

-  TOD study area boundary
-  Bike study area boundary
-  WHEELS hub - located Burnell Blvd at Belden Ave
-  TOD area bus stop
-  3 Bus route
-  CL Coastal Link
-  7L The Merritt 7 Link

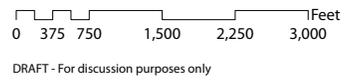
Norwalk Transit District Bus Routes

Norwalk TOD Pilot Program

Bicycle Safety and Engineering Study to and through South Norwalk

Prepared for the City of Norwalk, Connecticut and the Norwalk Redevelopment Agency

November 2013



DRAFT - For discussion purposes only



Norwalk, CT: TOD District Condition Assessment for Sidewalks and Pavement

Date: September 26, 2013

Technician: K. Tivin

Score Details: 4 = Brand New, 3 = Good, 2 = OK, 1 = Bad, 0 = Unusable

Segments		Material						Lighting		Score					
Road	Starting Intersection	Segment (250' from prior segment)	Sidewalk 1	Sidewalk 2	Curb 1	Curb 2	Curb Reveal Less than 3"?	Utility Type	Lighting Type	Sidewalk 1 Score	Sidewalk 2 Score	Average Sidewalk Score	Pavement Score	Segment Score (AVG. of Sidewalks and Pavement Scores)	Street Score (AVG. of Segments)
Martin Luther King Dr.	N. Main	1	Concrete	Concrete	Granite	Granite	No	Overhead	INDV Pole	2	3	2.5	3	2.8	2.5
		2	Concrete	Concrete	Granite	Granite	No	Overhead	INDV Pole	3	4	3.5	4	3.8	
		3	Concrete	Concrete	Granite	Granite	No	Overhead	INDV Pole	2	3	2.5	3	2.8	
		4	Concrete	Concrete	Granite	Granite	No	Overhead	INDV Pole	3	3	3.0	3	3.0	
		5	Concrete	Concrete	Granite	Granite	No	Overhead	INDV Pole	0	3	1.5	3	2.3	
		6	Concrete	Concrete	Granite	Granite	No	Overhead	INDV Pole	2	3	2.5	3	2.8	
		7	N/A	Concrete	Granite	Granite	No	Overhead	INDV Pole	0	3	1.5	3	2.3	
		8	N/A	Concrete	Granite	Granite	No	Overhead	INDV Pole	0	3	1.5	3	2.3	
		9	N/A	Concrete	Granite	Granite	No	Overhead	INDV Pole	0	3	1.5	3	2.3	
		10	N/A	Concrete	Granite	Granite	No	Overhead	INDV Pole	0	2	1.0	3	2.0	
		11	N/A	Concrete	Granite	Granite	No	Overhead	INDV Pole	0	2	1.0	3	2.0	
		12	N/A	Concrete	Granite	Granite	No	Overhead	INDV Pole	0	2	1.0	3	2.0	
		13	N/A	Concrete	Granite	Granite	No	Overhead	INDV Pole	0	2	1.0	3	2.0	
North Main St.	West Ave	1	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	2	2.5	4	3.3	3.3
		2	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	3	3.0	4	3.5	
		3	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	2	2	2.0	4	3.0	
		4	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	2	2.5	4	3.3	
South Main St.	Washington	1	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	3	3.0	3	3.0	2.3
		2	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	3	3.0	3	3.0	
		3	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	3	3.0	2	2.5	
		4	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	3	3.0	2	2.5	
		5	Concrete	Concrete	Granite	Granite	No	Overhead	UT Pole	2	2	2.0	2	2.0	
		6	Concrete	Concrete	Granite	Granite	No	Overhead	UT Pole	2	2	2.0	2	2.0	
		7	Concrete	Concrete	Granite	Granite	No	Overhead	UT Pole	2	2	2.0	2	2.0	
		8	Concrete	Concrete	Granite	Granite	No	Overhead	UT Pole	2	2	2.0	2	2.0	
		9	Concrete	Concrete	Granite	Granite	No	Overhead	UT Pole	2	2	2.0	2	2.0	
North Water St.	Ann	1	Conc/Brick	Conc/Brick	Concrete	Concrete	No	Under	Street LVL	3	3	3.0	2	2.5	2.1
		2	Conc/Brick	Conc/Brick	Concrete	Concrete	No	Under	Street LVL	3	3	3.0	2	2.5	
		3	Conc/Brick	Concrete	Concrete	Concrete	No	Under	Street LVL	2	2	2.0	1	1.5	
		4	Asphalt	Conc/Brick	Concrete	Concrete	No	Under	Street LVL	2	3	2.5	1	1.8	
Water St.	Washington	1	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	3	3.0	2	2.5	3.0
		2	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	3	3.0	3	3.0	

