

CHAPTER 7

BICYCLING, WALKING, & TRAILS: DESIGN GUIDELINES

The purpose of this chapter is to note and summarize preferred design guidelines for bicycle and pedestrian infrastructure and facilities in the SMTC area. Included in this chapter are generally accepted and representative implementation techniques for bicycle and pedestrian facilities in both New York State in particular, and the United States in general. This chapter is intended as a place for municipalities to start when trying to determine which bicycle and/or pedestrian facilities should be considered within their jurisdiction.

The first section of this chapter provides information on the most commonly utilized design guideline resources in New York State. Section 7.2 examines general design guidelines for pedestrian facilities (including broad information on the Americans with Disabilities Act), bicyclist facilities, greenways and trails, innovative treatments, traffic calming, and school zones. Section 7.3 describes additional resources that are useful in providing innovative solutions for a variety of bicycle and pedestrian related situations that may affect some local communities.

7.1 Existing Design Guideline Manuals

In New York State, several useful resources already exist for the design of bicycle, pedestrian and trail facilities. The New York State Department of Transportation (NYSDOT) and other agencies have published guidelines that can facilitate local efforts to implement better roads, shared use paths and other facilities for non-motorized travel. However, these resources are not always readily available to citizens and local officials. This document describes the most commonly used signs, pavement markings and design guidelines used in New York State. The communities in the SMTC region can use the tools provided in these guidelines to implement local pedestrian, bicycle and trail improvements.

These guidelines are based primarily on the following reference sources: NYSDOT Highway Design Manual, Manual on Uniform Traffic Control Devices (MUTCD), America Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities, and the AASHTO Guide for the Development of Pedestrian Facilities (pending publication).

These documents contain the vast majority of the design guidelines necessary for providing safe, accessible, well-designed facilities for pedestrians and bicyclists. In general, the New York State guidelines take precedence over national guidelines, while the national documents tend to include additional content on topics not specifically addressed in the New York State manuals. The SMTC library has each of these documents, which local municipalities may use while at the SMTC. Each document is briefly described on the following pages.

7.1.1 NYSDOT Highway Design Manual (Chapter 18 – Facilities for Pedestrians and Bicyclists)

Chapter 18, Facilities for Pedestrians and Bicyclists, within the NYSDOT Highway Design Manual is the primary source of bicycle and pedestrian design guidance for New York State. This chapter sets forth policy, procedures and guidelines for on and off-road facilities. It includes, on its first page (p. 18-1) the following text:

“Despite the importance of walking and bicycling, many existing streets and highways do not adequately provide for these modes of travel. Therefore, the scoping and Design Approval Documents for projects that are used by pedestrians and bicyclists should identify their needs, the objectives for meeting those needs, the design criteria, and all feasible alternatives. Designers are responsible for assuring project designs provide for safe, convenient and cost effective pedestrian and bicycle travel consistent with the objectives and design criteria developed during project scoping or preliminary design.”

Source: NYSDOT Highway Design Manual, Chapter 18 - Facilities for Pedestrians and Bicyclists, Revision 29, December 17, 1996, pg. 18-1.

The most recent version of Chapter 18 is Revision 29, dated December 17, 1996. Chapter 18 of the NYSDOT Highway Design Manual is available on-line at:

http://www.dot.state.ny.us/cmb/consult/hdmfiles/chapt_18.pdf

7.1.2 Manual on Uniform Traffic Control Devices (MUTCD)

The Manual on Uniform Traffic Control Devices (MUTCD) establishes guidelines and warrants for signage, signals and pavement markings. There is a Federal MUTCD, and New York State has its own manual (NYS MUTCD) with unique features specific to applications within the state. Examples include a hierarchy of local, regional, state and national bicycle route signage, ‘shared roadway’ bike signs, and ‘yield to pedestrians’ devices and signage. According to the Cornell Local Roads Program,

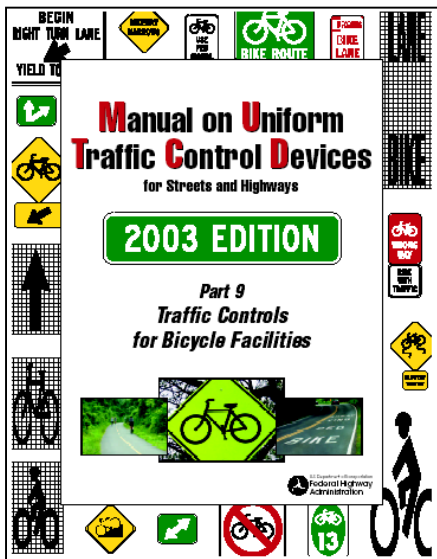
“The NYS MUTCD is found in Volume 17B of the New York Codes, Rules and Regulations. Every municipality should have a copy. Anyone who uses or occupies a highway or road for purposes other than travel and who may affect traffic is required to comply with it. It is in compliance with the federal manual, but differs in some important ways. Failure to comply with it greatly increases the legal liability of municipalities in the event of an accident.”

Source: Cornell Local Roads Program

<http://www.clrp.cornell.edu/flaggingTutorial/Lesson1.htm>

The NYS MUTCD is not available on-line, but can be purchased from West Group (1-800-344-5009 or www.westgroup.com or [NYS MUTCD \(Volume 17B of NYCRR\)](#)).

The 2003 Federal MUTCD, which applies to conditions and devices not specifically included in the NYS MUTCD is available on-line at <http://mutcd.fhwa.dot.gov/pdfs/2003/pdf-index.htm>



The Federal MUTCD is available on-line, and includes Chapter 9: Traffic Controls for Bicycle Facilities.

7.1.3 NYSDOT Highway Design Manual Chapter 25 - Traffic Calming

In addition to Chapter 18, the NYSDOT Highway Design Manual contains a chapter on traffic calming. This chapter includes a wide range of facility design guidelines for balancing the needs of pedestrians, bicyclists and motorists. The introduction to the chapter contains the following description on page 25-1:

“A <NYSDOT> Department task force developed a policy statement and guidance on traffic calming to assist Regions through the process. Section 25.2 contains the policy statement, policy scope, and the definition and background of traffic calming. Section 25.3 contains general guidance and requirements, including general considerations. Section 25.4 provides some examples of objectives that could be achieved by traffic calming. Section 25.5 lists example “test questions” to help determine if traffic calming is viable. Section 25.6 explains the applicability of traffic calming techniques, and describes the speed categories established specifically for traffic calming measures. Section 25.7 outlines the importance of community involvement and the process that should be followed. Section 25.8 covers project monitoring and its importance in evaluating the effectiveness of the project.”

Source: http://www.dot.state.ny.us/cmb/consult/hdmfiles/chapt_25.pdf

The most recent version of Chapter 25 is Revision 36, dated February 5, 1999. Chapter 25 of the NYSDOT Highway Design Manual is available on-line at: http://www.dot.state.ny.us/cmb/consult/hdmfiles/chapt_25.pdf

7.1.4 AASHTO Guides for Bicycle and Pedestrian Facilities

The American Association of State Highway and Transportation Officials (AASHTO) published a versatile and useful bicycle facility design guide, as well as a companion guide for pedestrian facilities.

AASHTO Guide for the Development of Bicycle Facilities

The most recent version of this bicycle guide is the 3rd Edition, dated 1999. The guide is described by AASHTO as follows:

“The guide is designed to provide information on the development of facilities to enhance and encourage safe bicycle travel. The majority of bicycling will take place on ordinary roads with no dedicated space for bicyclists. Bicyclists can be expected to ride on almost all roadways as well as separated shared use paths and even sidewalks, where permitted to meet special conditions. This guide provides information to help accommodate bicycle traffic in most riding environments. It is not intended to set forth strict standards, but, rather, to present sound guidelines that will be valuable in attaining good design sensitive to the needs of both bicyclists and other highway users.”

Source:

<https://www.transportation.org/publications/bookstore.nsf/ViewPublication?openform&ParentUNID=B727279D15B5225A862569AC006005E8>

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

The pedestrian guide was published in late 2004 and is described by AASHTO as follows:

“The purpose of this guide is to provide guidance on the planning, design, and operation of pedestrian facilities along streets and highways. Specifically, the guide focuses on identifying effective measures for accommodating pedestrians on public rights-of-way. Appropriate methods for accommodating pedestrians, which vary among roadway and facility types, are described in this guide. The primary audiences for this manual are planners, roadway designers, and transportation engineers, whether at the state or local level, the majority of whom make decisions on a daily basis that affect pedestrians. This guide also recognizes the profound effect that land use planning and site design have on pedestrian mobility and addresses these topics as well.”

Source:

<https://www.transportation.org/publications/bookstore.nsf/ViewPublication?openform&ParentUNID=A2D8FAA3CCED1E0F85256F0A006E35C9>

The AASHTO Guide for the Development of Bicycle Facilities (AASHTO Document #BFG-3) and the AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities (AASHTO Document #GPF-1) are not available online, but can be purchased from the AASHTO bookstore at: <https://www.transportation.org/publications/bookstore.nsf>.

