

## **Chapter 6. Engineering: Standards and Guidelines**

This chapter of the Winston-Salem Urban Area MPO Pedestrian Sidewalk and Facilities Plan acts as a stand-alone guidance document for the consideration, design, and construction of pedestrian facilities in the entire MPO. This is to be considered as recommended practice only; best practice in the design of pedestrian facilities must obviously be tempered through sound engineering practice that recognizes the site-specific physical constraints of various landscapes as well as cultural and community context.

Guidance on the design of pedestrian facilities has been published by NCDOT (1997); American Association of State Highway and Transportation Officials (AASHTO, 2004); and the Federal Highway Administration of the USDOT (FHWA, 2002). The recommendations herein rely heavily on those sources and others; users are encouraged to refer to them for additional information.

### ***6.1 On-Road Pedestrian Facilities Design Guidelines***

#### **Sidewalk Width**

The width of sidewalks should accommodate two persons walking past one another, a width generally perceived to be five feet when not directly behind the curb and gutter, at a minimum. In areas of high pedestrian activity or a more diverse use of sidewalk, additional width and different paving and streetscaping options should be considered.

The minimum width of a sidewalk and planting strip shall be as follows:

<b>Land Use – Street Type</b>	<b>Sidewalk</b>	<b>Buffer</b>
Central Business District	8 feet	Variable
Commercial/Industrial	5 feet	3.5-6.5 feet
Residential-Thoroughfares & Collector	5 feet	3.5-6.5 feet
Residential-Local	5 feet	3.5-6.5 feet

Other situations may require additional sidewalk width including: overhang from parked vehicles from off-street or angled parking areas, additional buffer from traffic when a planting strip can not be installed, and transit stops that provide seating or shelter for patrons.



Figure 6: Timed Crosswalk Signal

### Recommendations

- ❖ Eliminate both high and low contact points with tree branches, mast-arm signs, overhanging edges or amenities or furniture.
- ❖ Provide clear space between walls on one side of walkway and amenities, parking overhang, or plantings on the curb side of the walkway.
- ❖ Eliminate obstructions located in the sidewalk, i.e. utility poles, newspaper boxes, mail boxes, fire hydrants. Where this is not possible, provide adequate clearance around obstruction.

## **6.2 Signals**

Traffic signals and how they are phased or timed in coordination with each other greatly affect pedestrian safety. The State Division 9 Office is responsible for signals along State roadways such as on University Parkway, and other, and the Winston-Salem Traffic Engineering staff is responsible for signals along City roadways unless under agreement with NCDOT.

City and State traffic engineers determine need for pedestrian signals based on the Manual on Uniform Traffic Control Devices (MUTCD) Guidelines. The MUTCD is produced by the Federal Highway Administration and contains standards for traffic control devices that regulate, warn, and guide road users in all 50 States to optimize traffic performance, promote uniformity nationwide, and help improve safety. The MUTCD lays out criteria or “warrants,” including pedestrian traffic volume and proximity to schools, for installation of pedestrian signals.

## **6.2 Crosswalks**

Each city/municipality is responsible for installing and maintaining crosswalks on local roads according to established standards and specifications. They must work cooperatively with NCDOT when it comes to installing crosswalks on State Roads. Crosswalks are important pedestrian facilities and traffic control devices but are often taken for granted or overlooked, despite their impact on how pedestrians and motorists view a pedestrian crossing area. There are several factors that contribute to crosswalk effectiveness: visibility, location, design, appropriateness to the situation and enforcement.

Cross streets and intersections can be barriers to pedestrians when there is no or inadequate designation indicating where to cross. If a crosswalk is worn away, difficult to see or does not exist, then pedestrians are not encouraged to cross and motorists are not given a visual cue or warning to watch for pedestrians. A marked crosswalk includes the use of pavement markings and either signs or signals that are noticeable to motorists and pedestrians. Crosswalks should be:

### Recommendations

- ❖ Coordinate with signals or signs for maximum effectiveness.
- ❖ Be consistent so that they are recognizable throughout the MPO.
- ❖ Made visible.



Figure 25: Crosswalk

Twin lines for pedestrian crossings are not very visible and can be confused with other pavement markings.

#### Recommendations

- ❖ Zebra or other patterned, or stamped asphalt, shall be used generally and especially where there are no signal controls or at busy intersections.