		3	Conc/Brick	Conc/Brick	Granite	Granite	No	UN/OV	INDV/ST LVL	3	3	3.0	2	2.5	
		4	Conc/Brick	Conc/Brick	Granite	Granite	No	Overhead	INDV Pole	3	3	3.0	2	2.5	
		5	Conc/Brick	Conc/Brick	Granite	Granite	No	Overhead	INDV Pole	3	3	3.0	2	2.5	
		6	Concrete	Conc/Brick	Granite	Granite	No	Overhead	INDV Pole	2	3	2.5	2	2.3	
		7	Concrete	Conc/Brick	Granite	Granite	No	Overhead	INDV Pole	2	3	2.5	2	2.3	
		8	Conc/Brick	Conc/Brick	Granite	Granite	No	Overhead	INDV Pole	2	2	2.0	2	2.0	2.4
Chestnut St.	Monroe	1	AC/Conc	Concrete	Granite	Granite	Yes	Overhead	UT Pole	0	1	0.5	2	1.3	
		2	AC/Conc	Concrete	Concrete	Granite	Yes	Overhead	UT Pole	1	1	1.0	2	1.5	
		3	Concrete	Concrete	Granite	Granite	No	Overhead	UT Pole	1	2	1.5	2	1.8	
		4	Concrete	Concrete	Granite	Granite	No	Overhead	UT Pole	1	2	1.5	2	1.8	1.6
Day St.	Hanford	1	N/A	Asphalt	N/A	N/A	Yes	Overhead	UT Pole	0	0	0.0	2	1.0	
		2	Asphalt	N/A	Granite	N/A	Yes	Overhead	UT Pole	0	0	0.0	2	1.0	
		3	Concrete	Concrete	Concrete	Concrete	Yes	Overhead	UT Pole	2	2	2.0	2	2.0	
		4	Concrete	Concrete	Concrete	Concrete	Yes	Overhead	UT Pole	2	2	2.0	2	2.0	
		5	Concrete	Asphalt	Concrete	N/A	Yes	Overhead	UT Pole	1	0	0.5	2	1.3	1.5
Ann St.	N. Main	1	Conc/Brick	Conc/Brick	Concrete	Concrete	Yes	Under	Street LVL	3	3	3.0	3	3.0	
		2	Conc/Brick	Conc/Brick	Concrete	Concrete	No	Under	Street LVL	4	4	4.0	4	4.0	
		3	Conc/Brick	Conc/Brick	Concrete	Concrete	No	Under	Street LVL	4	4	4.0	3	3.5	
		4	Concrete	Concrete	Concrete	Concrete	No	Under	Street LVL	4	3	3.5	2	2.8	3.3
Marshall St.	N. Main	1	Conc/Brick	Conc/Brick	Concrete	Concrete	No	Under	Street LVL	3	3	3.0	3	3.0	
		2	Conc/Brick	Conc/Brick	Concrete	Concrete	No	Under	Street LVL	4	4	4.0	3	3.5	3.3
Washington St.	MLK	1	Concrete	Concrete	Concrete	Granite	No	Overhead	INDV Pole	3	2	2.5	1	1.8	
		2	Concrete	Concrete	Concrete	Granite	No	Overhead	UT Pole	2	3	2.5	2	2.3	
		3	Concrete	Concrete	Granite	Granite	No	Overhead	UT Pole	2	3	2.5	2	2.3	
		4	Conc/Brick	Conc/Brick	Granite	Granite	No	Overhead	UT Pole	3	2	2.5	3	2.8	
		5	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	3	3.0	3	3.0	
		6	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	3	3.0	2	2.5	
		7	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	3	3.0	2	2.5	2.4
Madison St.	MLK	1	Concrete	Concrete	Granite	Granite	No	Overhead	UT Pole	2	2	2.0	2	2.0	
		2	Concrete	Concrete	Granite	Granite	No	Overhead	UT Pole	1	2	1.5	1	1.3	
		3	Concrete	Concrete	Granite	Granite	No	Overhead	UT Pole	1	2	1.5	1	1.3	
		4	Concrete	Concrete	Granite	Granite	No	Overhead	UT Pole	1	1	1.0	2	1.5	1.5
Havilland St.	S. Main	1	Conc/Brick	Conc/Brick	Granite	Granite	No	Overhead	UT Pole	3	3	3.0	2	2.5	
		2	Conc/Brick	Conc/Brick	Granite	Granite	No	Overhead	UT Pole	2	3	2.5	2	2.3	
		3	Conc/Brick	Conc/Brick	Granite	Granite	No	Overhead	UT Pole	2	2	2.0	2	2.0	2.3
Elizabeth St.	S. Main	1	Conc/Brick	Concrete	Granite	Concrete	No	Overhead	UT Pole	2	1	1.5	2	1.8	
		2	Concrete	Concrete	N/A	Concrete	Yes	Overhead	UT Pole	1	3	2.0	2	2.0	
		3	Concrete	Conc/Brick	Granite	Granite	No	Overhead	UT Pole	3	3	3.0	2	2.5	2.1
Monroe St.	MLK	1	Concrete	Concrete	Granite	Granite	No	Overhead	INDV Pole	4	4	4.0	4	4.0	
		2	Concrete	Concrete	Granite	Granite	No	Under	Street LVL	4	4	4.0	3	3.5	
		3	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	4	4	4.0	3	3.5	
		4	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	2	2	2.0	2	2.0	
		5	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	2	3	2.5	2	2.3	
		6	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	2	2.5	3	2.8	

		7	Conc/Brick	Conc/Brick	Granite	Granite	Yes	Under	Street LVL	2	2	2.0	2	2.0	
		8	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	2	2	2.0	2	2.0	2.8
State St.	MLK	1	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	3	3.0	1	2.0	
		2	Conc/Brick	Conc/Brick	Granite	Granite	No	Under	Street LVL	3	2	2.5	2	2.3	2.1
Raymond St.	S. Main	1	Asphalt	Concrete	Asphalt	Concrete	Yes	Overhead	UT Pole	1	1	1.0	3	2.0	
		2	N/A	Concrete	N/A	Concrete	Yes	Overhead	UT Pole	0	1	0.5	2	1.3	
		3	Asphalt	Concrete	N/A	Concrete	Yes	Overhead	UT Pole	0	2	1.0	2	1.5	1.6
Spring St.	MLK	1	Concrete	N/A	Concrete	Concrete	No	Overhead	UT Pole	2	0	1.0	2	1.5	1.5
Henry St.	Ely	1	Concrete	Concrete	Concrete	Concrete	Yes	Overhead	INDV Pole	1	1	1.0	3	2.0	
		2	Concrete	Concrete	Granite	Granite	No	Overhead	INDV Pole	2	2	2.0	3	2.5	
		3	Concrete	Concrete	Granite	Granite	No	Overhead	INDV Pole	2	2	2.0	2	2.0	
		4	Concrete	Concrete	Granite	Granite	No	Overhead	INDV Pole	2	2	2.0	2	2.0	
		5	Concrete	Asphalt	Concrete	Asphalt	Yes	Overhead	UT Pole	1	1	1.0	2	1.5	2.0
Ely St.	Ely	1	Concrete	Concrete	Concrete	Concrete	No	Overhead	UT Pole	1	1	1.0	1	1.0	1.0
Concord St.	Chestnut	1	Concrete	Concrete	Granite	Granite	No	Overhead	UT Pole	2	1	1.5	2	1.8	
		2	Asphalt	N/A	Asphalt	N/A	Yes	Overhead	UT Pole	1	1	1.0	2	1.5	
		3	Brick	Concrete	Asphalt	Concrete	Yes	Overhead	UT Pole	1	3	2.0	2	2.0	
		4	Asphalt	Concrete	Asphalt	Concrete	Yes	Overhead	UT Pole	1	2	1.5	2	1.8	
		5	Asphalt	Concrete	Concrete	Concrete	Yes	Overhead	UT Pole	1	1	1.0	2	1.5	1.7

Abbreviations:

Conc - Concrete

A/C - Asphalt

UN/OV - both Underground and Overhead Utilities

INDV Pole - Individual Pole

UT Pole- Utility Pole

Street LVL - Street Level

N/A - Not Applicable

Adjusted based on City feedback/comment

Sidewalk/Curb 1 = Western or northern side of the street

Sidewalk/Curb 2 = Eastern or southern side of the street

What are Complete Streets?

“Complete Streets” is a set of principles where streets are designed to enable safe and convenient access and travel for **all users**, including pedestrians, bicyclists, and motorists.

Complete Streets Toolbox for Norwalk includes:

P Pedestrian Safety

T Traffic Control

B Bicycle Safety

I Transit/Intermodal Enhancements



Norwalk TOD Pilot Program
The City of Norwalk, CT and the Norwalk Redevelopment Agency.