7.2 General Design Guidelines

The pedestrian, bicycle and trail facility examples noted within this chapter are the minimum standards that a community or municipality should work towards achieving when installing facilities. However, there will always be exceptions and innovative solutions to certain issues such as difficult terrain or lack of right-of-way. For example, a 4-foot wide sidewalk may have to be installed in lieu of a more desirable 5-foot wide sidewalk due to a lack of space, but having a 4-foot sidewalk is most likely better than having none at all.

Local conditions in the SMTC region often include rain and snow, low visibility conditions, urban, suburban and rural locations, steep topography and high traffic arterial streets. Consistent application of signage, pavement markings and design guidelines can make these conditions safer for pedestrians, bicyclists and motorists. Paved shoulders (top left photo below) provide a simple improvement for pedestrians and bicyclists under many of these conditions.



The photos above illustrate the varying weather conditions that pedestrians and bicyclists endure in New York State (Photos: J. Olson).

7.2.1 Pedestrian Facilities

Pedestrian facilities include sidewalks, crossings, signals, Americans with Disabilities Act (ADA) compliance, signage, pavement markings and streetscape amenities such as trees, benches and lighting. The Highway Design Manual and MUTCD cover many of these issues, with an emphasis on pedestrian safety features.

Sidewalks

In many cases, sidewalks are the primary facility for pedestrians. Unfortunately, they are often treated as an “option” in many urban and suburban communities. NYSDOT’s Chapter 18 provides the following Guidelines for Installing Sidewalks in Developed Areas. Note that these are general, minimum guidelines for providing pedestrian facilities, and are often exceeded to enhance the built environment.

FACILITIES FOR PEDESTRIANS AND BICYCLISTS		
18-13		
Table 18-1 Guidelines for Installing Sidewalks in Developed Areas		
Type of Area (land use, roadway functional classification, or density of dwelling units)	Providing Sidewalks on New Urban and Suburban Streets	Providing Sidewalks on Existing Urban and Suburban Streets
Commercial and industrial and public service areas -- all streets	Developed sides of these streets	Developed sides of these streets
Residential -- arterials	Developed sides of these streets	Developed sides of these streets
Residential -- collectors	Developed sides of these streets	For multi-family dwellings – needed on developed sides of these streets. For single-family dwellings – needed on at least one side of these streets.
Residential -- streets with detached residences closer than 30 m apart	Developed sides of these streets	Desirable on both developed sides but needed on at least one side.
Residential -- streets with detached residences an average of 30 to 60 m apart	Desirable on both developed sides but needed on at least one side.	Desirable on both developed sides but needed on at least one side.
Residential -- roadways with residences further than 60 m apart (see note 5. below)	Needed on one side of these roadways, preferably the side where development occurs. See section 18.6.5	Needed on one side of these roadways, preferably the side where development occurs. See section 18.6.5

Sidewalks are generally 5 feet wide, which is based on the width required for two people to walk side-by-side. While some guidelines allow for narrower sidewalks under some conditions, the illustration from Chapter 18 of the NYS Highway Design Manual on the following page shows the preferred relationship between the sidewalk, street, and buffer zones. Please note that when designing or installing sidewalks that the sidewalks must be consistent with ADA specifications. The Americans with Disabilities Act (ADA) section of this chapter notes resources for ADA-

compliant design. In addition, design guidelines are available from the United States Department of Justice at <http://www.usdoj.gov/crt/ada/stdspdf.htm>.

Sidewalk with Offset from Street

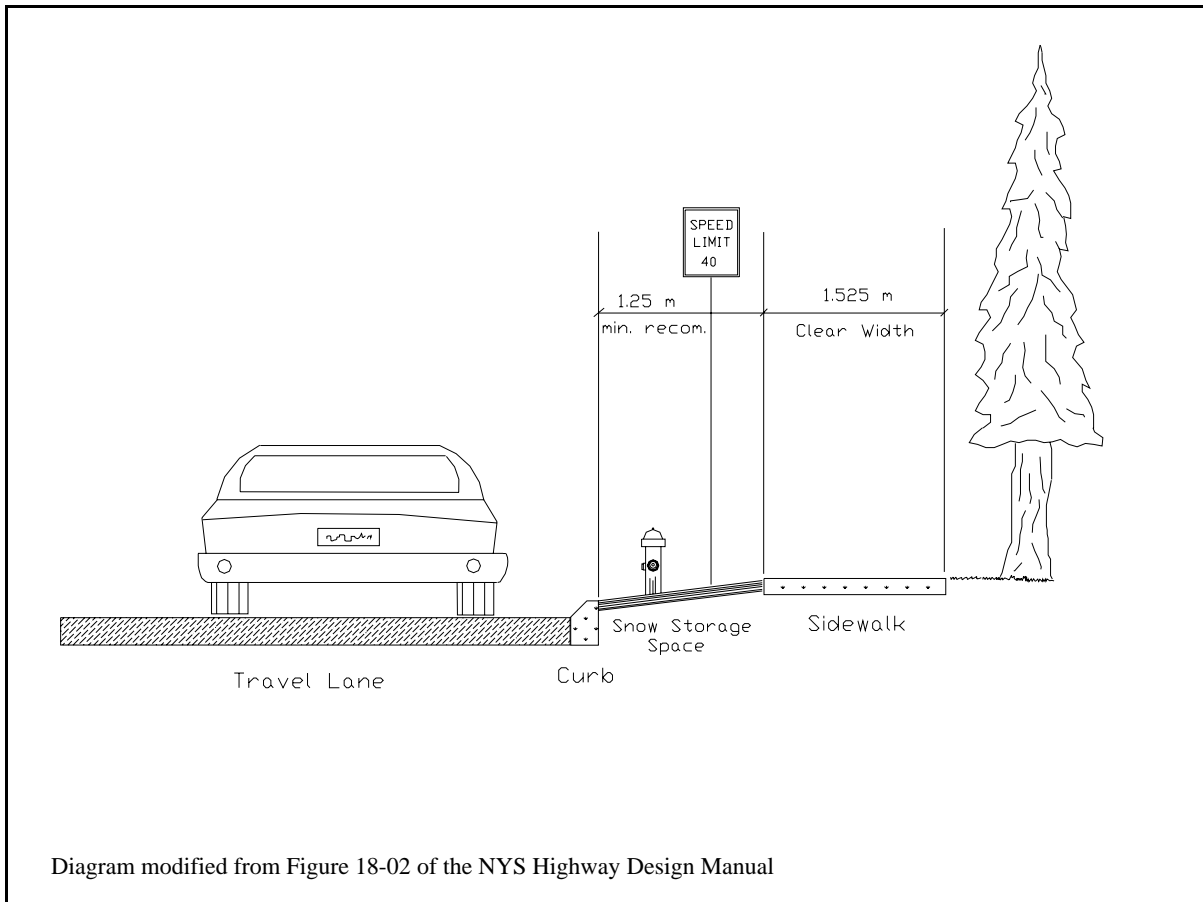
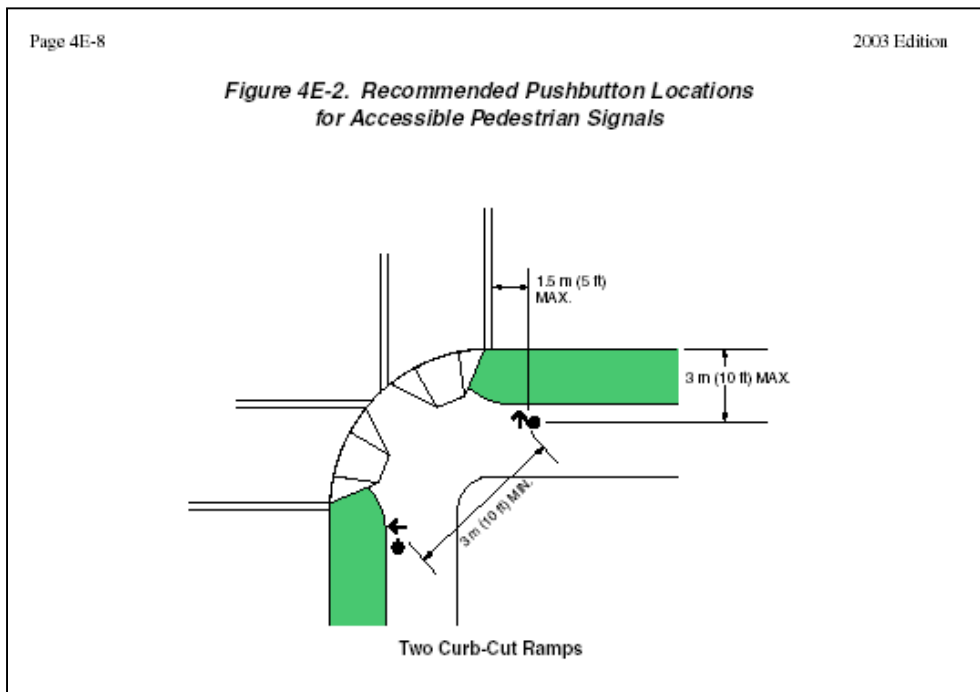
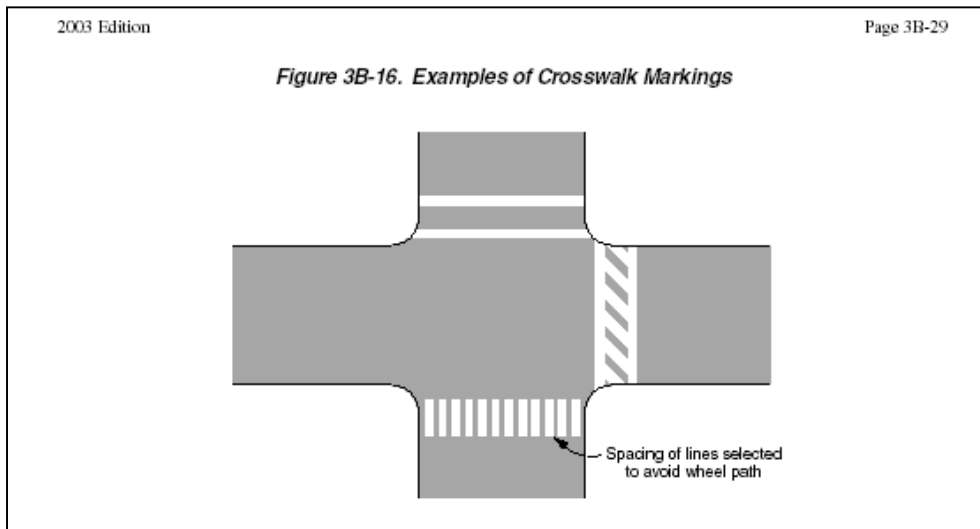


