City of Reidsville Senior Center Sidewalk Crossing Study

Final Report

PIEDMONT TRIAD
REGIONAL COUNCIL

Table of Contents

Figures 3
Existing Conditions 4
Washington Avenue 4
Sidewalks & Curb Ramps 4
Community Characteristics 7
Residential Uses 7
Office and Institutional Uses 7
Study Area Observation Summary 8
Pedestrian Crossing Recommendation 9
Facility Type 9
Location Analysis 9
Signs and Markings 12
Recommendation Overview 12
Design and Cost Information 15
Advance Signing 15
Advance Yield Line and Sign 16
Hi-Visibility Crosswalk (Ladder Crossing) 17
In-Street Pedestrian Crossing Signs 18
Crossing Signs 19
Detectable Warnings 19
Other Recommendations 20
Driveway Improvements 20
Rectangular Rapid Flash Beacon (RRFB) 21
Selected Resources on Pedestrian Crossing Facilities 22
NCDOT Resources 22
Other Resources 22

Figures

Figure 1: Pavement Conditions on Washington Avenue Looking North from Habitat Place 4
Figure 2: Location of Sidewalks Looking South Inside Study Area 5
Figure 3: Sidewalk Gap Looking North Inside Study Area..... 5
Figure 4: Sidewalk Locations and Conditions 6
Figure 5: 3D Rendering of New Senior Center..... 8
Figure 6: Unsignalized Mid-block Crossing Example in Kernersville, NC..... 9
Figure 7: Location Analysis..... 10
Figure 8: Aerial Photo of Option 3 Crossing Location on N. Washington Ave..... 11
Figure 9: Crossing Location Before Midblock Crossing..... 12
Figure 10: Crossing Location After MidBlock Crossing 13
Figure 11: Recommended Signs and Markings..... 14

Existing Conditions

Washington Avenue

This study is focused on the 100 block of North Washington Street which runs approximately 575 feet between West Morehead Street on the southern end, Habitat Street in the middle, and Graves Street to the north.

North Washington Avenue is a paved, unstriped, local collector street running along the northern center of the city and approximately half a mile from Reidsville's downtown. The width of the roadway varies by location from 22 feet wide in the southern end of the study area to 33.5 feet as it approaches Graves Street. From field observations, the roadway is used primarily by residents living nearby, visitors to the Recreation Center, and through traffic.

The condition of the roadway can be generally described as fair to poor depending on location. The pavement has been repaired in several areas due to wear or utility work, however, there are signs of distress that still exist, as shown in the photo below (Figure 1).

Figure 1: Pavement Conditions on Washington Avenue
Looking North from Habitat Place

Source: PTRC

Sidewalks & Curb Ramps

Several yards of sidewalk exist on both sides of North Washington Street within the study area (see Figure 2). The condition of the sidewalks vary from good to poor depending on the location. However, the majority of sidewalks are considered to be in good condition due to upgrades in the past few years. The sidewalk access is continuous within the study area except for an approximately 9.5 foot gap near the corner of Washington Avenue and Habitat Place as seen in Figure 3, likely due to a utility pole replacement. The map in Figure 4 illustrates the location and condition of sidewalks in the study area and the location of curb ramps.