Plan to Accommodate Auto, Pedestrian and Bicycle Travel in Norwalk, CT

Complete Streets Toolbox

Pedestrian Safety

- P-1** Articulated Crosswalks
- P-2** Mid-Block Crosswalks
- P-3** Speed Table Crosswalk and Elevated Intersections
- P-4** Pedestrian Refuge Islands and Channelizing Islands
- P-5** Accessible Sidewalks
- P-6** Countdown Pedestrian Crossing Signals
- P-7** Street Trees and Streetscaping
- P-8** Shared Spaces (Woonerfs)
- P-9** Moveable Parklets
- P-10** Underpass Lighting

Traffic Control

- T-1** Narrow Traffic Lanes and Road Diet
- T-2** Speed Humps/Tables
- T-3** Curb Radius Reduction
- T-4** Diverters and Chicanes
- T-5** Landscaped Medians
- T-6** On-Street Parking
- T-7** Mini Traffic Circles
- T-8** Modern Traffic Roundabouts
- T-9** Dynamic Speed Display Signs
- T-10** Real Time Parking Information

Bicycle Safety

- B-1** Shared Use Lanes (Sharrows)
- B-2** Bike Lanes
- B-3** Bike Boxes and Intersection Crossing Markings
- B-4** Cycle Tracks
- B-5** Bicycle Boulevard
- B-6** Shared Use Trails
- B-7** Bicycle Parking
- B-8** Bicycle Sharing Programs

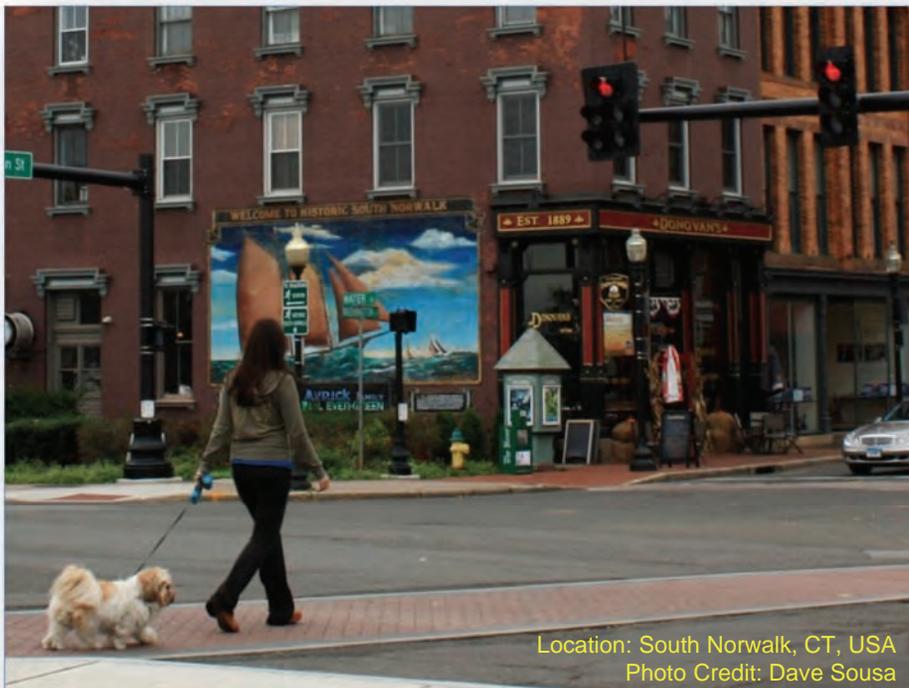
Transit/Intermodal Enhancements

- I-1** Bus Pullout
- I-2** Enhanced Bus Shelters and Route Marker Signs
- I-3** Mobility Hubs (mode interchange plaza)
- I-4** Dynamic Message Signs (real time arrivals)

P-1

Articulated Crosswalks

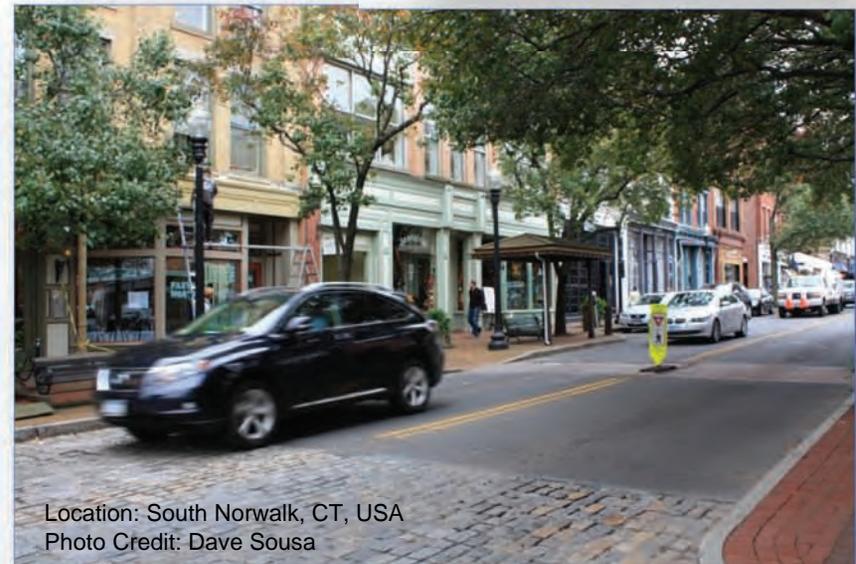
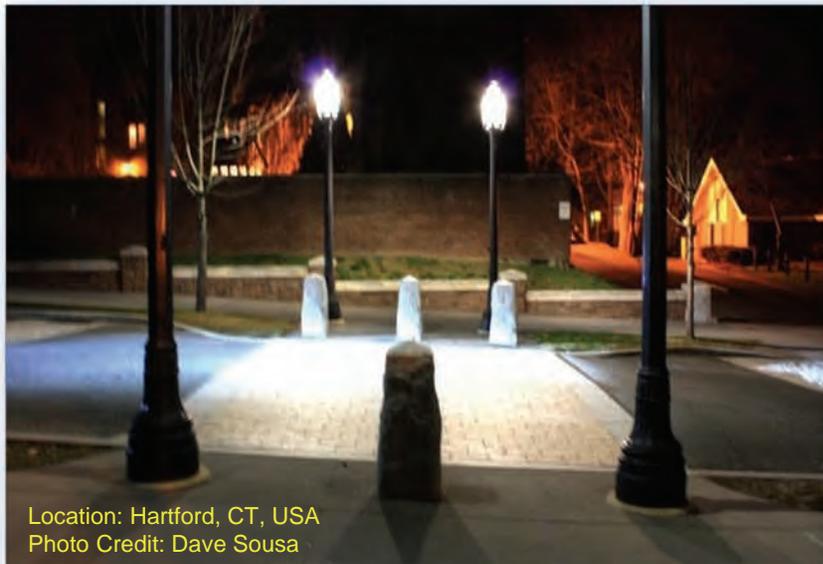
Wider, better-designed and more articulated crosswalks greatly improve pedestrian safety. Where possible, extend crosswalks through the tips of medians to provide a pedestrian safety zone. Examples of safe crosswalks in arterial streets include illuminated crosswalks with pavement imbedded lights, and crosswalks with pedestrian count-down signals.