Diagram modified from Figure 18-02 of the NYS Highway Design Manual

Pedestrian Crossings

Safe, attractive and accessible crossings are essential for creating walkable communities. However, good crossings require careful coordination of a variety of factors, including grades, utilities, signals, pavement markings, ADA compliance, drainage, landscape design, sight distances and signage. The following pedestrian sections illustrate the relevant portions of current State and National Guidelines.

The US MUTCD illustrates crosswalk marking types and the placement of pedestrian push buttons at curb ramps, as shown below.



Pedestrian Signs and Signals

Each pedestrian crossing can consist of unique characteristics based on features found in the Highway Design Manual and the MUTCD. Examples include actuated signals (US MUTCD, graphic to the right); yield markings (US MUTCD, graphic below), the standard pedestrian crossing sign and arrow (top left graphic on the next page), and countdown timers (Buffalo photo by J. Olson, top right on the next page).

Figure 4E-1. Typical Pedestrian Signal Indications

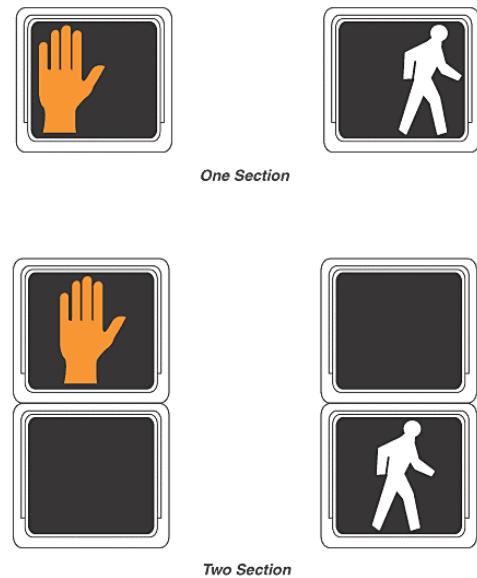
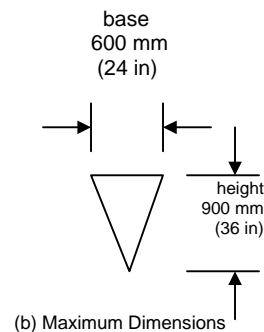
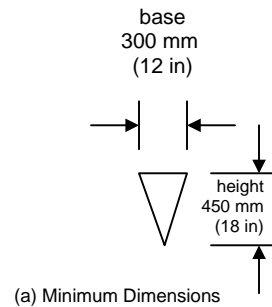
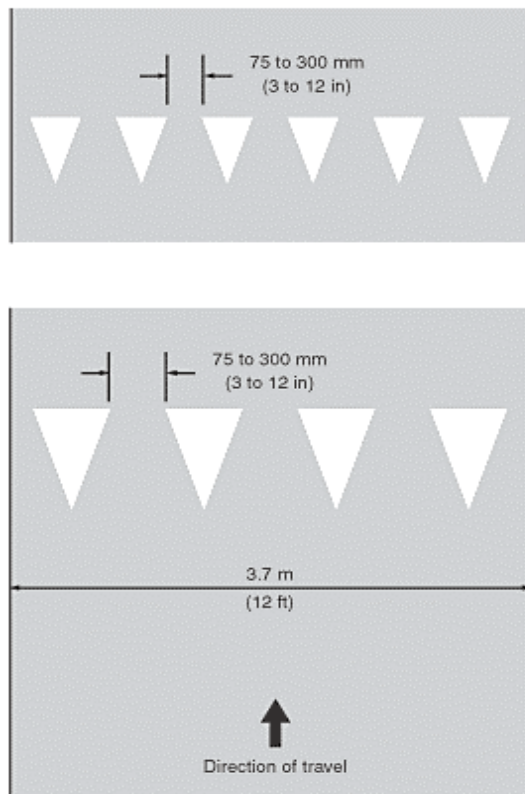


Figure 3B-14. Examples of Yield Line Layouts



Notes:
Triangle height is equal to 1.5 times the base dimension.

Yield lines may be smaller than suggested when installed on much narrower, slow-speed facilities such as shared-use paths.



Each pedestrian crossing can include unique features based on features found in the Highway Design Manual and the MUTCD. Examples include actuated signals and yield markings (shown on the previous page), and the standard pedestrian crossing sign and arrow (top left graphic) and countdown timers (Buffalo photo by J. Olson, top right). Note that pedestrian, bicycle and school zone crossings in strong fluorescent yellow-green provide enhanced visibility.

Yield to Pedestrians Signs

One of the most innovative features found in the New York State MUTCD is the “Yield to Pedestrians” signs and devices. These can be placed at intersections and mid-block crossings under conditions specified in the NYS MUTCD. These signs support the new Yield to Pedestrians section of the NYS Vehicle and traffic law, and have been shown to be an effective way to encourage motorists to yield the right of way to pedestrians in crosswalks (see signs R9-7 and R9-8 at the bottom of this page).

With the passage of a new pedestrian law, as of January 19, 2003, motorists must yield the right of way to a pedestrian who is walking in any part of a crosswalk that is in the same roadway as the motorist. The previous law indicated that motorists had to yield the right of way only when the pedestrian is on the same half of the roadway as the motorist. All of the old signs (“Yield to Pedestrian in Your Half of Crosswalk” – see photo, bottom left) need to be replaced with new signs (“Yield to Pedestrian in Crosswalk” – see photo, bottom right) reflecting the new law.

Old Pedestrian Law



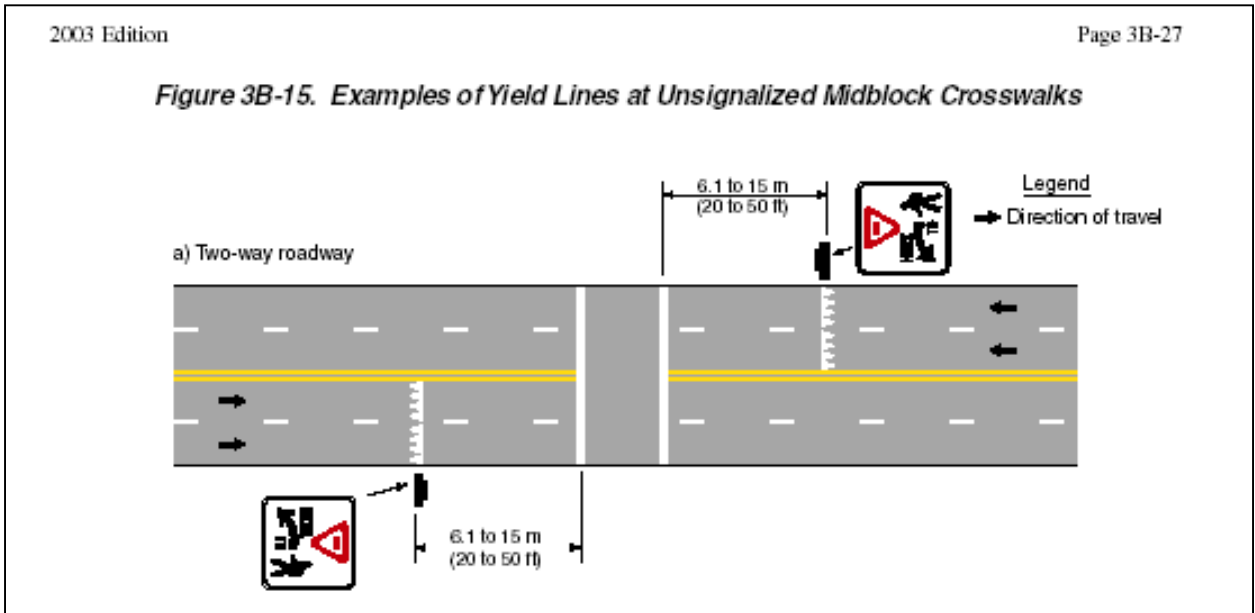
New Pedestrian Law



The signs to the right (R9-7 and R9-8) can be placed at intersections and mid-block crossings under conditions specified in the NYS MUTCD.



