner air, greater health of the population, reduced traffic congestion, more livable communities, less reliance on fossil fuels and their foreign supply sources and more efficient use of road space and resources; and

WHEREAS, the City of Greenville's Downtown Master Plan and Comprehensive Plan call for the planning and development of accessible transportation networks and multi-modal land-use with transportation choices; and

WHEREAS, the City of Greenville's Design and Specifications Manual requires that the inclusion of landscaping, bicycle and pedestrian oriented facilities be included with new and reconstructed roadways; and

WHEREAS, in 2006 crashes involving bicyclists and pedestrians represented eighteen (18%) percent of the traffic fatalities in Greenville County and in 2006 crashes involving bicyclists and pedestrians represented fourteen (14%) percent of the traffic fatalities in South Carolina; and

WHEREAS, the City of Greenville is strongly committed to improving travel conditions and travel choices for people of all ages & abilities; and

WHEREAS, the Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU) calls for the mainstreaming of bicycle and pedestrian projects into the planning, design and operation of our nation's transportation system; and

WHEREAS, bicycle and pedestrian projects and programs are eligible for funding from almost all of the major Federal-aid funding programs; and

WHEREAS, the City of Greenville affirms that bicycling and walking accommodations should be an integral part of planning, design, construction and operating activities, and will be included in the everyday operations of our transportation system; and

WHEREAS, the City of Greenville endorses the Complete Streets Policy by encouraging the design, operation and maintenance of the transportation network to promote safe and convenient access for all users in a manner consistent with, and supportive of, the surrounding community; and

WHEREAS, the City of Greenville endorses policies and procedures with the construction, reconstruction or other changes of transportation facilities on streets to support the creation of Complete Streets including capital improvements, re-channelization projects and major maintenance, recognizing that all streets are different and in each case user needs must be balanced.

NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COUNCIL OF THE CITY OF GREENVILLE, SOUTH CAROLINA that the City endorses and supports the Complete Streets Policy as follows:

1. City staff shall enforce existing policies, provide guiding principles and create operating practices as deemed appropriate and if feasible so that transportation systems are planned, designed, constructed and operated to make bicycling and pedestrian movements an integral part of the City's transportation planning and programming while promoting safe operations for all users.

2. City staff shall plan for, design, construct and operate all new City transportation improvement projects to provide appropriate accommodation for pedestrians, bicyclists, transit riders, and persons of all abilities, while promoting safe operation for all users, as deemed appropriate and if feasible.

3. City staff shall incorporate Complete Streets principles into transportation strategic planning, transportation plans, manuals, rules, regulations and programs as deemed appropriate and if feasible.

RESOLVED THIS 24 DAY OF NOVEMBER, 2008.

MAYOR

Attest:

CITY CLERK

ATTACHMENT A

ORDINANCE NO. _____

AN ORDINANCE OF THE CITY OF REDMOND, WASHINGTON IN ORDER TO ADOPT "COMPLETE STREET" LEGISLATION IN REDMOND'S MUNICIPAL CODE TO ENSURE THAT ALL TRANSPORTATION PROJECTS INCLUDE SAFE AND APPROPRIATE FACILITIES FOR PEDESTRIANS, BICYCLISTS, TRANSIT USERS, AND PERSONS OF ALL ABILITIES; ADDING A NEW CHAPTER 12.06 TO THE REDMOND MUNICIPAL CODE; PROVIDING FOR SEVERABILITY AND ESTABLISHING AN EFFECTIVE DATE.