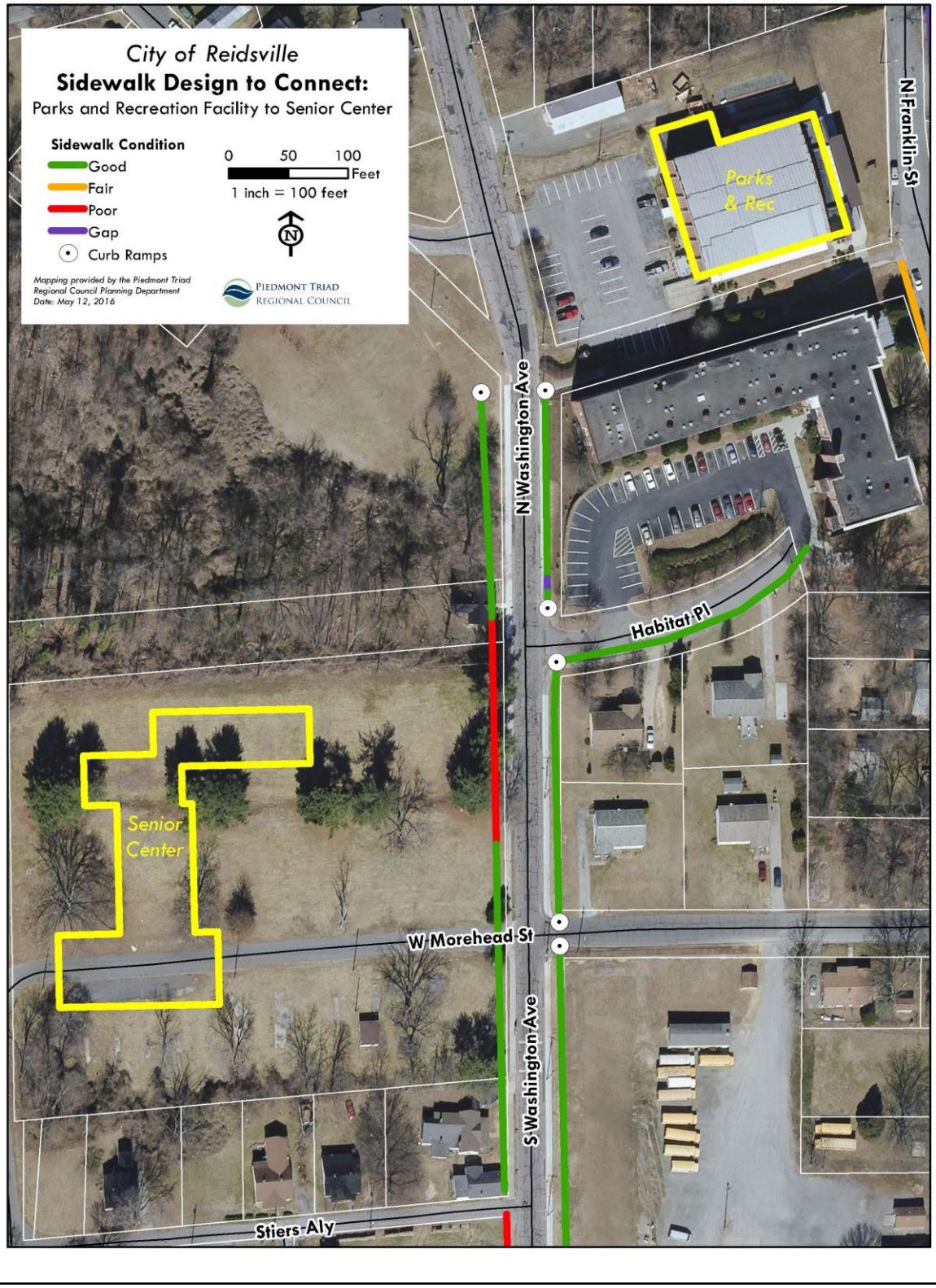
Figure 2: Location of Sidewalks Looking South Inside Study Area

Source: PTRC

Figure 3: Sidewalk Gap Looking North Inside Study Area

Source: PTRC

Figure 4: Sidewalk Locations and Conditions



Community Characteristics

The study area has both within and surrounding it several different land-uses ranging from residential to office and industrial.

Residential Uses

The majority of the surrounding land is zoned for High Density Residential (R6). The City of Reidsville's Zoning Ordinance describes High Density Residential (R6) as "medium to high density residential areas where single and multi-family dwellings are mingled with certain open areas where similar residential development will likely occur." Outside of the residential neighborhoods to the north, several residential properties exist within the study area. The largest of these is the RHS Apartments located at 115 North Washington Avenue. The building was originally built in 1940 and functioned as Reidsville High School for several decades before being converted into 53 apartments for senior adults. Other residential properties along North Washington Avenue include three single family houses located at 110 North Washington Avenue, 103 Habitat Place, and 106 West Moreland Street.

Office and Institutional Uses

The primary office and institutional destinations identified within the study area are the City of Reidsville's Recreation Administration/Gymnasium Building and the future Senior Center building that is currently under construction.

The Recreation Administration/Gymnasium provides seniors with meeting space in addition to health and fitness opportunities. The fitness center, located on the lower level of 201 North Washington Avenue, includes weights, stationary bikes, treadmills, elliptical machines, and other fitness equipment.

The Senior Center (see rendering in Figure 5), located at 102 North Washington Avenue, is approximately 500 feet to the south???? of the Recreation Administration/Gymnasium. According to information provided by The City of Reidsville, the new Senior Center building will include a multi-purpose gym, fitness room, dance theater, craft room, computer lab, library, social lounge and a large dining room. The remaining space will be used by Aging, Disability, and Transit Services (ADTS) of Rockingham County while the exterior of the facility will include parking for 100 vehicles; outdoor courts for shuffleboard, bocce ball, and horseshoes; decorative landscaping and a concrete sidewalk surrounding the entire grounds allowing a handicap (ADA) accessible pedestrian route.

Figure 5: 3D Rendering of New Senior Center

Source: tma architect

Study Area Observation Summary

The following table summarizes the data gathered from the study area.