Figure 3B-15 from the US MUTCD (below), shows how the Yield to Pedestrian devices noted on the previous page can be combined with the new 'sharks tooth' triangular markings to provide safe mid-block pedestrian crossings.



The Americans with Disabilities Act (ADA)

The design of public infrastructure is required to comply with the Americans with Disabilities Act (ADA) of 1990. The ADA is civil rights legislation, not a just a design guideline or transportation agency regulation. NYSDOT's Highway Design Manual – Chapter 18 addresses ADA related issues, and there is a continually evolving base of information on this topic. Basic concepts included in ADA compliant design include slope, cross slope, signal timing and placement, crossing distances, visibility and auditory information to allow universal access to rights of way for people of all ages and abilities.

An excellent resource for ADA-compliant design is *Designing Sidewalks and Trails for Access*, published by the United States Department of Transportation (USDOT). This document describes the ADA compliance requirements as follows:

“...Under the ADA, services and facilities must be accessible to be nondiscriminatory, and the requirements for new construction and alterations are much more stringent than those for existing facilities. Sidewalks, and trails associated with covered services are subject to the requirements of the ADA...Newly constructed and altered sidewalks and trails should be accessible and useable by people with disabilities. In addition, covered entities are required for developing transition plans and implementing accessibility improvements, where needed, to existing facilities. High priority should be given to the accessibility of sidewalks and trails during planning and site development.”

Source: *Designing Sidewalks and Trails for Access, Best Practices Guide*, U.S. Department of Transportation, Publication No. FHWA-EP-01-027.

The most common ADA improvements are the provision of accessible curb ramps and pedestrian crossings. Excellent guidance on this topic is available from the Pedestrian and Bicycle Information Center, including the following:

“Curb ramps (wheelchair ramps) provide access between the sidewalk and roadway for people using wheelchairs, strollers, walkers, crutches, handcarts, bicycles, and also for pedestrians with mobility impairments who have trouble stepping up and down high curbs. Curb ramps must be installed at all intersections and midblock locations where pedestrian crossings exist, as mandated by federal legislation (1973 Rehabilitation Act). Wheelchair ramps must have a slope of no more than 1:12 (must not exceed 25.4 mm/0.3 m (1 in/ft) or a maximum grade of 8.33 percent), with a maximum side slope of 1:10, and must be designed in accordance with the ADA guidelines.”

Source: www.walkinginfo.org/de/curb1

Streetscape Amenities

There are numerous factors that make a street a great place to walk. Safety features are regulated by the MUTCD and the Highway Design Manual. However, there is another level of design that goes beyond these basic elements and creates a great public place. The placement and design of benches, street trees, lighting, public art, informational signage, architecture, and other factors all are part of good streetscape design. The following photos illustrate examples of the practice of streetscape design:



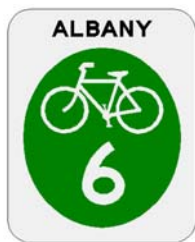
The Rochester ArtWalk (top left photo: J. Booth) shows how custom pavement patterns can create a great place; The famous Walker Evans photo (bottom left) of Saratoga Springs in 1931 shows how street trees, angled parking and architecture can define a Main Street; and the photo taken in Seattle (photo on right: J. Olson) illustrates a high level of detail with bronze street names inset into the curb ramps, and ‘piano key’ crosswalk markings designed to reduce maintenance while improving visibility – note how the gap in the marking pattern is aligned with the space where motorists and bicyclists drive through the pedestrian crossing.

7.2.2 Bicyclist Facilities

Facilities for bicyclists include paved shoulders, signed bike route systems, bike lanes, bicycle parking, signals, signage and crossings. Chapter 18 of the NYSDOT Highway Design Manual, the MUTCD and the AASHTO Guide provide guidelines for providing safe facilities. The core elements of these documents are highlighted in the following sections.

Bicycle Route Signage

For many years, bicycle routes consisted only of generic green signs which said “Bike Route.” These signs often provided very little information, and as a result, New York State has included a hierarchal system of bike facility signage that can be used to identify Local, Regional, State and National bicycle routes. These signs can be supplemented by panels that identify distance and destinations, street crossings, transit connections, and/or other information.



M6-2



M6-3



M6-4

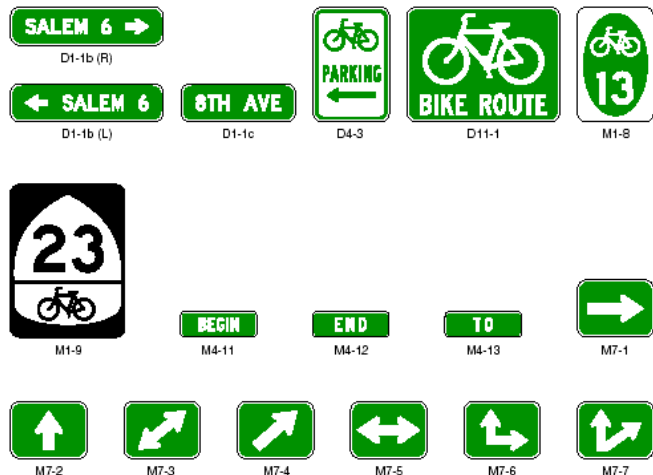


M6-5

Bike Route 5,
Onondaga County

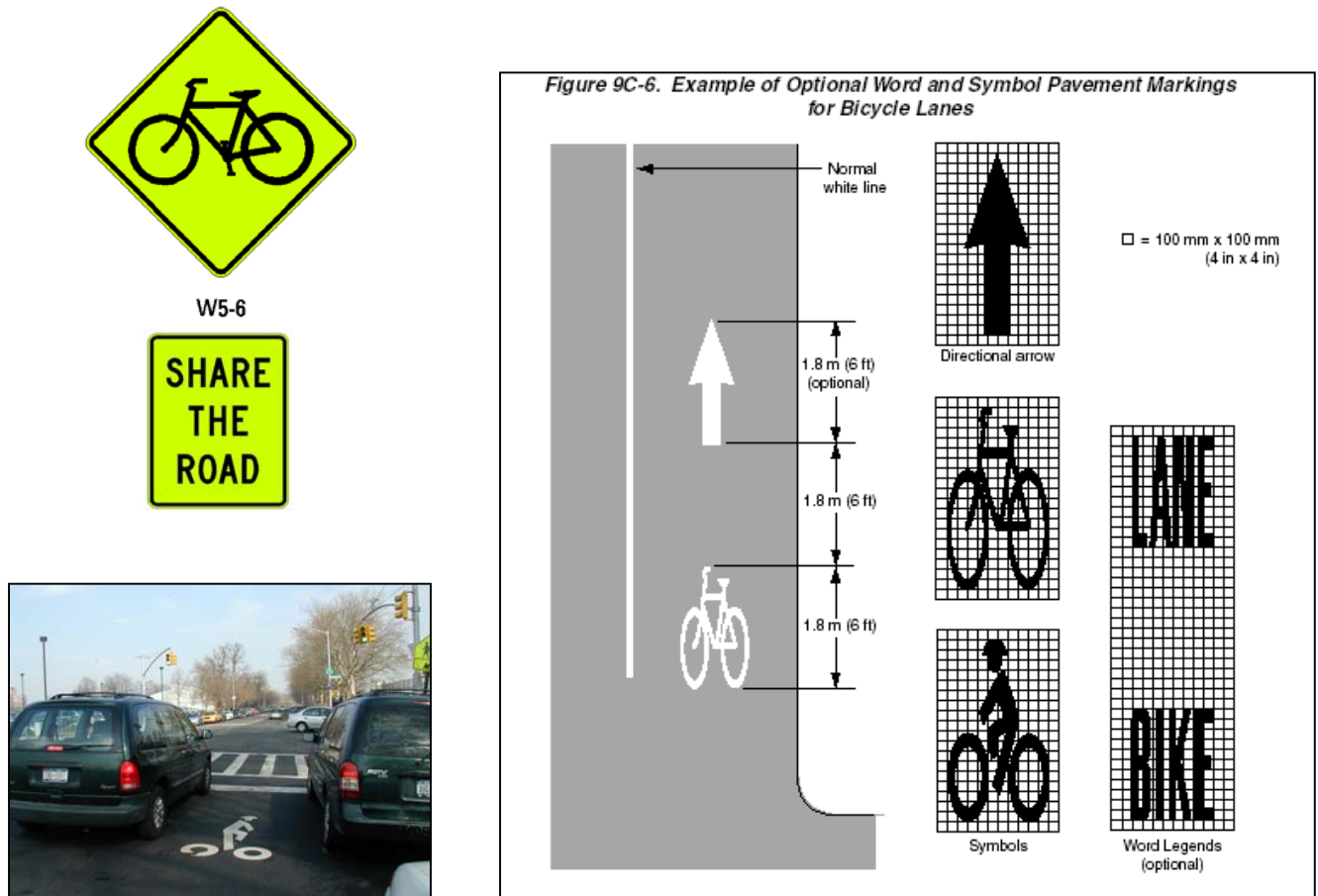


The New York State hierarchy of bicycle route signs includes local (M6-2 small green circle), regional (M6-3 green pentagon), state (M6-4 green oval) and national (M6-5 black inverted shield) route markers. These symbols can be applied in combination with supplemental panels (US MUTCD, right) to create a logical system of routes developed for bicyclists, just as a motorist has signs for local, county, state and interstate highways. Note that the state bike route sign (M6-4) shown above is utilized along State Bike Route 5 (Route 31 in Onondaga County).



