

Appendices

Appendix A

FHWA's Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations –

Section 4: Select Countermeasure(s)

4

Select Countermeasure(s)



GUIDING PRINCIPLES

This section can help the agency select countermeasures based on information previously collected and assessed. The agency can use the following resources to select countermeasures:

- » First, reference Table 1 to compare roadway and vehicle speed characteristics to countermeasure options.
- » Then, reference Table 2 to compare crash types and other observed safety issues to countermeasure options.
- » Review Appendix B for more information about countermeasure CRFs and CMFs.

Application of Countermeasures by Roadway Feature

Table 1 includes a comprehensive matrix and list of STEP pedestrian crash countermeasures suggested for application at uncontrolled crossing locations per roadway and traffic features. The countermeasures are assigned to specific matrix cells based on safety research, best practices, and established national guidelines. When a pedestrian crossing is established, the agency should review the countermeasure options in the cells before selecting the optimal group of crossing treatments. The agency should consider the previously obtained characteristics such as pedestrian volume, operational speeds, land use context, and other site features when selecting countermeasures.

The agency should also reference the MUTCD and other national, State, and local guidelines when making the final selection of countermeasures.

For example, the agency may evaluate a 5-lane road with no raised median, an AADT of 12,000, and a 35 mph posted speed limit. The matrix recommends the agency strongly consider high-visibility crosswalks, adequate lighting, and parking restrictions on the approaches. In addition, the agency should strongly consider adding advance Yield Here To (Stop Here For) Pedestrians signs and yield (stop) lines, pedestrian refuge islands, and PHBs. Other candidate treatments include implementing a Road Diet along the corridor and adding curb extensions.

Table 1 provides initial countermeasure options for various roadway conditions. Each matrix cell indicates possibilities that may be appropriate for designated pedestrian crossings. Not all of the countermeasures listed in the matrix cell should necessarily be installed at a crossing.

For multi-lane roadway crossings with vehicle AADTs exceeding 10,000, a marked crosswalk alone is typically insufficient (Zegeer, 2005). Under such conditions, more substantial crossing improvements (such as the refuge island, PHB, and RRFB) are also needed to prevent an increase in pedestrian crash potential.

Table 1. Application of pedestrian crash countermeasures by roadway feature.

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	① 2 4 5 6	① 5 6 7 9	① 5 6 ⑦ ⑨	① 4 5 6	① 5 6 7 9	① 5 6 ⑦ ⑨	① 4 5 6 7 9	① 5 6 7 9	① 5 6 ⑨
3 lanes with raised median (1 lane in each direction)	① 2 3 4 5	① ③ 5 7 9	① ③ 5 ⑦ ⑨	① 3 4 5 7 9	① ③ 5 ⑦ ⑨	① ③ 5 ⑦ ⑨	① ③ 4 5 7 9	① ③ 5 ⑦ ⑨	① ③ 5 ⑨
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	① 2 3 4 5 6 7 9	① ③ 5 6 7 9	① ③ 5 6 ⑨	① 3 4 5 6 7 9	① ③ 5 6 ⑦ ⑨	① ③ 5 6 ⑨	① ③ 4 5 6 7 9	① ③ 5 6 ⑨	① ③ 5 6 ⑨
4+ lanes with raised median (2 or more lanes in each direction)	① ③ 5 7 8 9	① ③ 5 7 8 9	① ③ 5 8 ⑨	① ③ 5 7 8 9	① ③ 5 ⑦ 8 ⑨	① ③ 5 8 ⑨	① ③ 5 ⑦ 8 ⑨	① ③ 5 8 ⑨	① ③ 5 8 ⑨
4+ lanes w/o raised median (2 or more lanes in each direction)	① ③ 5 6 7 8 9	① ③ 5 ⑥ 7 8 9	① ③ 5 ⑥ 8 ⑨	① ③ 5 ⑥ 7 8 9	① ③ 5 ⑥ ⑦ 8 ⑨	① ③ 5 ⑥ 8 ⑨	① ③ 5 ⑥ ⑦ 8 ⑨	① ③ 5 ⑥ 8 ⑨	① ③ 5 ⑥ 8 ⑨
<p>Given the set of conditions in a cell,</p> <ul style="list-style-type: none"> # Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location. ● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location. ○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.* <p>The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.</p>					<ol style="list-style-type: none"> 1 High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs 2 Raised crosswalk 3 Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line 4 In-Street Pedestrian Crossing sign 5 Curb extension 6 Pedestrian refuge island 7 Rectangular Rapid-Flashing Beacon (RRFB)** 8 Road Diet 9 Pedestrian Hybrid Beacon (PHB)** 				

*Refer to Chapter 4, 'Using Table 1 and Table 2 to Select Countermeasures,' for more information about using multiple countermeasures.