WHEREAS, walking and biking are non-motorized travel modes that enhance health through physical activity and help to reduce air pollution; and

WHEREAS, the Comprehensive Plan Goals include providing safe and environmentally friendly transportation, as well as emphasizing transportation choices; and

WHEREAS, Comprehensive Plan Framework Policy FW-32 directs the City to promote mobility choices by developing a range of practical transportation alternatives through increased investment in alternative modes and projects that emphasize safety and efficiency; and

WHEREAS, the Comprehensive Plan Transportation Element places the highest priority for allocating transportation resources on addressing public health and safety concerns and provides policy guidance for the implementation of the Pedestrian and Bicycle Plans contained in the Transportation Master Plan in order to create a system of pedestrian and bicycle facilities; and

WHEREAS, the City of Redmond's Transportation Master Plan places particular emphasis on creating streets throughout Redmond that accommodate pedestrians, bicyclists, and transit users and allow for seamless interconnections between all modes; and

WHEREAS, the 2007 Redmond Community Indicators Report states that in a survey of Redmond residents, "nearly half of the 417 respondents believe that the City should emphasize pedestrian safety and walk ability citywide more than it already does", NOW, THEREFORE,

THE CITY COUNCIL OF THE CITY OF REDMOND, WASHINGTON DO ORDAIN AS FOLLOWS:

Section 1. A new chapter 12.06 is hereby added to the Redmond Municipal Code to read as follows:

Chapter 12.06
Complete the Streets

Sections:

12.06.10 Complete the Streets

The City of Redmond will plan for, design and construct all new transportation projects to provide appropriate accommodation for bicyclists, pedestrians, transit users and persons of all abilities in comprehensive and connected networks.

Section 12.06.20 Exceptions

Facilities for bicyclists, pedestrians, transit users and/or people of all abilities are not required to be provided:

(a) Where their establishment would be contrary to public health and safety;
(b) Where there is no identified long-term need; or
(c) Where the Public Works Director grants a documented exception which may only be authorized in specific situations where conditions warrant. Such site-specific exceptions shall not constitute general changes to the standards set in RMC 12.06.10.

Section 2. If any section, sentence, clause, or phrase of this ordinance should be held to be invalid or unconstitutional by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, sentence,

clause or phrase of this ordinance.

Section 3. This ordinance, being an administrative action, is not subject to referendum and shall take effect five days after passage and publication of an approved summary thereof consisting of the title.

CITY OF REDMOND

_____
MAYOR ROSEMARIE IVES

ATTEST/AUTHENTICATED:

_____
CITY CLERK, MALISA FILES

APPROVED AS TO FORM:
OFFICE OF THE CITY ATTORNEY

BY: _____

FILED WITH THE CITY CLERK:
PASSED BY THE CITY COUNCIL:
PUBLISHED:
EFFECTIVE:
ORDINANCE NO.: _____

Complete Streets legislation for the county of Erie, NY (similar legislation was passed in the city of Buffalo)

A RESOLUTION TO BE SUBMITTED BY LEGISLATORS IANNELLO, WHYTE AND REYNOLDS RE: INTEGRATING BICYCLING AND WALKING INTO TRANSPORTATION, CLIMATE, ENERGY, SAFETY AND HEALTH POLICY ISSUES, DEFINED AS 'COMPLETE STREETS'

WHEREAS, national health organizations, environmental agencies, and physical fitness activists believe increased bicycling and walking to be of national interest not only for health purposes, but also as a mode of transportation; and

WHEREAS, the development of transportation, environmental and public health policies promoting bicycling and walking as a means of transportation should be the concern of local, county, and state governments; and

WHEREAS, persons with disabilities, pedestrians, bicyclists, motorists and transit riders should be able to safely move along and across a 'complete street;' and

WHEREAS, complete streets are defined as facilities that are designed and operated to enable safe access for all users comprehensive across the life span for both recreational and transportation; and

WHEREAS, a complete street is one that has improved safety conditions that encourages users to reduce the number of motor vehicle miles traveled whenever possible through increased use of bicycling or walking trips; and

WHEREAS, the County of Erie is in concert with this philosophy for the safety, health and environmental integrity of all residents visitors and the community as a whole; and

WHEREAS, school aged youth ages 5 to 17 years old (2006), represents an astonishing 29.4% of the total percentage of bicyclists and 19.8% of pedestrians both injured and killed in New York State; and

WHEREAS, New York State should designate its percentage of safety dollars to be commensurate with the percentage of traffic related deaths that are pedestrians and bicyclist; and