On Street Bikeways

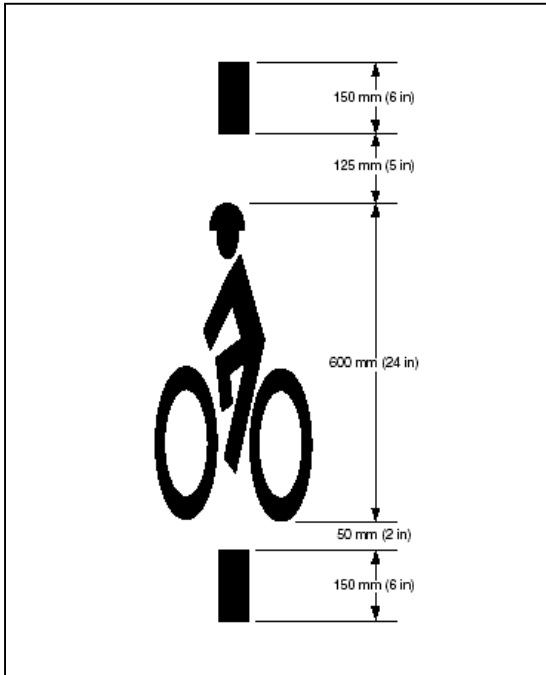
On-street bicycle facilities include a range of shared roadways, paved shoulders, signed routes and bike lanes. The existing design guidelines in New York State allow communities and regions to implement the appropriate features to meet local conditions. Examples of these treatments are illustrated below.



The NYS MUTCD is adopting the “Share the Road” signs as shown in the federal manual (top left). The bicycle symbols can be used in dedicated bike lanes (as shown in the US MUTCD, right), or as pavement markings along bicycle routes (bottom left, Bronx NY, photo: J. Olson) to indicate correct lane position and direction of travel for both motorists and bicyclists.

Note that while NY State and USDOT Guidelines provide good information on typical features, excellent sources are also available on *which* design to choose for a specific roadway based on local conditions. Fortunately, the Pedestrian and Bicycle Information Clearinghouse provides both a *Facility Selection Guide* and a *Bike Lane Design Guide*. These documents are available on line at <http://www.bicyclinginfo.org/de/index.htm>.

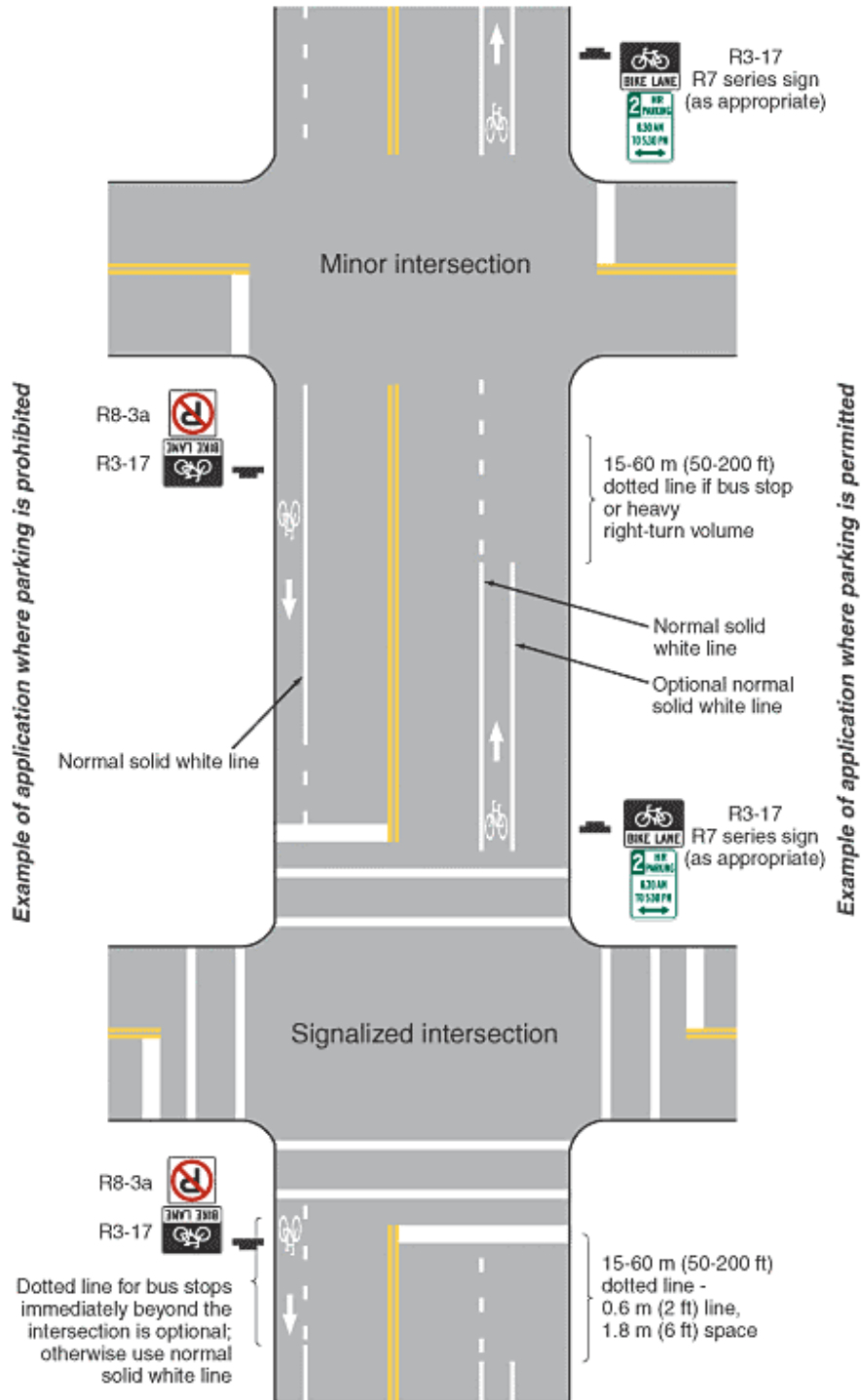
Bicycle Lanes and Signals



The US MUTCD now includes a standard symbol for marking the spot where a bicyclist should stand to activate a traffic signal sensor (US MUTCD figure 9C-7, top right Boulder, CO, photo: J. Olson). At Herald Square in New York City, Dutch – style bicycle signals are provided in the bicycle lanes (bottom right photo: J. Olson). The US MUTCD includes detailed examples of bike lane markings and signage (top left and next page).



Figure 9C-5. Example of Pavement Markings for Bicycle Lanes on a Two-Way Street



Typical Width of Bicycle Facilities

As noted previously, facilities for bicyclists can include a range of on-road facilities, such as shared roadways, paved shoulders, bike routes and bike lanes, as well as off-road facilities. Shared roadways and paved shoulders that are not marked for bicycling are also referred to as Class III facilities. Marked bike lanes and bike routes are also known as Class II facilities, and off-road facilities are also referred to as Class I facilities.

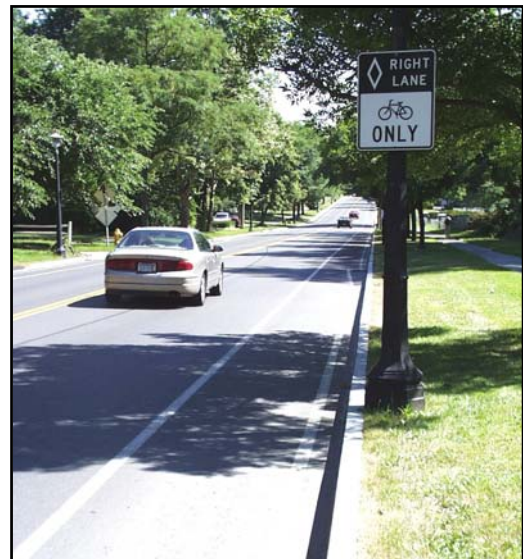
On-Street Facilities

When designing on-street bicycle facilities, it is typically suggested that the width of the facility be no less than 4 feet.

According to the ITE Transportation Planning Handbook, “A few extra feet of paved roadway shoulder can greatly benefit bicycle travel – as little as three feet of smoothly paved shoulder to the right of the edge line can enable the bicyclist to move out of the travel lane, given that this area does not include rumble strips, which make the shoulder impassable for bicyclists. Paved shoulders of four to six feet in width are preferred.”¹⁰⁵ There are several additional benefits to paved shoulders, such as added safety and easier maintenance. For a larger listing of benefits, see *Reasons for Highway Shoulders* and *Benefits of Urban Bike Lanes to Other Road Users* as prepared by Michael Ronkin (located at the end of the Recommendations Appendix). Bike lane widths should also be a minimum of 4 feet, according to the AASHTO *Guide for the Development of Bicycle Facilities*.¹⁰⁶

The City of Syracuse created its first bicycle lanes along both sides of Comstock Avenue between Colvin Street and Stratford Street in the City of Syracuse in Fall 2001 (see photo to the right)

The 4-foot wide bike lanes are designated through a series of pavement markings stating “Bike Only” at various increments along the lanes. In addition, steel posted signs indicating “Bike Lane Starts” and “Bike Lane Ends” exist at both intersections in both directions. See section 3.2 for more details on the Comstock Avenue bike lane.