### **6.3 Mid-Block Crossings**



Figure26: Mid-Block Cross,  
Winston-Salem

Mid-block crossings pose special problems for many state and local departments of transportation, since pedestrians will often choose to cross at the location that is the most convenient for them, not necessarily where it is the safest. The Charlotte Department of Transportation has developed important research and guidance for assessing alternative treatments at mid-block crossings. This guidance is based, in part, upon the work of FHWA and Charles Zegeer in examining a number of unmarked and marked mid-block crossings. Zegeer noted that a simple marked crosswalk by itself is often insufficient to provide a good cue to motorists that a pedestrian crossing is in front of them, particularly on roadways exceeding 12,000-15,000 vehicles per day (vpd). This is especially true in poor lighting conditions, short sight distance situations, multi-lane crossings, and high-volume streets. The Winston-Salem Urban Area MPO assumes that pedestrians will be using every street and making crossings, so the question becomes how best to safely accommodate pedestrians in a crossing situation.

When evaluating a mid-block crossing, Charlotte DOT considers: traffic volume, proximity to the nearest signalized crossing, vehicle speeds, and vehicular/pedestrian volumes. Other factors like roadway width and the presence of a high number of pedestrians will also influence the decision to locate a mid-block crossing and the type

of treatment needed to help ensure safe pedestrian crossings. The treatments that Charlotte identified are in the table below, along with costs and operating parameters.

**Mid-Block Crossing Treatment Design Criteria (Charlotte DOT, 2005)**

<b>Pedestrian Mid-Block Crossing Treatment</b>	<b>AADT</b>	<b>Operating Speed</b>	<b>Approximate Cost</b>
<b>Signs</b>	5,000-35,000	Less than 45 mph	\$250-350
<b>High-Visibility Markings</b>	5,000-12,000	Less than 35 mph	\$500-1,500
<b>Colored/Textured Markings</b>	5,000-12,000	Less than 35 mph	\$5,000+
<b>Curb Extensions</b>	5,000-12,000	Less than 35 mph	\$5,000-25,000
<b>Raised Crosswalks</b>	5,000-15,000	Less than 30 mph	\$2,000-15,000
<b>Refuge Island</b>	12,000-30,000	Less than 40 mph	\$10,000-40,000
<b>Median</b>	15,000-35,000	35-40 mph	Varies greatly
<b>In-Pavement Illumination</b>	5,000-15,000	Less than 35 mph	\$40,000
<b>Pedestrian-Only Signal</b>	15,000-35,000	35-45 mph	\$40,000-75,000
<b>HAWK Signal</b>	15,000-35,000	35-45 mph	\$35,000-60,000

Every mid-block crossing treatment will require a specific investigation by the relevant transportation department prior to initiating design and construction. Mid-block treatments can be useful in improving safety in areas with fairly high pedestrian crossings and low numbers of vehicles and vehicle speeds.

**6.4 Special Features**

**Mobility Impaired Designs**

The Winston-Salem Urban Area MPO strives to maintain a pedestrian system that is fully accessible to all of its citizens regardless of individual mobility limitations, and in accordance with the Americans with Disabilities Act of 1990 (ADA). This is accomplished through design sufficiency as well as recognizing appropriate details that make designs user-friendly. The following is not a comprehensive guide, but offers guidance on a number of criteria design details that should be considered when developing portions of the pedestrian system.

### Typical Curb Ramp Design

Curb ramps are a significant and required feature of accessible pedestrian transportation systems, and must be designed carefully to fulfill their function and the requirements of the Americans with Disabilities Act.

### Recommendation

- ❖ Curb ramps should not have a slope greater than 1:12, meaning that for every foot of travel, the slope should not rise more than one inch.
- ❖ Provide a tactile warning to the visually impaired, raised truncated domes with a color contrast to the background material should be used.
- ❖ Curb ramps will be placed entirely within the area of the marked crosswalk, so that a pedestrian can enter the ramp space at an angle perpendicular to the direction of travel. The standard is to have separate curb ramps on each corner; if a shared curb ramp is constructed, then the width and radius should accommodate the user so that entry onto the ramp is parallel to the direction of travel.

The *ADA Accessibility Guidelines for Buildings and Facilities* has an easy to use format for locating specific design criteria related to curb ramps, rise/run restrictions on ramps, and figures illustrating basic concepts.

In the City of Winston-Salem, the Mayor's Council for Persons with Disabilities sponsors a Barrier Awareness Day. Barrier Awareness Day begins with a Challenge event where participants pair up with a person with a disability, and a "guardian angel." The participant assumes the same disability as their guide and the guardian angel is there to assist as all three return to the community. Participants may decide to go back to their place of work or visit the mall or a grocery store to experience first hand the physical and attitudinal barriers people with disabilities face on a daily basis. Participants include community citizens and governmental employees who oversee construction of City facilities, such as sidewalks, streets, and housing.