P-2

Mid-Block Crosswalks

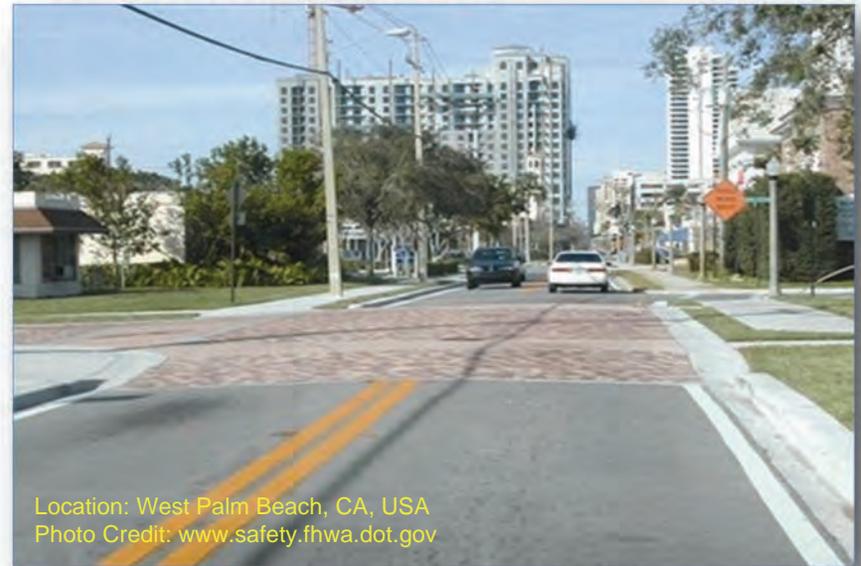
Mid-block crosswalks are ped or bike crossings at locations that are not at intersections. They require particular care in design since motorists tend to travel higher speeds between intersections and are not expecting to encounter pedestrians. Safety improvements include area lighting, signage, and varying degrees of flashing warning lights or traffic signals (depending on traffic volumes and speeds). Mid-block crosswalks often require user activated signals (such as a Rectangular Rapid Flashing Beacon (RRFB)) to stop traffic and allow safe crossing. Bump-outs (also known as bulb-outs) are also effective in alerting drivers and calming traffic at mid-block X-ings.



P-3

Speed Table Crosswalk and Elevated Intersections

Raised pedestrian crosswalks and intersections extend the height of the sidewalk into the road and brings the motorist to the pedestrian level. Approaching traffic is forced to slow down at the intersection due to the height change. This enhances intersection safety and allows for safe pedestrian crossing. These are most appropriate where sight distance is not an issue and roadway grade is not too steep.

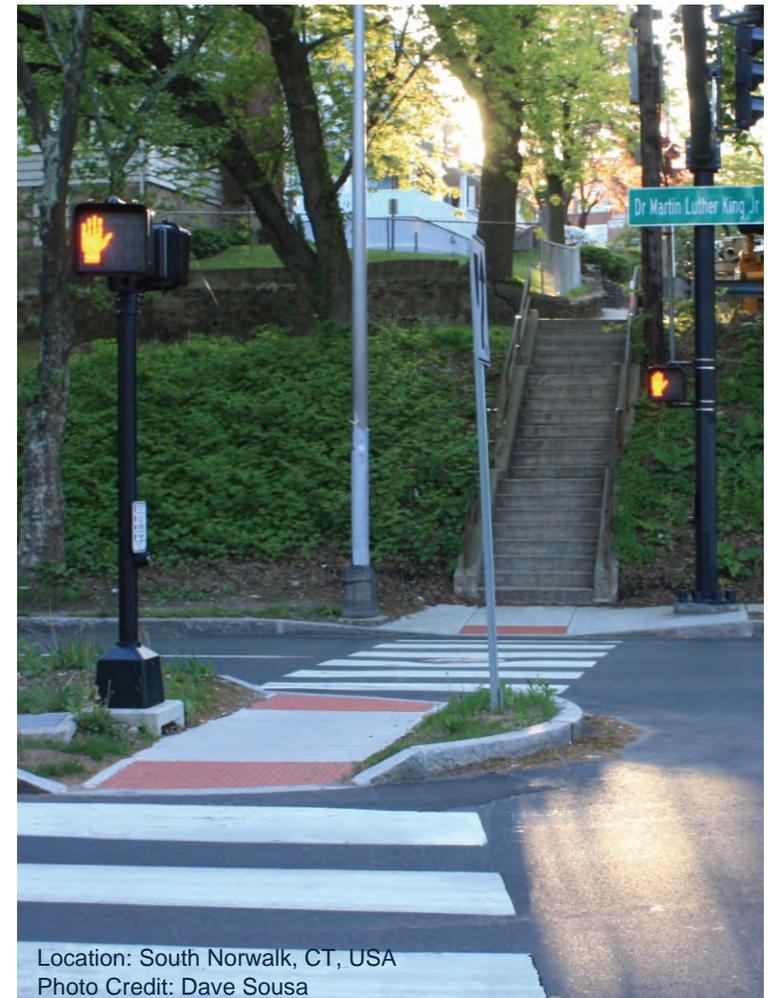


P-4

Pedestrian Refuge Islands and Channelizing Islands

Pedestrian refuge islands are protected spaces placed in the center of the street to protect bicyclists and pedestrians at designated crossings. The islands also serve to calm traffic on the street by physically narrowing and/or reducing the perceived operating width of the roadway.

Often pedestrians have difficulty crossing due to right-turn movements and wide crossing distances. Well-designed right turn slip lanes place right-turning vehicles at a 60° angle from through traffic. This angle limits vehicle turning speeds and increases the visibility of pedestrians. Right-turn slip lanes should be accompanied by pedestrian refuge islands within the intersection. Pedestrians can cross the right-turn lane and wait on the island for their walk signal.



P-5

Accessible Sidewalk

Sidewalks should be ADA compliant to allow everyone safe usage of pedestrian facilities. New sidewalks widths should account for wheelchair movement, pedestrians passing by each other, and side by side travel with a service animal. Sidewalks should have slip resistant surfaces and street furniture should not interfere with sidewalk travel routes.