For more information on on-street bicycle facilities, please go to the Design and Engineering page of the Pedestrian and Bicycling Information Center (www.bicyclinginfo.org) and click on On-Street Facilities.

¹⁰⁵ John D. Edwards (ed.), *ITE Transportation Planning Handbook*, Institute of Transportation Engineers, Washington, D.C., 2d edition, 1999, p. 608.

¹⁰⁶ AASHTO Task Force on Geometric Design, *Guide for the Development of Bicycle Facilities*, American Association of State Highway and Transportation Officials, Washington, D.C., 1999, p.22.

Off-Road Facilities

When designing off-road facilities (also referred to as shared use paths, trails, bike paths, or Class I facilities) 10 feet or 3 meters is the recommended width for a two-way shared use path on a separate right of way.¹⁰⁷

Although off-road facilities are typically considered to be the most safe for bicyclists and pedestrians (particularly for children and family use), “shared use paths are an addition, and complimentary, to the roadway network: they are not a substitute for providing access to streets and highways. Even the most extensive trail network cannot provide access to all the origins and destinations in a community, and trail users have to be able to get to and from the trail on the regular street network.”¹⁰⁸ The AASHTO Guide for the Development of Bicycle Facilities specifically notes that, “shared use paths should not be used to preclude on-road bicycle facilities but rather to supplement a system of on-road bike lanes, wide outside lanes, paved shoulders and bike routes.”¹⁰⁹

There are several other critical factors concerning trail design, which can be found at www.bicyclinginfo.org (go to the Design and Engineering page and click on Shared Use Paths).

¹⁰⁷ Pedestrian and Bicycle Information Center, *Shared Use Paths (Trails): Design Details*, 12/15/04, <<http://www.bicyclinginfo.org/de/shared.htm>>.

¹⁰⁸ Pedestrian and Bicycle Information Center, *Shared Use Paths (Trails): Introduction*, 12/15/04, <<http://www.bicyclinginfo.org/de/shared.htm>>.

¹⁰⁹ AASHTO Task Force on Geometric Design, *Guide for the Development of Bicycle Facilities*, American Association of State Highway and Transportation Officials, Washington, D.C., 1999, p.33.

Bicycle Regulatory Signs

Just as there are regulations for motorists, there are regulations for bicyclists and appropriate signage to indicate legal roadway behavior. The following section from Part 9 of the US MUTCD illustrates the range of signage which can be applied to encourage bicyclists and motorists to ride in the proper direction, obey traffic controls and share roads and trails with other users.

Figure 9B-2. Regulatory Signs for Bicycle Facilities



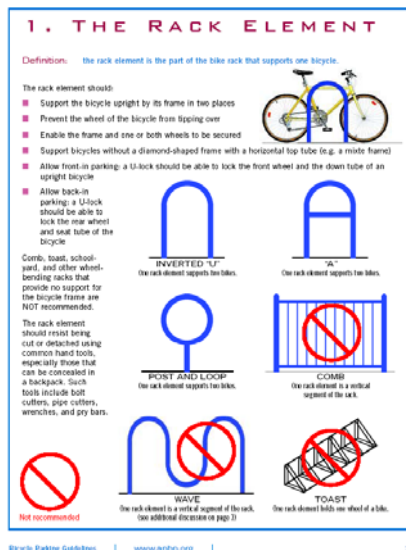
Bicycle Parking and Amenities

Travel by bicycle is similar in many ways to driving a car – you need safe routes to travel on, secure parking at the end of your trip, and amenities to make your trip enjoyable. Like streetscape design, these features are generally not detailed in the Highway Design Manual, MUTCD or AASHTO Guide. Fortunately, there are excellent resources available, and they can be used with creativity to provide excellent solutions.

One of the best resources for bicycle parking guidelines is available on-line from the Association of Pedestrian and Bicycle Professionals (APBP). The Pedestrian and Bicycle Information Center describes the basics of bicycle parking as follows:

“Bicycle parking needs to be visible, accessible, easy to use, convenient, and plentiful. Racks need to support the whole bike (not just one wheel) and enable the user to lock the frame and wheels of the bike with a cable or U-shaped lock. Parking should preferably be covered, well lit, and in plain view without being in the way of pedestrians or motor vehicles.”

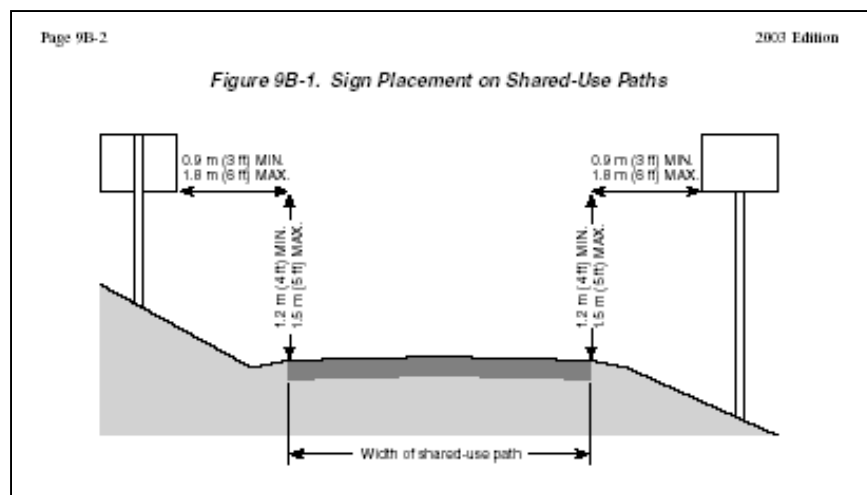
The APBP bicycle parking guidelines are available online at: <http://www.bicyclinginfo.org/de/park.htm>.



Bicycle parking can be easily customized to provide functional, context sensitive solutions. These examples show how local Syracuse icons can be easily integrated into standard bike racks (APBP Bicycle Parking Guide cover, left; Graphics, right: J. Olson).