Roadway Name and Location	North Washington Avenue, City of Reidsville
Type of Area	Urban
Adjacent Land-Uses	High Density Residential, Office, and Institutional
Roadway Functional Class	Collector or Minor Arterial
Volume	Low (observed)
Speed	Low (25 mph)
Number of Lanes	2 lanes (unmarked asphalt)
Roadway Widths	22 feet to 33.5 feet
Paths Present Along Roadway	Sidewalk (concrete)
Sidewalk Width	4 feet
Traffic Signal	Not present
Transit Line/Route	Not present
School Zone/Crossing	Not present
Railroad Crossing	Not present
Work Zone	Not present

Pedestrian Crossing Recommendation

Facility Type

To accommodate the expected rise in pedestrian traffic volume between the existing Parks and Recreation building and the new Senior Center, an ***unsignalized mid-block crossing on North Washington Street has been chosen as the desired pedestrian accommodation*** to connect the existing Parks and Recreation Facility with the new Senior Center. A pedestrian mid-block crossing is a marked crosswalk that occurs in a location other than an intersection. An example of an unsignalized mid-block crossing is shown in Figure 6. This crossing connects a neighborhood with a shopping district.

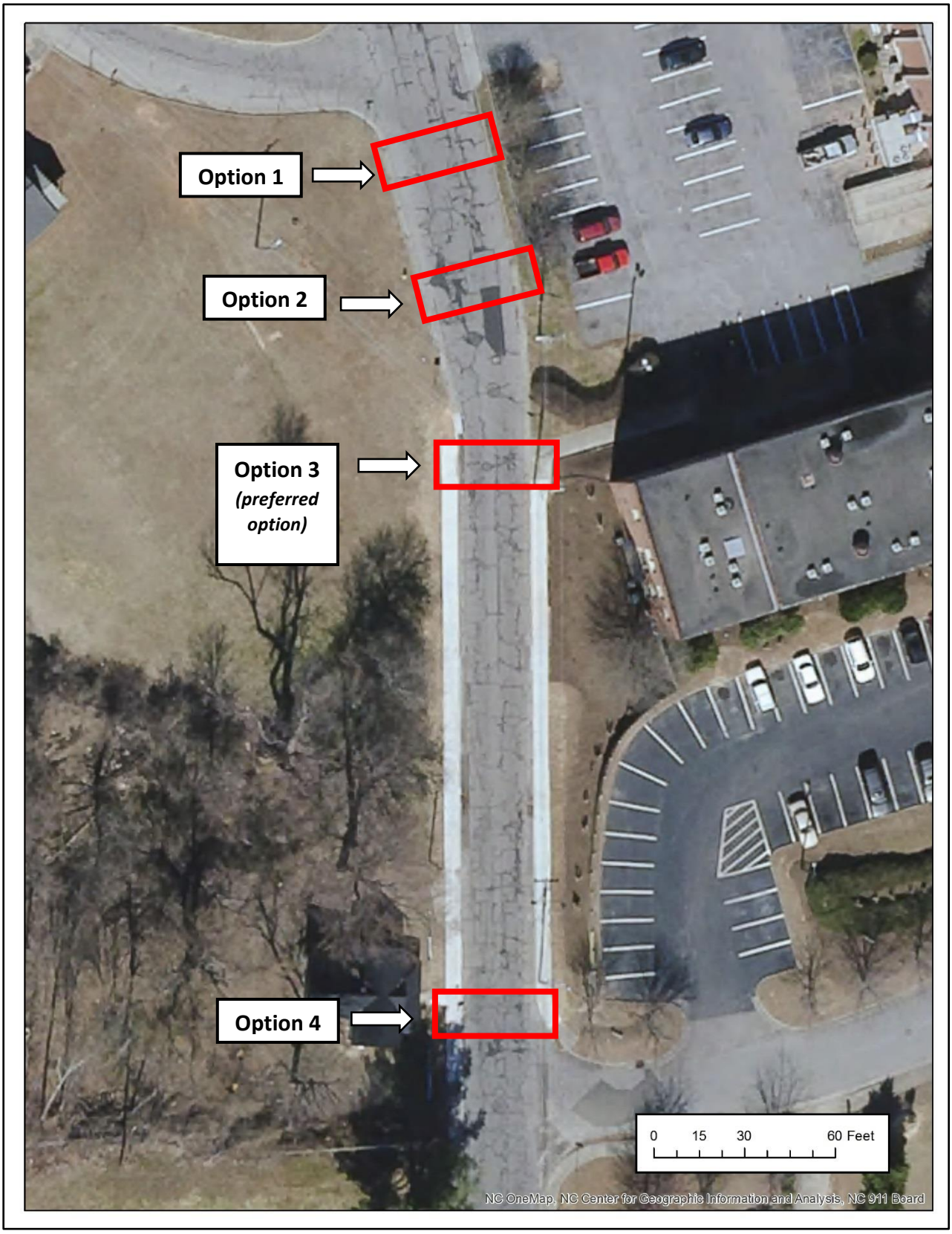
Figure 6: Unsignalized Mid-block Crossing Example in Kernersville, NC

Source: PTRC

Location Analysis

After a mid-block crossing has been selected as the preferred pedestrian accommodation, the next step is to determine the appropriate location for the facility. The segment of North Washington Avenue within the study area was evaluated using both aerial photography and site visits. As shown in Figure 7, several locations were initially considered for the crossing location. ***After careful analysis, Option 3 was chosen as the best location of a mid-block crossing***.