P-6 Countdown Pedestrian Crossing Signals

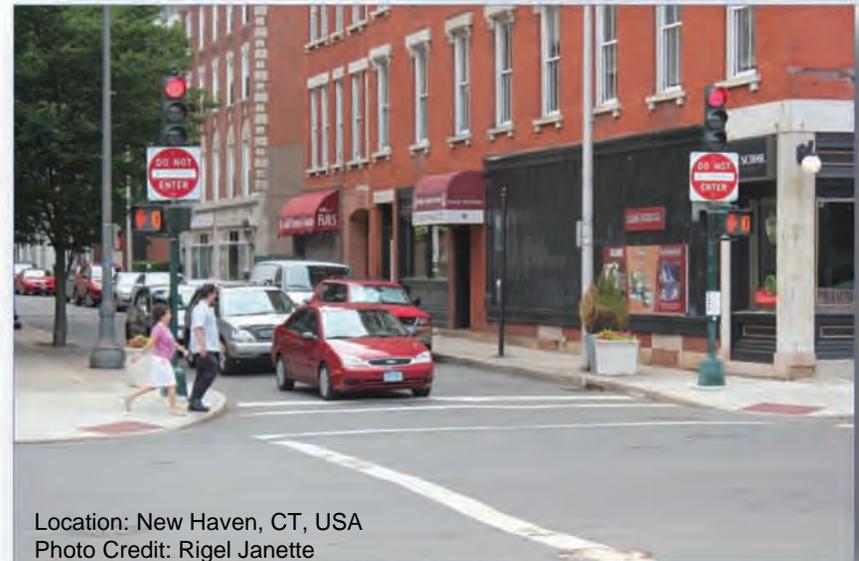
Countdown timers indicate when and how long it is safe to cross an intersection. They reduce uncertainty for pedestrians and allow pedestrians to make informed judgment calls. They are also effective at reducing red light time by shortening the average time necessary for pedestrians to cross.



Location: New Haven, CT, USA
Photo Credit: Rigel Janette



Location: New Haven, CT, USA
Photo Credit: Rigel Janette



Location: New Haven, CT, USA
Photo Credit: Rigel Janette

P-7

Street Trees and Streetscaping

Urban landscape and streetscaping help create and define desirable urban spaces. Quality streetscaping improves communities with greener, friendlier public spaces.

Trees also help mitigate urban heat island effects and provide shading for pedestrians.



Location: Cleveland, OH, USA
Photo Credit: CDM Smith



Location: Saratoga Springs, NY, USA
Photo Credit: Dave Sousa



Location: Bridgeport, CT, USA
Photo Credit: Dave Sousa

P-8

Shared Spaces (Woonerfs)

Removal of traffic guides on narrow local streets diminishes priority and dominance of vehicular drivers. The roadway is shared among all users including pedestrians and bicyclists. This causes drivers to reduce speeds. Appropriate placement of Woonerfs is critical. The design should be reserved for residential areas and narrow urban streets where low traffic speed is prevalent.



P-9

Movable Parklets

A parklet is a temporary use of space in the dedicated public right-of-way (parking spaces, unused bus stops, and other types of vehicular and non-vehicular zones) for public uses such as seating or bicycle racks.

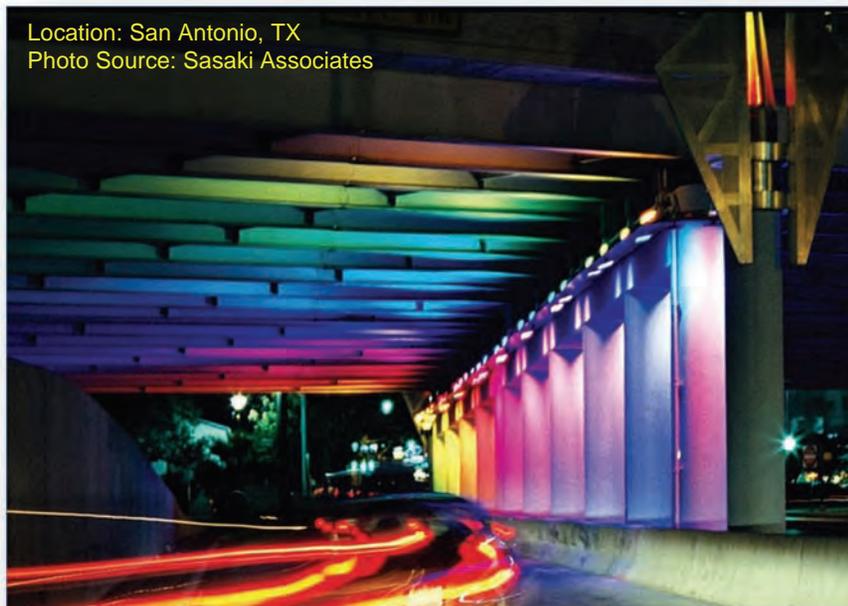
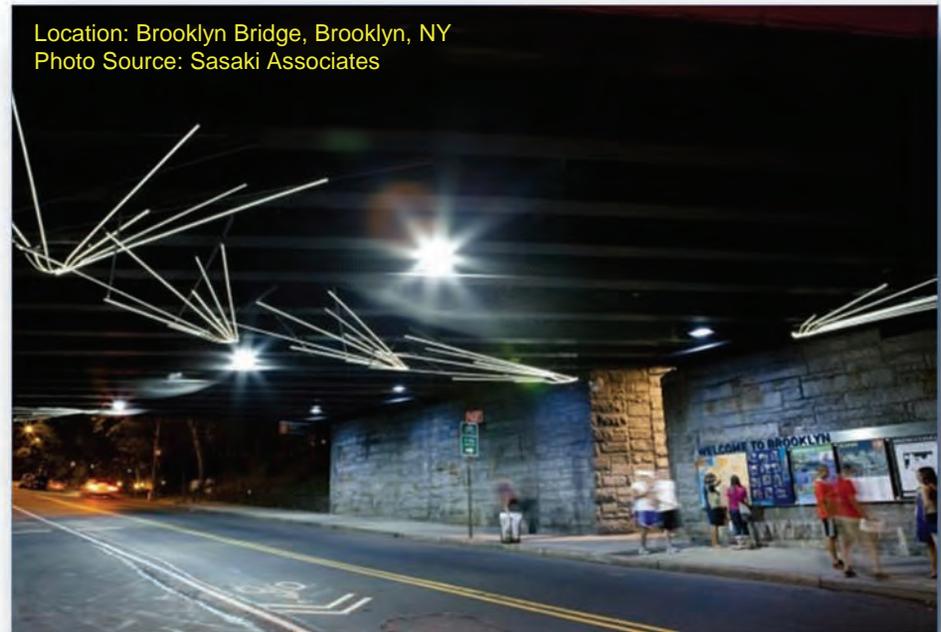
Parklets are intended to be publicly accessible space for the enjoyment and use of all citizens, and are typically privately constructed and maintained.