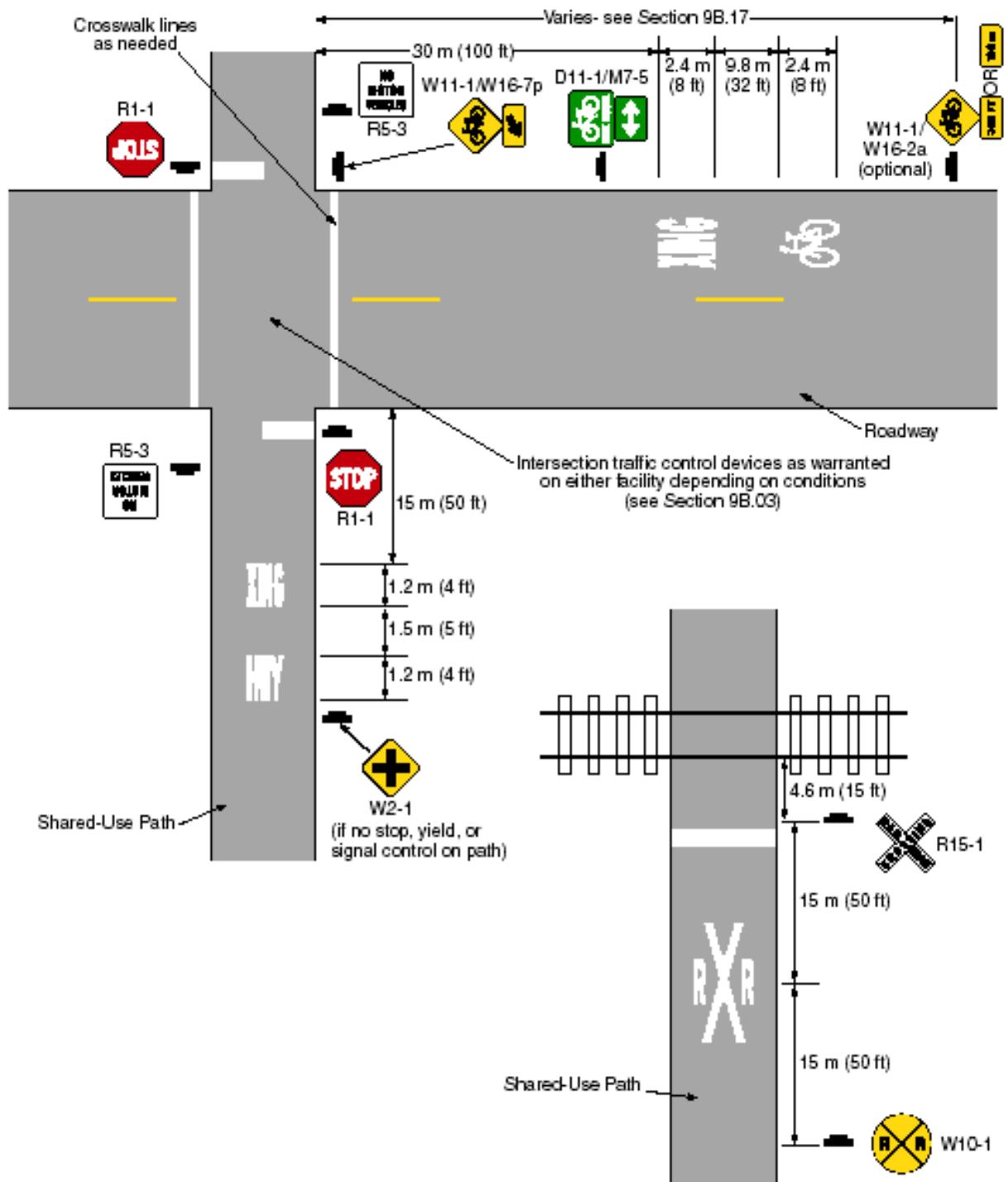
7.2.3 Greenways and Trails

The SMTC region's developing greenway and trail system includes the Onondaga Lake Trail, the Onondaga Creekwalk, the Erie Canalway Trail, Bear Trap Creek trail (along a portion of I-81), and others (see the Existing Conditions portions of this document for more detail). Basic guidance for trail width, surfaces, geometric design, safety signage and pavement markings is included in the MUTCD, the AASHTO Guide, and the Highway Design Manual. Creativity and context-sensitive design can be applied to features such as historical interpretation, mile markers, gateways, overlooks, rest stops, benches and other amenities. Valuable resources for these features are available online from Parks and Trails New York at <http://ptny.logical.net/greenways/tools.shtml>.



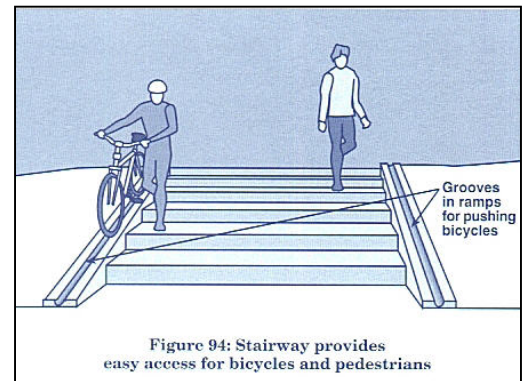
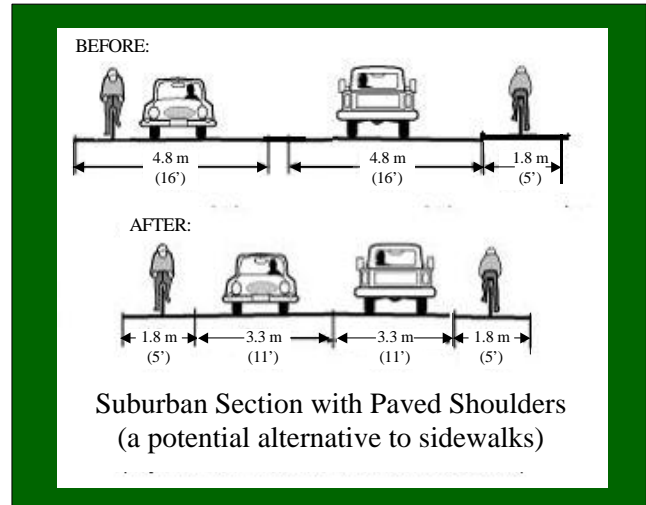
The MUTCD, AASHTO and NYSDOT guidelines can provide trail geometry (top left graphic) and safety signage (graphic, next page). Local conditions can be expressed in the design of trail features and amenities that make each trail a unique experience. Local history and art can be integrated into greenways and trails, as shown along the Erie Canal Trail (bottom left photo: J. Olson.).

Figure 9B-7. Examples of Signing and Markings for Shared-Use Paths



7.2.4 Innovative Treatments

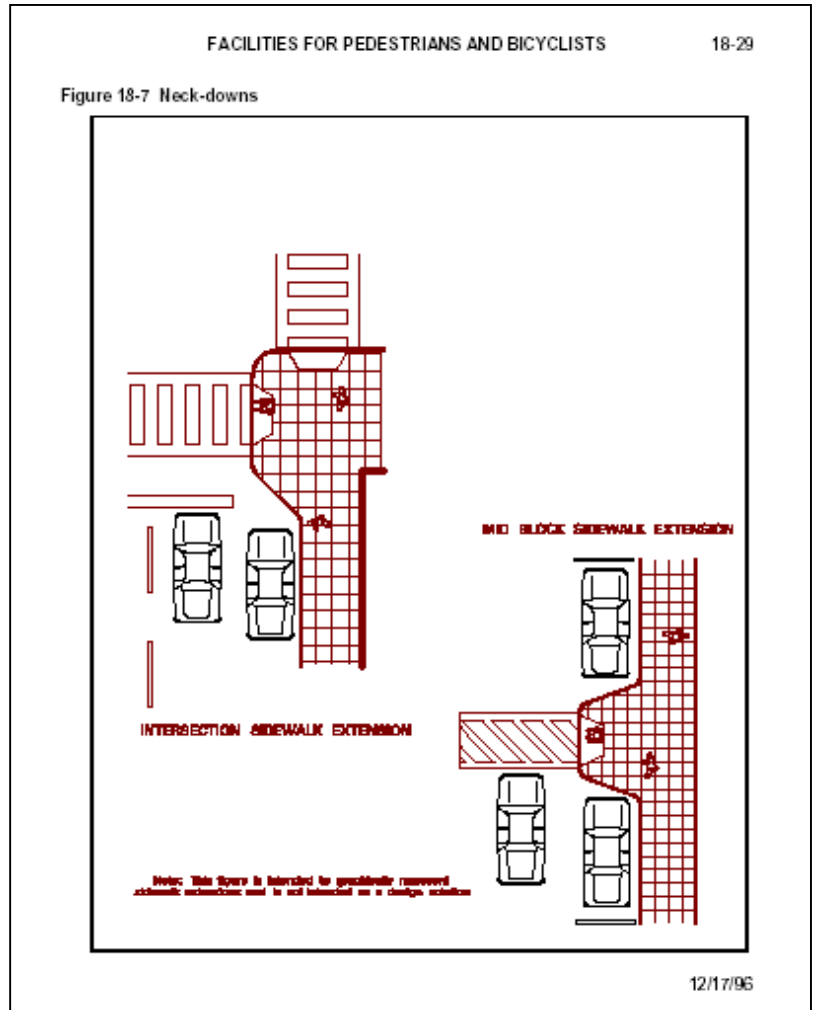
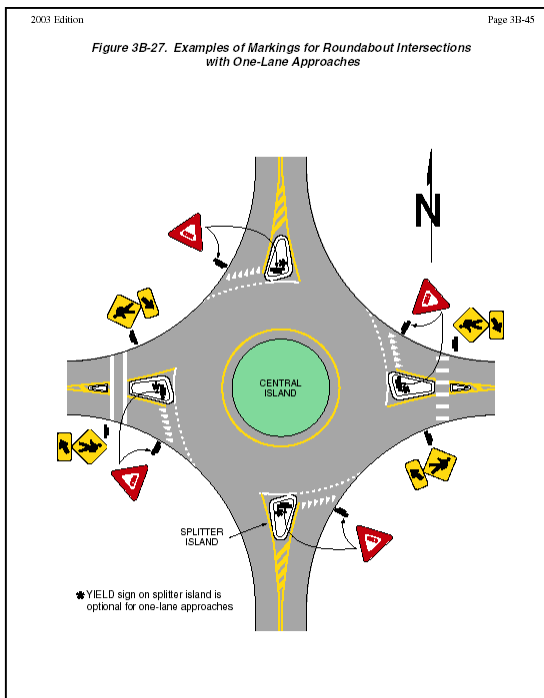
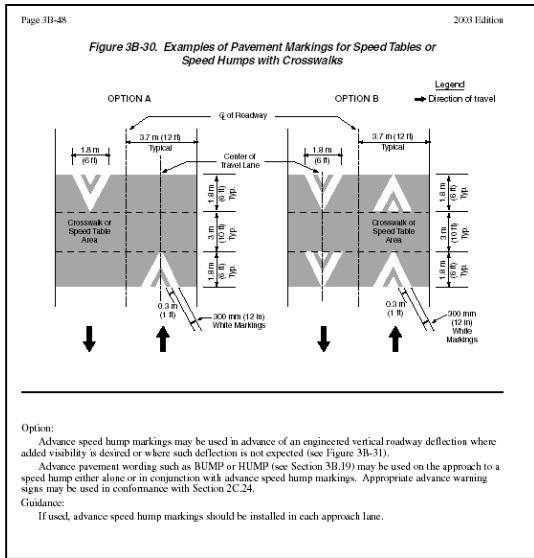
There are a number of ways in which design guidelines can be combined with ‘engineering judgment’ that provide innovative solutions based on existing design guidelines. The guidelines provided by the MUTCD and Highway Design manual are not intended to show every possible condition, and in many cases can be used with flexibility. The following examples show how guidelines can be used as the basis of innovative treatments for pedestrians and bicyclists.