Figure 7: Location Analysis

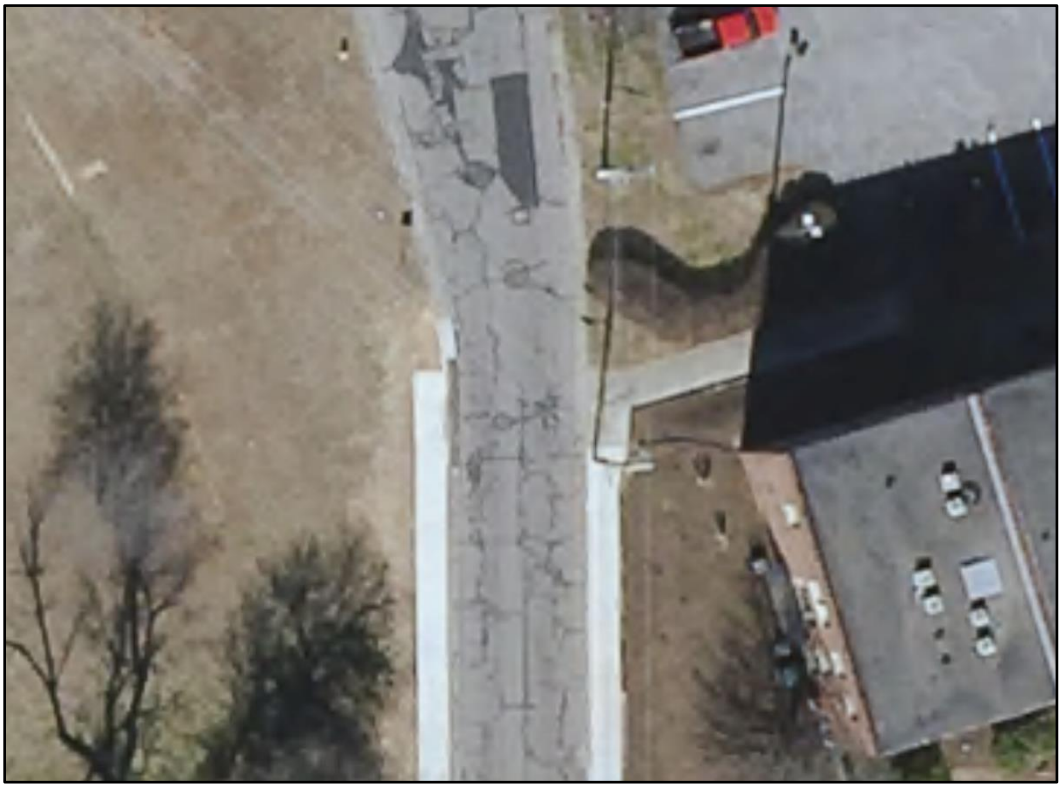


If Option 3 is not available, then Option 4 should be selected. Both Option 1 and Option 2 should only be considered if a sidewalk is built and/or improved along this portion of North Washington Avenue.

The following reasons factored into the final location decision:

- The location of existing sidewalks that are in good condition.
- The location of existing curb ramps.
- The crosswalk's proximity to the existing Recreation Center.
- The width of roadway at the crosswalk.
- The lower potential for conflicts with turning vehicles either from the Recreation Center parking lot or [enter street name].

Figure 8: Aerial Photo of Option 3 Crossing Location on N. Washington Ave.



Signs and Markings

Recommendation Overview

The following is more detailed information regarding the types of signs and markings that are recommended for the unsignalized mid-block crossing on North Washington Street. These recommendations are for Option 3, but can be modified to fit other options if desired. Figure 9 and Figure 11 show before and after views of the midblock crossing and Figure 10 provides a summary of these recommendations.