### **Grade-Separated Crossing**

It is often desirable to provide a separated-grade crossing of a major street, sometimes in conjunction with a stream crossing at the same location. A grade-separated crossing provides continuity of a bicycle/pedestrian facility over or under a barrier. This can be provided by either a bridge or an underpass. Pedestrians are sensitive to uninviting interiors of such crossings, and will not use them if they perceive them to be threatening due to especially long traverses in poorly lit conditions.

If the roadway is not elevated, then the openings of an underpass should be flared out to provide clear lines of sight. Minimum widths are 10-12 feet for traverses less than 60 feet in length. Wider widths are suggested for urban areas of longer traverses. Vertical clearances should be a minimum of 8 feet, but 10 feet is more desirable. *AASHTO* provides guidance for lighting in underpasses in their *Roadway Lighting Design Guide*. Providing below-grade crossings must also be dependent on the proximity to floodways.

When constructing pedestrian overpasses it is important to remember that pedestrians will not use an overpass that is inconvenient. Instead, they may choose a time saving, and sometimes more hazardous crossing. Fencing or other controls may be required to reinforce the safe crossing point.



Figure 27: Pedestrian Bridge, Old Salem

Currently in Winston-Salem, there are seven pedestrian underpasses and five overpasses.

Underpasses:

1. Silas Creek Parkway and Yorkshire Road
2. Silas Creek Parkway between Bethabara Road and Fairlawn Drive (part of greenway)
3. R.J. Reynolds High School on Northwest Boulevard
4. Deacon Boulevard between Coliseum and Groves Stadium
5. Convention Center under 5<sup>th</sup> Street
6. Cherry Street/Marshall Street Deck under Cherry Street
7. Highland Avenue near 12<sup>th</sup> Street

Overpasses:

1. Old Salem over Old Salem Road
2. between 13<sup>th</sup> Street and Northwest Boulevard over University Parkway
3. between Vargrave Street and Willow Street over US 52
4. over Cherry Street at the Convention Center
5. over 3<sup>rd</sup> Street between Liberty Street and Town Run Lane

Recommendations

- ❖ Pedestrians should not be put into a situation where they are at risk from rapidly rising flood waters
- ❖ Crossings shall be well lit for pedestrian safety

**Rail-to-Trail Program**

Rail-trails are multi-purpose public paths created from former railroad corridors. Flat or following a gentle grade, they traverse urban, suburban and rural America. Ideal for many uses, such as bicycling, walking, inline skating, cross-country skiing, equestrian

and wheelchair use, rail-trails are extremely popular as recreation and transportation corridors. Since the 1960s, 13,150 miles of rail-trails have been created across the country. Rail-trails also serve as wildlife conservation corridors, linking isolated parks and creating greenways through developed areas, and as a means of preserving historic landmarks.

When a railroad proposes a corridor for abandonment, it must notify the Rivers and Trails program of the National Park Service. Rivers and Trails shares the information with Rails-to-Trails Conservancy (RTC), which notifies community activists and officials of the impending abandonment. RTC's early warning packet also provides information on how to preserve a corridor for trail use through railbanking. Federal regulations require interested parties to request railbanking within 30 to 45 days. Without the early warning system, many community leaders would learn of rail abandonment too late to preserve corridors for public use.

The only existing Rail-to-Trail system in the Winston-Salem Urban Area MPO is the Strollway in Winston-Salem. This is a one-mile trail that connects downtown Winston-Salem to Historic Old Salem and the Southeast Gateway area. The trail is constructed of asphalt and crushed stone. It is well-lit and provides access to adjacent neighborhoods.

#### Recommendations

- ❖ Norfolk-Southern Railroad line along Stratford Road and Northwest Boulevard in Winston-Salem
- ❖ Norfolk-Southern Railroad line from 25<sup>th</sup> Street to downtown research park in Winston-Salem

#### **Traffic Calming for Pedestrian Safety**

The Winston-Salem Urban Area MPO has a proactive policy to provide safe, on-street environments for vehicular, pedestrian and bicycle travel. The City of Winston-Salem

conducts and implements several traffic calming studies each year that analyze and recommend appropriate treatments to slow vehicles and discourage high “cut-through” traffic volumes of cars and trucks. Although a complete treatment of traffic calming principles and guidance is beyond the scope of this document, there are a number of principals that should be emphasized during the evaluation, design, and implementation of traffic calming devices.

- The installation of some traffic calming devices, if inappropriately designed, can impede the safe movement of cyclists, mobility-impaired pedestrians, emergency response vehicles, and some vehicle types such as combination truck-trailers or motorcycles.

Sited and designed properly, traffic calming can successfully enhance pedestrian environments. If poorly designed and/or located, traffic calming measures can have the opposite of the intended effects on the walking environment and potentially the safety of pedestrians.