The ‘bicycle box’ advanced stop marking allows cyclists to queue in front of motorists at intersections (bottom left - Cambridge, England, photo: J. Olson); Paved shoulders are a good solution for pedestrians and bicyclists in rural and suburban areas (top right graphic: J. Olson); ‘Adopt a Highway’ programs can be used for bicycle routes, as shown along Bike Route 17 near Binghamton, NY (top left photo: L. Rossi) and ‘Dutch Stairways’ can be provided to accommodate bicyclists and pedestrians (bottom right graphic: Oregon DOT Bicycle and Pedestrian Plan).

7.2.5 Traffic Calming

Traffic calming provides street designs that balance the needs of pedestrians, bicyclists and motorists. The MUTCD and NYS Highway Design Manuals have both been updated recently to include a variety of traffic calming features including speed humps, raised crossings, roundabouts, curb neckdowns and other devices. The NYSDOT Highway Design Manual includes a new Chapter 25: Traffic Calming, which provides guidelines on selecting traffic calming features for use on state and local roads. The facility selection tables are provided on the following page. Examples of traffic calming features that are included in the manuals are shown below.



Speed tables (top left) and Roundabouts (bottom left) are illustrated in the US MUTCD; curb neckdowns for both intersection and midblock conditions (right) are detailed in NYSDOT Chapter 18.

TRAFFIC CALMING

25-15

Table 25-1 Suitability of Traffic Calming Features for Speed Categories (continued)

TRAFFIC CALMING FEATURES	CATEGORY I (NEIGHBORHOOD) (25-39 km/h)	CATEGORY II (40-59 km/h)		CATEGORY III (60-79 km/h)	CATEGORY IV (+ 80 km/h)	SPEED REDUCTION ¹	VOLUME REDUCTION ¹
		LOCAL ² STREETS OR ROADS	ALL OTHER STREETS OR ROADS				
CONSTRICTIONS							
Neckdowns, Chokers ⁵	SUITABLE	NOT RECOMMENDED	NOT PERMITTED			SLIGHT	NO
1-Way Entry/Exit Choker, Half Closure, Semi-Diverter						YES	YES
Curb Extensions at Intersections		SUITABLE*				SLIGHT	NO
Pedestrian Refuge/Midblock Islands		SUITABLE					
Driveway Link	SUITABLE	NOT PERMITTED				YES	YES
Single Lane Slow Point							
Single Lane Angled Slow Point							
Two-Lane Slow Point		NOT RECOMMENDED					
Two-Lane Angled Slow Point							
NARROW PAVEMENT WIDTHS							
Pavement Narrowing	SUITABLE	NOT RECOMMENDED	NOT PERMITTED			POSSIBLE	POSSIBLE
ENTRANCE FEATURES							
Gateways	SUITABLE				NOT PERMITTED	YES	YES

* Suitable only with upstream parking.
See General Notes and Endnotes following this table.

TRAFFIC CALMING

25-16

Table 25-1 Suitability of Traffic Calming Features for Speed Categories (continued)

TRAFFIC CALMING FEATURES	CATEGORY I (NEIGHBORHOOD) (25-39 km/h)	CATEGORY II (40-59 km/h)		CATEGORY III (60-79 km/h)	CATEGORY IV (+ 80 km/h)	SPEED REDUCTION ¹	VOLUME REDUCTION ¹
		LOCAL ² STREETS OR ROADS	ALL OTHER STREETS OR ROADS				
RELATED STREETSCAPING							
Color Contrast or Patterns/Markings	SUITABLE					POSSIBLE	NOT LIKELY
Landscape Development						NO	
Sidewalks, Shoulders						NO INFORMATION	
Street Furniture and Lighting							
Surface Textures				NOT RECOMMENDED		POSSIBLE	NOT LIKELY
Shared Zones		NOT RECOMMENDED	NOT PERMITTED				NO INFORMATION
UNCATEGORIZED MEASURES							
Supplementary Pedestrian Crossing Channelization Devices ⁶	SUITABLE	SUITABLE (40-49km/h) NOT PERMITTED (50-59km/h)		NOT PERMITTED		NO INFORMATION	
Back-In Diagonal Parking ⁷		NOT RECOMMENDED					
Reduced Intersection Radii						YES	
Single-Lane Roundabouts			**	**			NOT LIKELY
Multiple-Lane Roundabouts	**	**	**	**		NO INFORMATION	

** Any proposal for a roundabout should be developed on a case-by-case basis with input from the Design Quality Assurance Bureau.
See General Notes and Endnotes following this table.

7.2.6 School Zones

Children are dependent on walking and bicycling as their only independent means of transportation. There is a growing movement to create 'Safe Routes to Schools' so that the areas around our schools are safe places to walk and bicycle (see Action Item P6 in Appendix A for more details on the Safe Route to Schools program). Bicycle, pedestrian and traffic calming improvements are part of the solution. The MUTCD *Part 7: Traffic Controls for School Areas*, provides a wide range of school zone safety signs and pavement markings, as illustrated below.

Part 7 Traffic Controls for School Areas



Figure 7C-1. Two-Lane Pavement Marking of "SCHOOL"

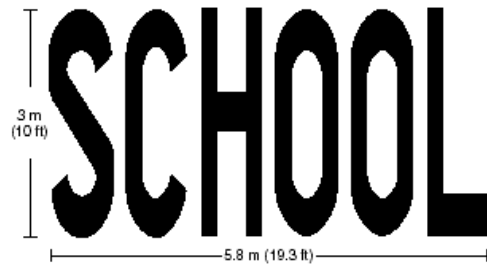
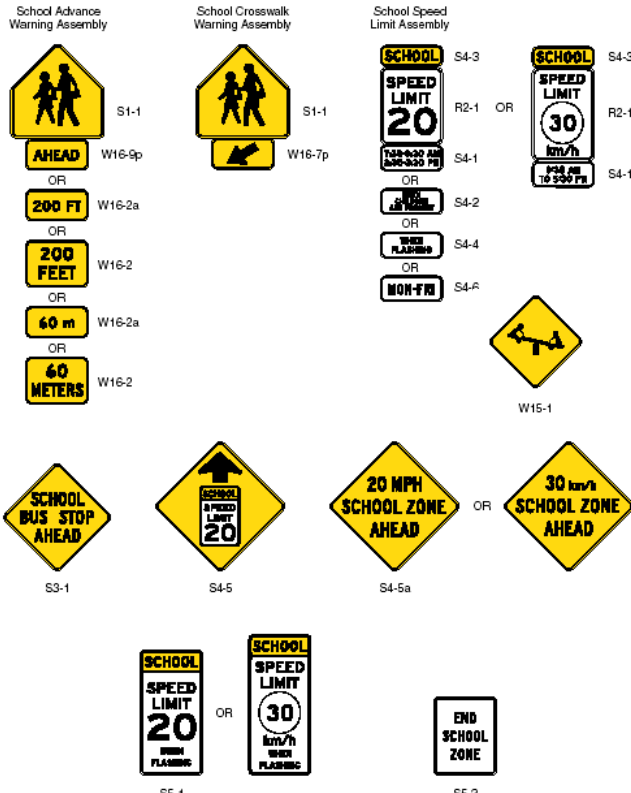


Figure 7B-1. School Area Signs



7.3 Additional Resources

The primary documents referred to in this document are the basic guidelines for developing bicycle and pedestrian improvements in the SMTC region. There are a growing number of innovative design guidelines that go beyond the basic information included in State and Federal manuals. In many cases, these following documents and resources are useful in providing innovative solutions for local communities.

NYBC The New York Bicycling Coalition (NYBC) provides an online guide called “*Improving Bicycling & Pedestrian Safety in New York State.*” This resource provides case studies, photo files and tools for creating bicycle-friendly communities. The NYBC also offers several pedestrian related planning tools.

Website: www.nybc.net

PTNY Parks & Trails New York (PTNY) is a great resource for developing Greenways and Trails. Their website includes an online guide for local communities, as well as a variety of tools for getting greenways on the ground in New York State.

Website: www.ptny.net

Pedestrian and Bicycle Information Center

<http://www.bicyclinginfo.org> Design and Engineering

“Designers and engineers have a diverse array of design elements and ever-developing technologies at their disposal. Use this section of the web site as a source for information on the design and engineering tools that promote bikeability.” Excellent bicycle lane and bicycle parking design guidelines are available from this source.

<http://www.walkinginfo.org> Design and Engineering

This site provides *“...engineering treatments for pedestrians as they relate to pedestrian facility design, roadway design, intersection design, traffic calming, traffic management and signals and signs.”*

The Oregon Bicycle and Pedestrian Plan

“This document is the planning and design manual for pedestrian and bicycle transportation in Oregon. It is published by the Oregon Bicycle and Pedestrian Program and was adopted by the Oregon Transportation Commission on June 14, 1995. The standards and designs shown in the plan are ODOT standards used on State Highway projects. These standards meet or exceed national standards as outlined in AASHTO (American Association of State Highway Transportation Officials) documents, the ADAAG (Americans with Disabilities Act Accessibility Guidelines) and other documents. These standards are recommended but not required for use by local jurisdictions in Oregon.”

Website: <http://www.odot.state.or.us/techserv/bikewalk/obpplan.htm>