Figure 9: Crossing Location Before Midblock Crossing

Figure 10: Crossing Location After MidBlock Crossing

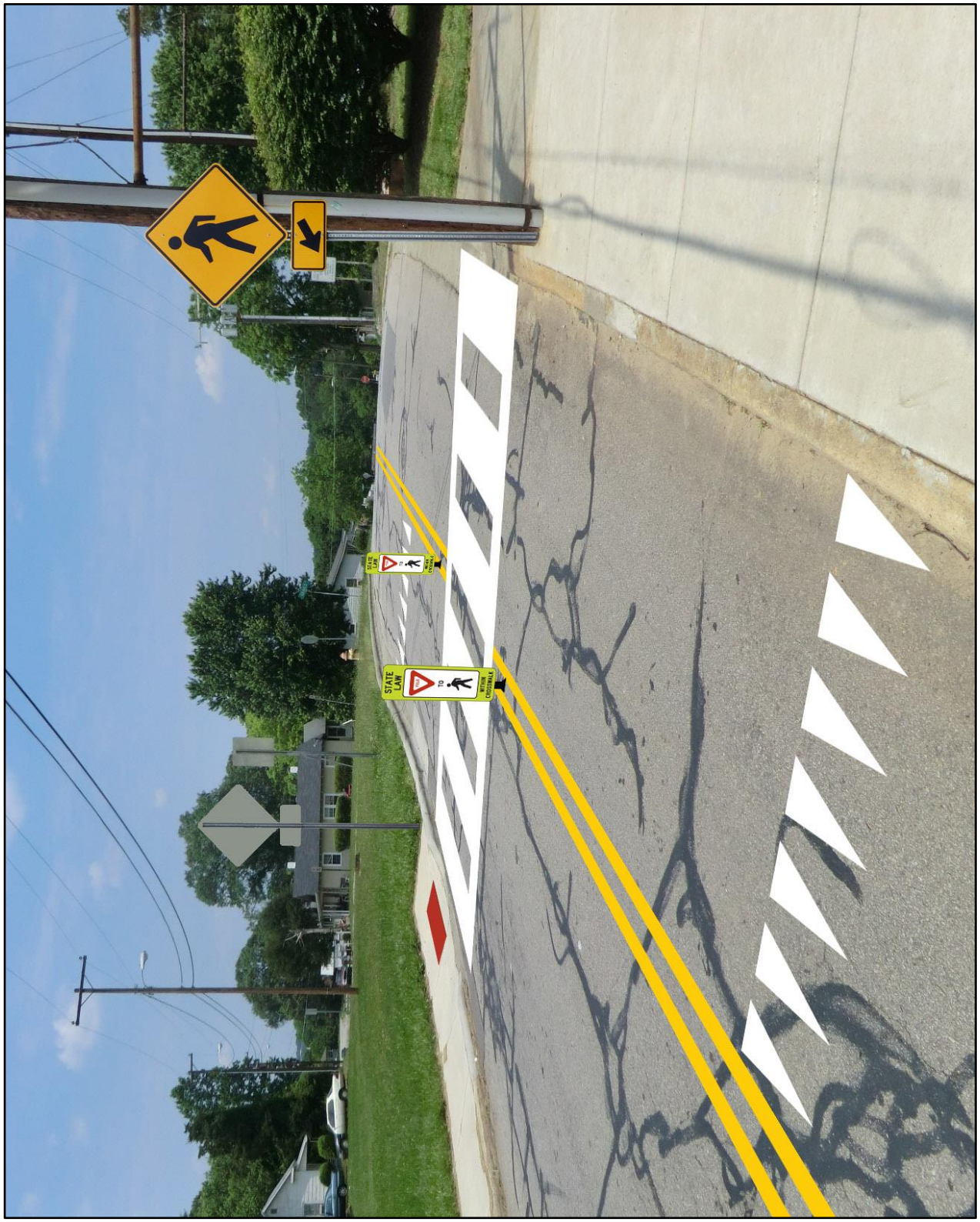
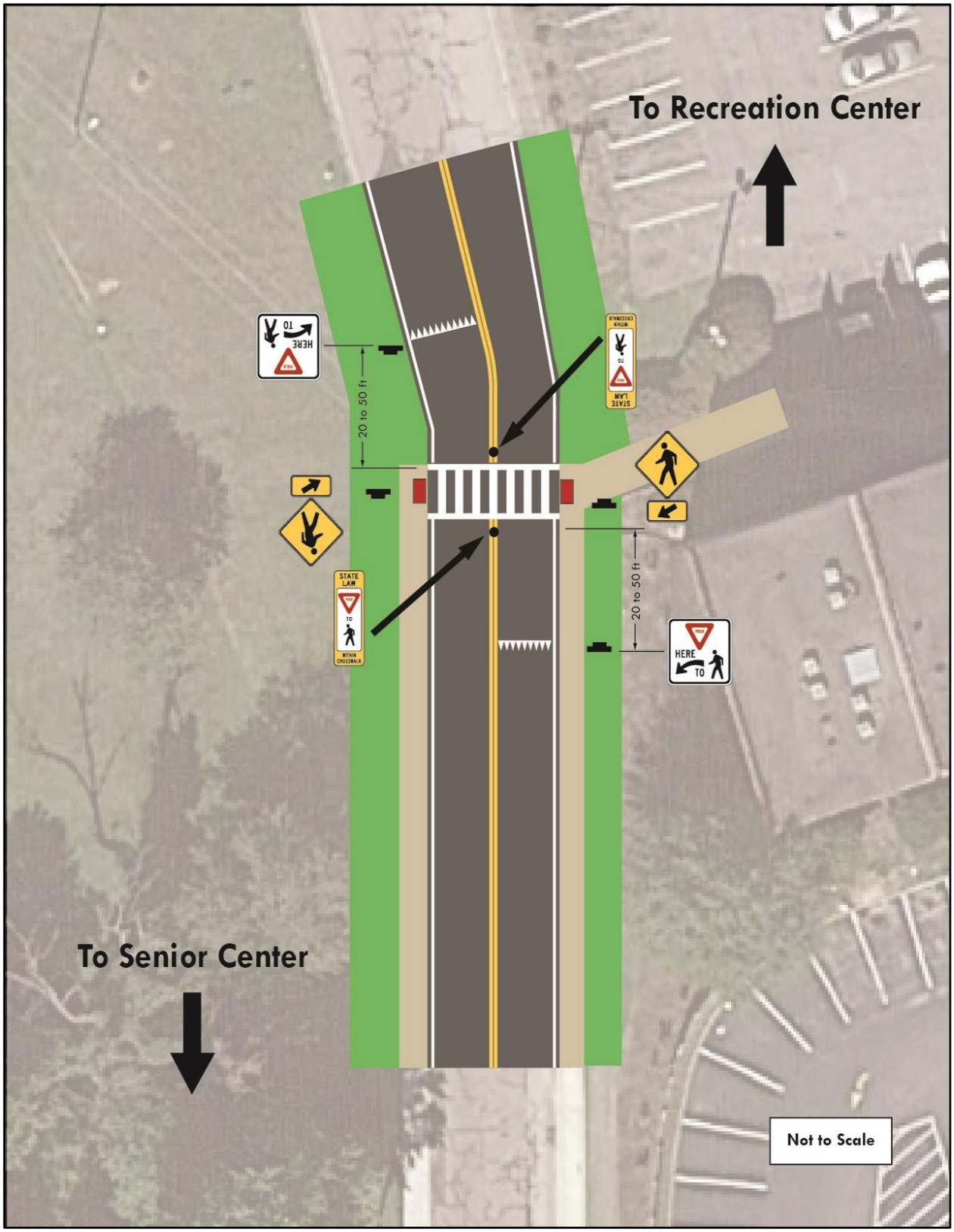