P-10

Underpass Lighting

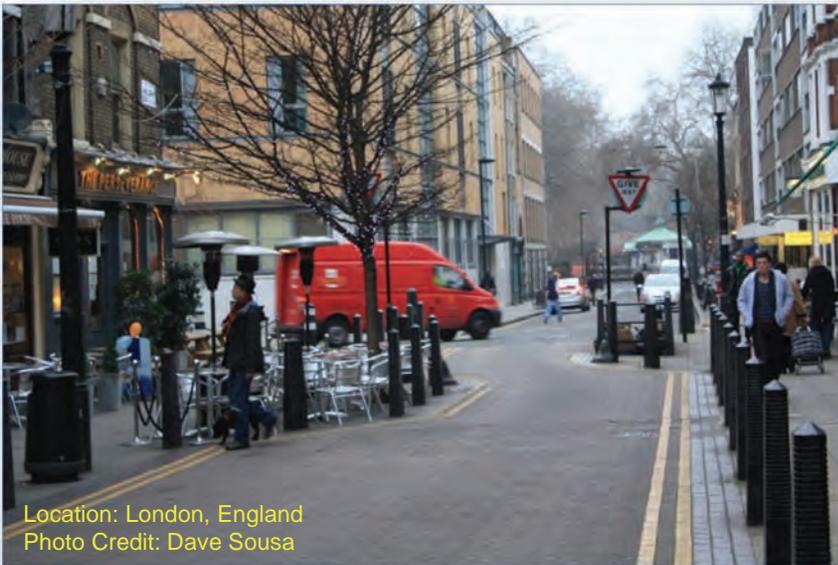
Underpass lighting can transform an uninviting underpass into an attraction or destination by improving safety and comfort as well as adding character to an otherwise bland piece of infrastructure. While underpasses are typically pedestrian barriers in the urban fabric, creative lighting can connect neighborhoods previously severed by major highways or rail lines.



T-1

Narrow Traffic Lanes and Road Diet

Suburban and urban streets should be designed for slower travel speeds and with narrower travel lanes (11' vs. 12' to 13') and narrower or no shoulders. Suburban streets are often designed using criteria that are more appropriate for rural streets – that is, they are designed for speed in the misguided belief that speed increases capacity. For a suburban street, the capacity is controlled at signalized intersections. Red light times can be shorter on streets with slower moving traffic and narrower crosswalks allow pedestrians to cross more quickly, further lowering red light durations. Narrowing lanes as part of a road diet, allows reallocation of excess automobile operating space for other amenities such as sidewalks, landscaping, bicycle amenities, medians, etc.



Location: London, England
Photo Credit: Dave Sousa



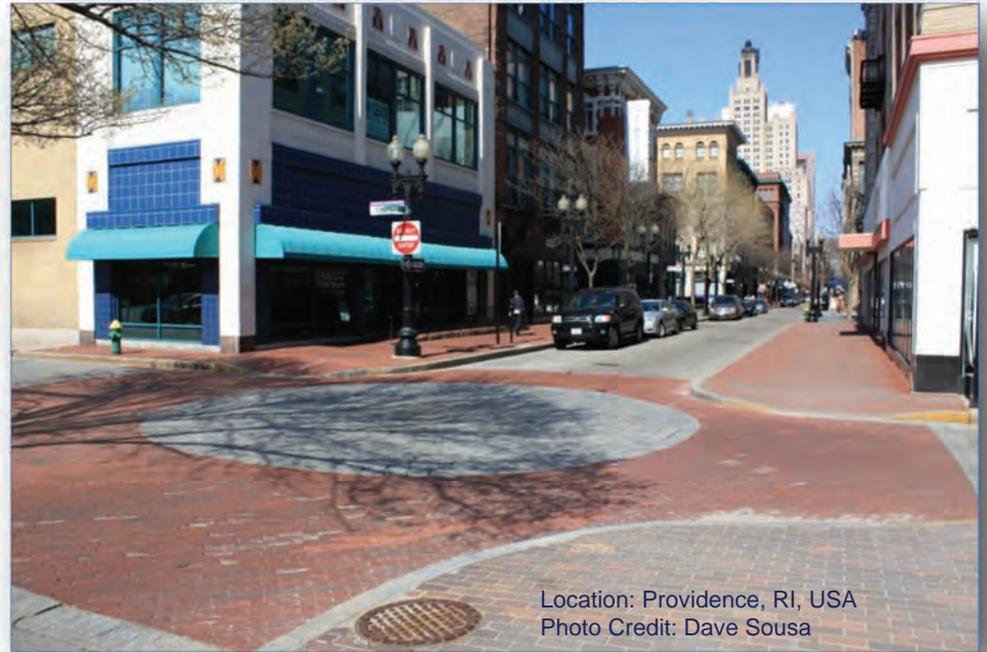
Location: Annapolis, MD
Photo Credit: Dave Sousa

T-2

Speed Tables and Speed Humps

Speed tables have a similar effect to that of raised intersections, the vertical deflection slows vehicle speeds but is not necessarily part of a pedestrian crossing. Speed tables are long enough for the wheelbase of a car to rest on top which allows cars to traverse them without bottoming out.

Raised crosswalks are Speed Tables outfitted with crosswalk markings and signage for safer and level pedestrian crossings. Also, by raising the level of the crossing, pedestrians are more visible to approaching motorists.



T-3

Curb Radius Reduction

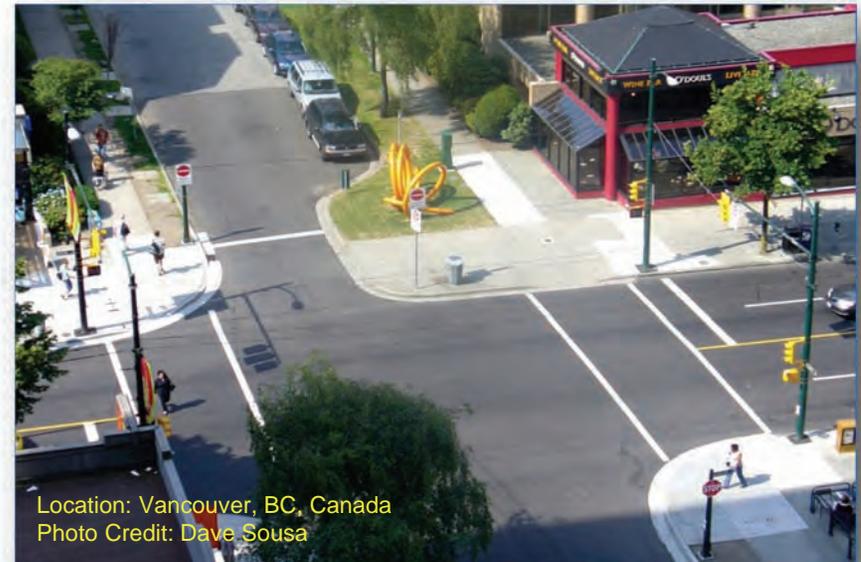
Smaller curb radii improve intersection safety for all users. A tighter curb radius results in slower turning speeds for vehicles and improved visibility for pedestrians. They also decrease the pedestrian crossing distance.