<b>TRAFFIC CALMING TREATMENTS AND POTENTIAL FOR POOR DESIGN TO INFLUENCE DIFFERENT USER GROUPS</b>					
<b>Device/Treatment</b>	<b>Description</b>	<b>B</b>	<b>P</b>	<b>MI</b>	<b>VI</b>
Curb Extensions “pinch points”	Curb extensions, planters, or centerline traffic islands that narrow traffic lanes to control traffic and reduce pedestrian crossing distances. Also called “chokers.”	●	□	○	○
Speed tables, raised crosswalks	Ramped surface above roadway, 2-3 inches high, 10-20 feet long.	○		○	□
Mini-circles	Small traffic circles at intersections.	□	□	□	□
Median islands	Raised island in the road center (median) narrows lanes and provides pedestrian with a safe place to stop.			□	□
Channelization island	A raised island that forces traffic in a particular direction, such as right-turn-only.	□	○	○	○
Tighter corner radii	The radius of street corners affects traffic turning speeds. A tighter radius forces drivers to reduce speed. It is particularly helpful for intersections with numerous pedestrians.	□			

Speed humps	Curved, 2-3 inches high, 10-20 feet long hump.	○		□	
Rumble Strips	Low bumps across road that make noise when driven over.	□			□
Chicanes	Curb bulges or planters (usually 3) on alternating sides, forcing motorists to slow down.	●			
Roundabouts	Medium to large circles at intersections.	□	□	○	□
Pavement treatments	Special pavement textures (textured concrete or asphalt) and markings to designate special areas.	○		○	○
Bike lanes	Marking bike lanes narrows traffic lanes.	□			
“Road diets”	Reducing the number and width of traffic lanes, particularly on arterials.	○			
Horizontal shifts	Lane centerline that curves or shifts.	○			□
2-lanes narrow to 1-lane	Curb bulge or center island narrows two-lane road down to one lane, forcing traffic for each direction to take turns.	□			
Semi-diverters, partial closures	Restricts entry/exit to/from neighborhood. Limit traffic flow at intersections.	□			
Street closures	Closing off streets to through vehicle traffic at intersections or mid-block.	□			
Stop signs	Additional stop signs, such as 4-way stop intersections.	□	□	□	□
Neo-traditional street design	Streets with narrower lanes, shorter blocks, T-intersections, and other design features to control traffic speed and volumes.	□		□	
Perceptual design features	Patterns painted or stamped into road surfaces and other perceptual design features that encourage drivers to reduce their speeds.				○
Street trees	Planting trees along a street to create a sense of enclosure and improve the pedestrian environment.			□	
Special reductions	Traffic speed reduction programs. Increased enforcement of speeding violations.				

**B**=Cyclist; **P**=Pedestrian; **MI**=Mobility Impaired Person; **VI**=Visually Impaired person  
 No impact to pedestrians; □ Light Potential Impact; ○ Moderate Potential Impact; ● Serious Potential Impact

## Parking Facilities

Everyone becomes a pedestrian once they park their car, but there are many examples of poor parking lot design. The most common design issue is that the

primary carriageway for vehicles in the parking lot happens to coincide with where the greatest numbers of pedestrians are crossing, directly in front of the main entrance. Other issues include poor sight lines to spot pedestrians, bad transition areas from the public domain to the private parking area, and inconvenient pedestrian access between parking areas, shops, and adjacent communities. Through the driveway permitting process, the site plan review process and revision to the UDO, attain the following:

### Recommendations

- ❖ Provide continuous transitions from the street into a safe landing area in the parking lot; do not dump pedestrians into the throat of a driveway.
- ❖ Maintain good sight lines at major turning points inside the parking area.
- ❖ Whenever possible, provide perpendicular pedestrian access into the front of a high volume land use such as major retail use.
- ❖ Move the main parking aisle away from the principal entrance.

### **Temporary Pedestrian Access**

The construction or expansion of roadways, utilities, or private development sometimes requires that sidewalks be temporarily closed to allow for the movement of construction vehicles on and around the site. When pedestrian facilities are closed temporarily, the entity responsible for the construction is also responsible for providing adequate access through or around the site as well as signage that provides advance warning to pedestrians and motorists of the closure. Both the MUTCD (Manual of Uniform Traffic Control Devices), NCDOT Draft Planning and Designing Local Pedestrian Facilities, and the ADA (Americans with Disabilities Act) stipulate that safe passage should be maintained throughout a temporary closure unless it occurs during an extreme situation such as a natural or man-made emergency. During private construction within the City limits, it is the responsibility of the City of Winston-Salem to ensure compliance with these rules by regular monitoring.



Figure 28: Temporary Sidewalk, Old Salem