Figure 11: Recommended Signs and Markings



Design and Cost Information

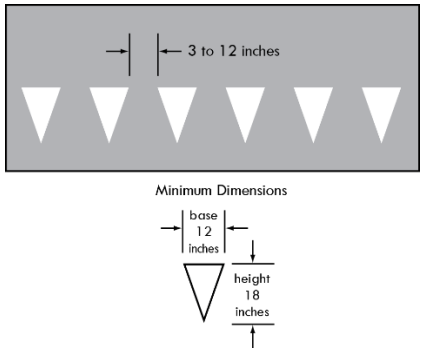
The following pages provides detailed information about the recommended signs and markings including descriptions, designs, guidance information (if available), and estimated costs.

Advance Signing

<table>
<tr><td colspan="2">Advance signing is used to provide additional notification to drivers that a crosswalk is near and pedestrians may be crossing the roadway. Advance signing is particularly useful at locations where a crosswalk might be unexpected by approaching drivers. (Source: TCRP Report 112/NCHRP Report 562)</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>MUTCD Description: Non-Vehicular Warning signs may be used to alert road users in advance of locations where unexpected entries into the roadway might occur or where shared use of the roadway by pedestrians, animals, or equestrians might occur. When used in advance of a pedestrian, snowmobile, or equestrian crossing, the signs should be supplemented with plaques with the legend AHEAD or XX FEET to inform road users that they are approaching a point where crossing activity might occur.</td><td>MUTCD Guidance: When a fluorescent yellow-green background is used, a systematic approach featuring one background color within a zone or area should be used. The mixing of standard yellow and fluorescent yellow-green backgrounds within a selected site area should be avoided. Non-vehicular signs should be used only at locations where the crossing activity is unexpected or at locations not readily apparent.</td></tr>
<tr><td colspan="2">Costs: Approximately $400 to $500 (Source: Palo Alto Bicycle and Pedestrian Plan).</td></tr>
</table>

Advance Yield Line and Sign

At midblock crossings and signalized or stop-controlled approaches to intersections, the vehicle yield line can be moved farther back from the pedestrian crosswalk for an improved factor of safety and for improved visibility of pedestrians.



R1-5

R1-5a

FHWA Ped Facilities Users Guide Description:
Advance yield lines allow pedestrians and drivers to have a clearer view of each other and more time in which to assess intentions. The effectiveness of this tool depends upon whether motorists are likely to obey the stop line, which varies. In some places, the yield line has been moved back by 15 to 30 feet (4.6 to 9.1 m) relative to the marked crosswalk with considerable safety benefits for pedestrians.