Location: Princeton, NJ, USA
Photo Credit: Dave Sousa



Location: Cambridge, MA, USA
Photo Credit: Dave Sousa



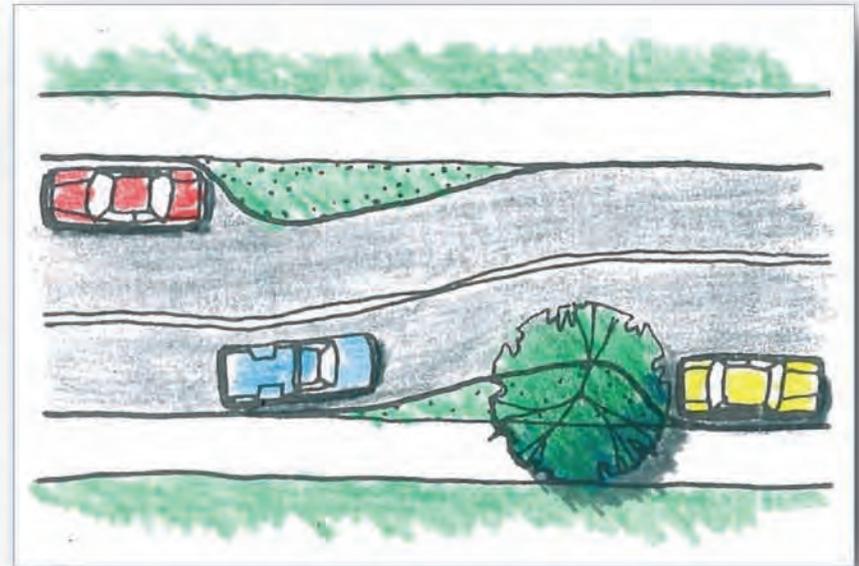
Location: Vancouver, BC, Canada
Photo Credit: Dave Sousa

T-4

Diverters & Chicanes

Traffic diverters cut an intersection in half diagonally to reduce traffic flow and speeds due to excessive through traffic. They are typically most suitable in residential areas where traffic calming is desired. Diverters typically preserve bicycle and pedestrian access while discouraging non-resident automobile travel.

Chicanes are a type of traffic calming device that redirects the path of travel by shifting travel lanes on an otherwise straight section of road. This has the effect to slow motorists who must navigate curves in the new travel lanes.



Location: New Haven, CT, USA
Photo Credit: Rigel Janette



Location: Berkeley, CA, USA
Photo Credit: CDM Smith screen capture of Google Maps Street View

T-5

Landscaped Medians

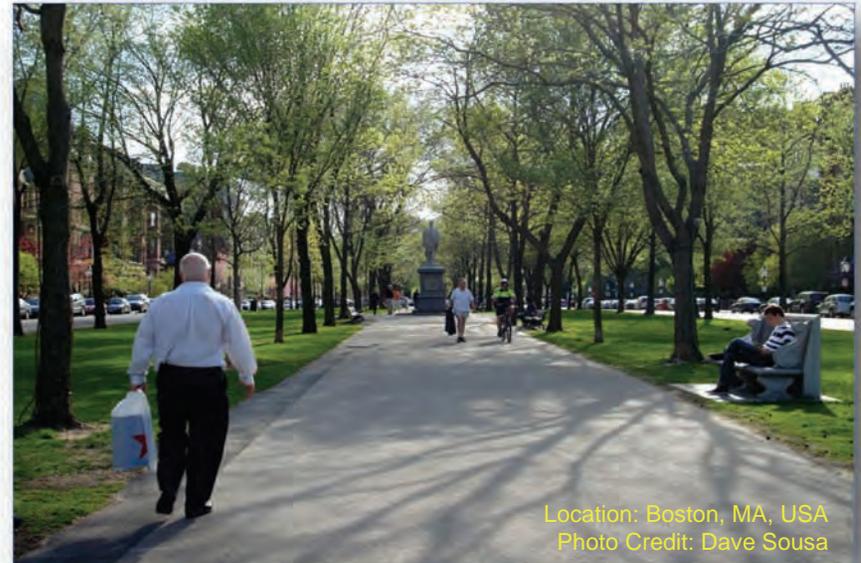
Landscaped median islands help define the entrance to local areas and enhance the character of the roadway. They provide a visual cue to drivers that they should expect to slow down on the oncoming roadway. This gateway treatment aides in traffic calming by narrowing the roadway, slowing traffic, allowing turning at designated points, improves conditions for pedestrians, and deters non-local traffic.



Location: New York City, NY, USA
Photo Credit: Dave Sousa



Location: South Norwalk, CT, USA
Photo Credit: Dave Sousa



Location: Boston, MA, USA
Photo Credit: Dave Sousa

T-6

On-Street Parking

On-street parking is common in downtown areas where land use is costly and parking is a high priority to visitors. On-street parking can reduce travel speeds, provide a buffer between traffic and pedestrians, and provide convenient access to street fronting destinations.



Location: South Norwalk, CT, USA
Photo Credit: Dave Sousa



Location: Cambridge, MA, USA
Photo Credit: Dave Sousa



Location: South Norwalk, CT, USA
Photo Credit: Dave Sousa

T-7

Mini Traffic Circles

Mini-Circles are raised circular islands constructed in the center of the intersections of residential streets (non-arterials).

They reduce vehicle speeds by forcing motorists to steer around them. Drivers making left turns must go the right of the circle.



T-8

Modern Traffic Roundabouts

Modern traffic roundabouts are viable alternatives to traditional signalized traffic intersections. They improve safety and efficiency for pedestrians, cyclists and motor vehicles.

Unlike older traffic circles or rotaries, modern roundabouts require entering vehicles to yield to vehicles already in the circle and have tight radii that discourage high speeds. The incidence of vehicle-pedestrian accidents is also less in roundabouts than in signalized intersections.



Location: Keene, NH
Photo Credit: City of Keene



T-9

Dynamic Speed Display Signs

Dynamic speed display signs measure the speed of oncoming traffic and tell drivers how fast they are going. They are considered not as effective as physical measures however they are effective in reducing speeds an average of 1-5 mph. They are most effective on those driving over the speed limit.



Location: Newport, RI
Photo Credit: Google Earth, screen capture by CDM Smith



Location: Unknown
Photo Credit: Open Source

T-10

Real Time Parking Information

Real time parking information provided through signage, mobile device applications or websites directs drivers to available parking as they are searching for it. The information reduces congestion resulting from circling in search of parking which in some urban areas can make up 35-70% of on street traffic.



Location: San Francisco, CA, USA
Photo Credit: Sfpark.org website, screen capture by CDM Smith



Location: San Jose, CA, USA
Photo Credit: CDM Smith

B-1

Shared Use Lanes (Sharrows)

A shared-lane marking or sharrow is a street marking installed in a travel lane that is too narrow to allow formal bicycle lanes. Sharrows remind motorists that a bicyclist may also use the lane. These symbols also serve to guide motorists and bicyclists into positions that accommodate safe passing of bicyclists. The directional nature of chevrons also serve to reduce the incidence of wrong-way bicycling.