WHEREAS, increased bicycling and walking trips will not only help to reduce the carbon footprint in America, but it is aimed at the 65% of US adults who are overweight; and

WHEREAS, bicycle commuters save annually on average $1,825 in auto related costs, carbon emissions by 128 pounds, conserve 145 gallons of gasoline and avoid 50 hours of gridlock traffic; and

WHEREAS, we are a nation of over 300 million people with an expected number of 365 million people by 2030, and 465 million by 2050; and

WHEREAS, the vast majority of that growth is occurring in urban areas where there are significant limitations on accommodating increased motor vehicle travel; and

WHEREAS, over 200 cities in the United States, representing 35 million people, have committed to action plans to increase bicycling and walking as a mode of transportation utilizing health and quality of life as a performance measure; and

WHEREAS, a national network of interconnected urban and rural bikeways can provide valuable community benefits, including low cost recreation and alternative transportation options for people of all ages; and

WHEREAS, such networking designs must include safe and expanded areas for bicycles and pedestrians and can begin on the local level of government policy.

NOW, THEREFORE, BE IT RESOLVED, that Erie County join in concert with the 200 US cities to implement a bicycle and pedestrian friendly action plan to achieve the intended goals of good health, improved safety, lesson the carbon imprint and increase bicycling and walking as a standard mode of transportation; and be it further

RESOLVED, that the Erie County Commissioner of Public Works shall include pedestrian and bicycle facilities in all new street construction, street reconstruction and park projects undertaken by the County of Erie, where feasible; and be it further

RESOLVED, that this only take place if bicyclists and pedestrians are not prohibited by law from using the facility; and be it further

RESOLVED, that if the cost of establishing pedestrian or bicycle facilities would be excessively disproportionate to the need or probable use, meaning that if the additional cost exceeds more than 20% of the project, that such facilities be omitted from such projects; and be it further

RESOLVED, that if an existing right of way does not allow for sidewalks, bike lanes or other improvements, that alternative routes be provided; and be it further

RESOLVED, that all bicycle and pedestrian walkways be planned, designed, developed and maintained in accordance with the United States Department of Transportation, the New York State Department of Transportation and other guidelines adhered to by Erie County; and be it further

RESOLVED, that the entire focus be on improving human health, decreasing carbon emissions, enhancing safety and increasing walking and bicycle trips as a mode of transportation; and be it further

RESOLVED, that these actions will enable Erie County to become a "Clean Streets County" with "Complete Streets" policies and a leader in New York State; and be it further

RESOLVED, that we call upon or Federal and State legislators to provide incentives for local governments to adopt and implement "Complete Street" policies designed to accommodate all users; and be it further

RESOLVED, that certified copies of this resolution be sent to Senators Schumer and Clinton and our Western New York delegation in Albany.

ORDINANCE NO. 4061

AN ORDINANCE OF THE CITY OF KIRKLAND RELATING TO BICYCLE AND PEDESTRIAN WAYS ALONG TRANSPORTATION FACILITIES.

The City Council of the City of Kirkland do ordain as follows:

Section 1. The Kirkland Municipal Code is amended by the addition of a new Section 19.08.055 to read as follows:

19.08.055 Bicycle and pedestrian ways along transportation facilities.

(1) Bicycle and pedestrian ways shall be accommodated in the planning, development and construction of transportation facilities, including the incorporation of such ways into transportation plans and programs.

(2) Notwithstanding that provision of paragraph (1), bicycle and pedestrian ways are not required to be established:

(a) Where their establishment would be contrary to public safety;
(b) When the cost would be excessively disproportionate to the need or probable use;
(c) Where there is no identified need;
(d) Where the establishment would violate Comprehensive Plan policies; or
(e) In instances where a documented exception is granted by the Public Works Director.

Passed by majority vote of the Kirkland City Council in open meeting this _____ day of _____, 2006.

Signed in authentication thereof this _____ day of _____, 2006.

_____
MAYOR

Attest:

_____
City Clerk

Approved as to Form:

_____
City Attorney