MUTCD Guidance:
If used, yield lines should be placed a minimum of 4 feet (1.2 m) in advance of the nearest crosswalk line at controlled intersections. If used at an un-signalized midblock crosswalk, yield lines should be placed adjacent to the Yield Here to Pedestrian sign located 20 to 50 feet (6.1 to 15 m) in advance of the nearest crosswalk line, and parking should be prohibited in the area between the yield line and the crosswalk.

Costs: When installed as part of new paving or during repaving projects, the cost is approximately $200 to $800 per intersection, otherwise the cost is approximately $1000 to $2000. (Source: http://www.pedbikeinfo.org and Costs for Pedestrian and Bicyclists Infrastructure Improvements)

Cost: Approximately $200 (Source: Costs for Pedestrian and Bicyclists Infrastructure Improvements).

Hi-Visibility Crosswalk (Ladder Crossing)

<table>
<tr><td colspan="2">Markings provide guidance for pedestrians who are crossing roadways by defining and delineating paths on approaches to and within signalized intersections, and on approaches to other intersections where traffic stops. They also alert road users of a pedestrian crossing point across roadways not controlled by signals or stop signs. At non-intersection locations, markings legally establish the crosswalk. Specific guidance on the use of marked crosswalks is provided in FHWA-RD-01-075. These FHWA guidelines may be used as a supplement to the guidelines for marked crosswalks presented here. (Source: TCRP Report 112/NCHRP Report 562)</td></tr>
<tr><td> 
</td><td>  </td></tr>
<tr><td>MUTCD Markings Guidance: Crosswalks should be no less than 6 feet (1.8 m) wide. Crosswalk lines should extend across the full width of pavement.
Crosswalks should be marked at all intersections with “substantial conflict” between vehicles and pedestrians.

FHWA Markings Guidelines: Marked crosswalks alone should not be installed at un-signalized pedestrian crossings when speeds are greater than 40 mph.</td><td>MUTCD Markings Standard: When crosswalk lines are used, they shall consist of solid white lines that shall not be less than 6 in nor greater than 24 in wide.</td></tr>
<tr><td colspan="2">Cost: Approximately $3,000 - $5,000 each (Source: Costs for Pedestrian and Bicyclists Infrastructure Improvements).</td></tr>
</table>

In-Street Pedestrian Crossing Signs

In-Street Pedestrian Crossing signs are regulatory signs placed in the street (on lane edge lines and road centerlines, or in medians). In-Street Pedestrian Crossing signs are described in the 2003 Manual of Uniform Traffic Control Devices, in Section 2B.12.

The In-Street Pedestrian Crossing sign (R1-6 or R1-6a) may be used to remind road users of laws regarding right of way at an un-signalized pedestrian crossing. The legend STATE LAW may be shown at the top of the sign if applicable. The legends STOP FOR or YIELD TO may be used in conjunction with the appropriate symbol. (Source: TCRP Report 112/NCHRP Report 562)

R1-6

MUTCD Standard: The In-Street Pedestrian Crossing sign shall not be used at signalized locations. The STOP FOR legend shall only be used in states where the state law specifically requires that a driver must stop for a pedestrian in a crosswalk. If used, the In-Street Pedestrian Crossing sign shall have a black legend (except for the red STOP or YIELD sign symbols) and border on either a white and/or fluorescent yellow-green background. If the In-Street Pedestrian
Crossing sign is placed in the roadway, the sign support shall comply with the breakaway requirements of the latest edition of AASHTO's specifications.

MUTCD Guidance: If an island is available, the In-Street Pedestrian Crossing sign, if used, should be placed on the island.

MUTCD Option: The In-Street Pedestrian Crossing sign may be used seasonally to prevent damage in winter because of plowing operations and may be removed at night if the pedestrian activity at night is minimal.

Cost: Approximately $220 (Source: Palo Alto Bicycle and Pedestrian Plan).

Crossing Signs

Pedestrian crossing signs (W11-2 and W16-7P) may be used to alert road users in advance of locations where unexpected entries into the roadway or shared use of the roadway by pedestrians may occur.

W11-2

W16-7P

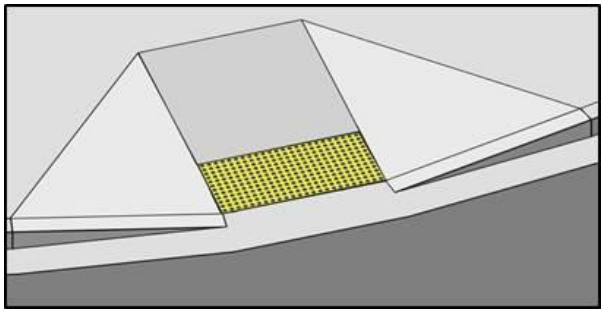
MUTCD Signs Guidance: When used in advance of a crossing, the W11-2 sign may have a supplemental plaque with the legend AHEAD or XX FEET to provide advance notice to road users of crossing activity.