B-2

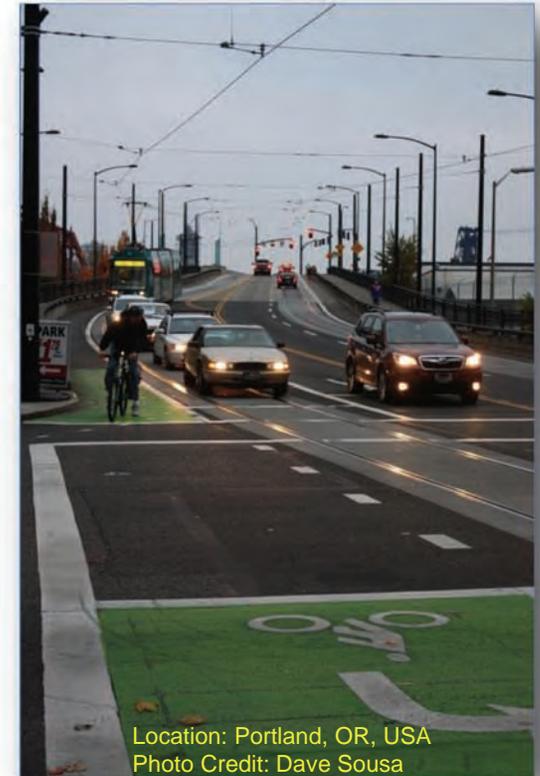
Bicycle Lanes

Bicycle lanes increase safety for bicyclists by separating them and passing motorists, and ultimately encourage cycling.

Motorists become more aware of the presence of cyclists and moderate their driving behavior accordingly.

Visibility of lanes can be enhanced with colored pavement and is typically used at potential areas of conflict such as intersections and driveways.

Buffers can be added to bicycle lanes in order to further separate the bicycle lane from the adjacent travel lane and/or parking lane further improving safety.



Location: Portland, OR, USA
Photo Credit: Dave Sousa



Location: New York City, NY, USA
Photo Credit: Dave Sousa



Location: Portland, OR, USA
Photo Credit: Dave Sousa

B-3

Bike Boxes and Intersection Crossing Markings

Bike boxes and ‘Through Bike Lanes’ are strategies to improve the visibility and safety of bicyclists at intersections. Bike boxes clearly defines the bicycle and vehicle zones and position cyclists to get a head start across the intersection. They also provide a buffer zone that discourages vehicles from blocking the pedestrian crossing. ‘Through Bike Lanes’ reinforce that through bicyclists have priority over turning vehicles or vehicles entering the roadway from cross streets. Both are especially important at intersections with high volumes of left and right-turning traffic. ‘Bicycle pockets’ and ‘combined bicycle lane/turn lanes’ at intersections allow bicyclists traveling in a bike lane to position themselves at a traffic signal to avoid conflicts with turning vehicles.



B-4

Cycle Tracks

Cycle tracks are dedicated bike lanes that provide vertical and horizontal separation between motor vehicles and cyclists. Protected Cycle Tracks are best situated between the on-street parking lane and the sidewalk (at the sidewalk level) to provide ultimate separation. A recent study by the Harvard School of Public Health reveals that cycle tracks had a 28% lower injury rate vs. on-street bicycle lanes. They are more attractive for bicyclists of all levels and ages and are much preferred over on-street bicycle lanes.



B-5 Bicycle Boulevard

Bicycle boulevards are streets with low speed limits that give bicyclists priority over other modes of transportation. They allow localized vehicle traffic but are optimized for bicycle usage. The design improves bicyclist safety and comfort for riding in urban areas.

Features such as diverters are used to calm traffic and filter localized traffic from the boulevard.



Location: Amsterdam, Netherlands
Photo Credit: Dave Sousa



Location: Utrecht, Netherlands
Photo Credit: Dave Sousa



Location: Frankfurt, Germany
Photo Credit: Dave Sousa

B-6

Shared Use Trails

Share use trails (sometimes referred to as multi-use trails or greenways) are off-road pathways intended for use by bicycles, equestrians, and pedestrians. They should also be designed to accommodate wheelchairs and therefore should be paved or have a well-graded stone-dust surface. They often follow river valleys or abandoned railroad rights-of-way and are used principally for recreation.



Location: Simsbury, CT
Photo Credit: Dave Sousa



Location: Bridgeport, CT, USA
Photo Credit: Dave Sousa

B-7

Bicycle Parking

Bicycle parking needs to be visible, accessible, and conveniently located. Racks should support both wheels and enable the user to lock the frame and wheels of the bike with a cable or U-shaped lock. Long-term parking areas should be covered, well lit, and visible.



Location: Yale University, New Haven, CT
Photo Credit: Dave Sousa



Location: Bridgeport, CT
Photo Credit: Dave Sousa

B-8

Bicycle Sharing Programs

This is a service in which bicycles are provided to users for shared use through community programs. The goal is provide an affordable alternative transportation for short distance trips. In urban areas where traffic congestion is a major issue, bike sharing reduces the volume of roadway traffic. Programs may be unregulated, deposit oriented, or require a membership for usage.



Location: Cambridge, MA, USA
Photo Credit: Dave Sousa



Location: Providence, RI, USA
Photo Credit: Dave Sousa

I-1

Bus Pullout

A bus pullout is a zoned area designated for frequent bus stops. They prevent blocking of traffic during boarding and alighting and may improve the safety of users accessing or leaving the bus.

If buses have difficulty merging back into traffic, “yield to bus” laws may be instituted.



I-2

Enhanced Bus Shelters and Route Marker Signs

Bus shelters protect passengers from inclement weather while waiting for the bus. Modern bus shelters may include LED lighting, benches, trash receptacles, system mapping, and dynamic messaging signs for users. Route markers show the direction of travel for a bus line. These signs may also include bus stop location, schedules, maps, and alternative bus lines. These signs help users orient themselves in the transit system and makes navigation towards their destination easier.



Location: Philadelphia, PA, USA
Photo Credit: Dave Sousa



Location: Danien, CT, USA
Photo Credit: Dave Sousa



Location: Vancouver, B.C., Canada
Photo Credit: Dave Sousa

I-3

Mobility Hubs (mode interchange plaza)

Mobility hubs are placed where multi-modal systems can merge in a key area. They provide shelter and transition between modes of transportation. As a transit station, the more convenient it facilitates transition between modes, such as a bus to a train or car to a train, the more riders the system will draw.



Location: Hartford, CT
Photo Credit: Dave Sousa



Location: New Haven, CT, USA
Photo Credit: Rigel Janette

I-4

Dynamic Message Signs (Real Time Arrivals)

Dynamic message signs give users real-time information about the arrival of their bus or train. This information helps users plan their trips accordingly and rider satisfaction is significantly higher if they know exactly how long they will have to wait for their bus or train. For larger transit systems, information may be posted for multiple routes.



Location: Portland, OR, USA
Photo Credit: Dave Sousa



Location: New Haven, CT, USA
Photo Credit: Rigel Janette

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