MUTCD Signs Standard: When used at crossings, pedestrian crossing signs shall be supplemented with a diagonal downward-pointing arrow plaque showing the location of the crossing.

Cost: Approximately $430 each (Source: Palo Alto Bicycle and Pedestrian Plan).

Detectable Warnings

Detectable warnings are a distinctive surface pattern of domes detectable by cane or underfoot that alert people with vision impairments of their approach to street crossings and hazardous drop-offs. They are used to indicate the boundary between pedestrian and vehicular routes where there is a flush instead of a curbed connection. (Source: United States Access Board)



Cost: $25 - $200 each depending on size and type chosen.

Other Recommendations

Driveway Improvements

Several driveway design characteristics may cause safety and access problems for pedestrians, including excessively wide and/or sloped driveways, driveways with large turning radii, multiple adjacent driveways, driveways that are not well defined, and driveways where motorist attention is focused on finding a gap in congested traffic.

When driveways cross sidewalks, the sidewalk should be clearly delineated across the driveway (e.g. if the sidewalk is composed of concrete, the concrete surface treatment should be continuous across the driveway) to make it clear to motorists that they must watch for pedestrians. Additionally, it is necessary to maintain a sidewalk level across the driveway with no more than 2 percent cross slope in order to safely accommodate pedestrians in wheelchairs and other mobility devices and to comply with ADA standards.

As a general rule, driveways should be designed to look like driveways, not roadway intersections. However, in locations where a driveway must function as part of an intersection, it should be designed with pedestrian safety features such as crosswalks, small corner radii, and pedestrian signal heads if signalized.

(Source: http://www.pedbikesafe.org/PEDSAFE)

Cost: Varies by location and treatment used.

Rectangular Rapid Flash Beacon (RRFB)

Rectangular Rapid Flash Beacons (RRFB) can enhance safety by reducing crashes between vehicles and pedestrians at un-signalized intersections and mid-block pedestrian crossings by increasing driver awareness of potential pedestrian conflicts.

RRFBs are user-actuated amber LEDs that supplement warning signs at un-signalized intersections or mid-block crosswalks. They can be activated by pedestrians manually by a push button or passively by a pedestrian detection system. RRFBs use an irregular flash pattern that is similar to emergency flashers on police vehicles. RRFBs may be installed on either two-lane or multi-lane roadways. (Source: http://safety.fhwa.dot.gov/intersection/conventional/unsignalized/tech_sum/fhwasa09009)

Image Source: www.carmanah.com

The RRFB design differs from the standard flashing beacon by utilizing: A rapid flashing frequency (approximately 190 times per minute), a brighter light intensity, and ability to aim the LED lighting.

This device is currently not included in the MUTCD, but design, placement, and operation of RRFBs should be in accordance with FHWA's Interim Approval for Optional Use of Rectangular Rapid Flashing Beacons issued July 16, 2008

Cost: Approximately $14,000 to $22,000
(Source: Costs for Pedestrian and Bicyclists Infrastructure Improvements)

Selected Resources on Pedestrian Crossing Facilities

NCDOT Resources

North Carolina Pedestrian Crossing Guidance:
https://connect.ncdot.gov/projects/planning/RNAProjDocs/NC%20Pedestrian%20Crossing%20Guidance%2020150720.pdf

What You Need to Know About North Carolina Crosswalks:
http://www.watchformenc.org/wp-content/themes/WatchForMeNC_Custom/CampaignMaterials/WFM_Brochure.pdf

North Carolina Terminology for Active Travel:
https://connect.ncdot.gov/projects/BikePed/Documents/NC%20Terminology%20for%20Active%20Travel.pdf

NCDOT Pavement Markings:
https://connect.ncdot.gov/resources/safety/signing%20and%20delineation%20library/division%2012-%20pavement%20markings%20markers%20and%20delineation.pdf

Other Resources

Federal Highway Administration University Course on Bicycle and Pedestrian Transportation Lesson 12: Midblock Crossings:
http://nacto.org/docs/usdg/university_course_on_bicycle_and_ped_trans_fhwa.pdf

An Overview and Recommendations of High-Visibility Crosswalk Marking Styles:
http://www.pedbikeinfo.org/cms/downloads/PBIC_WhitePaper_Crosswalks.pdf

Informational Report on Lighting Design for Midblock Crosswalks:
http://www.fhwa.dot.gov/publications/research/safety/08053/08053.pdf

Handbook for Designing Roadways for the Aging Population:
http://safety.fhwa.dot.gov/older_users/handbook/ch2.cfm