**It should be noted that the PHB and RRFB are not both installed at the same crossing location.

This table was developed using information from: Zegeer, C.V., J.R. Stewart, H.H. Huang, P.A. Lagerwey, J. Feaganes, and B.J. Campbell. (2005). Safety effects of marked versus unmarked crosswalks at uncontrolled locations: Final report and recommended guidelines. FHWA, No. FHWA-HRT-04-100, Washington, D.C.; FHWA. Manual on Uniform Traffic Control Devices, 2009 Edition. (revised 2012). Chapter 4F, Pedestrian Hybrid Beacons. FHWA, Washington, D.C.; FHWA. Crash Modification Factors (CMF) Clearinghouse. <http://www.cmfclearinghouse.org/>; FHWA. Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE). <http://www.pedbikesafe.org/PEDSAFE/>; Zegeer, C., R. Srinivasan, B. Lan, D. Carter, S. Smith, C. Sundstrom, N.J. Thirsk, J. Zegeer, C. Lyon, E. Ferguson, and R. Van Houten. (2017). NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments. Transportation Research Board, Washington, D.C.; Thomas, Thirsk, and Zegeer. (2016). NCHRP Synthesis 498: Application of Pedestrian Crossing Treatments for Streets and Highways. Transportation Research Board, Washington, D.C.; and personal interviews with selected pedestrian safety practitioners.

Select Countermeasure(s)

Safety Issues Addressed per Countermeasure

The results of the crash analysis, road safety audit, and/or stakeholder input provide the agency with a better understanding of the risk factors at uncontrolled crossing locations. The countermeasures listed in this guide can improve the visibility of crossing locations and reduce crashes, and they each address at least one additional safety concern associated with a higher risk of collision and/or severe

injury. These additional safety issues include the following: excessive vehicle speed, inadequate conspicuity/visibility, drivers not yielding to pedestrians in crosswalks, and insufficient separation from traffic.

Table 2 shows the specific safety issues that each countermeasure may address. For example, the addition of PHBs has been consistently shown to improve motorist yielding by 90 percent or greater, when compared with no traffic control or warning type devices.

Table 2. Safety issues addressed per countermeasure.

Pedestrian Crash Countermeasure for Uncontrolled Crossings	Safety Issue Addressed				
	Conflicts at crossing locations	Excessive vehicle speed	Inadequate conspicuity/visibility	Drivers not yielding to pedestrians in crosswalks	Insufficient separation from traffic
Crosswalk visibility enhancement					
High-visibility crosswalk markings*					
Parking restriction on crosswalk approach*					
Improved nighttime lighting*					
Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line*					
In-Street Pedestrian Crossing sign*					
Curb extension*					
Raised crosswalk					
Pedestrian refuge island					
Pedestrian Hybrid Beacon					
Road Diet					
Rectangular Rapid-Flashing Beacon					

*These countermeasures make up the STEP countermeasure “crosswalk visibility enhancements.” Multiple countermeasures may be implemented at a location as part of crosswalk visibility enhancements.

Select Countermeasure(s)

Using Table 1 and Table 2 to Select Countermeasures

Table 1 provides initial countermeasure options for various roadway conditions. Each matrix cell indicates possibilities that may be appropriate for designated pedestrian crossings. Not all of the countermeasures listed in the matrix cell should necessarily be installed at a crossing. Agency officials should also review safety issues referenced in Table 2, the surrounding land development context, pedestrian travel patterns, countermeasure effectiveness, and costs when considering what countermeasure(s) are best suited for the crossing.

A marked crosswalk is useful to show pedestrians and drivers preferred crossing locations. However, for multi-lane roadway crossings where vehicle AADTs are in excess of 10,000, a marked crosswalk alone is typically not sufficient (Zegeer, 2005). Under such conditions,

more substantial crossing improvements are also needed to prevent an increase in pedestrian crash potential. Examples of more substantial treatments include the refuge island, PHB, and RRFB. Refer to the symbols used in Table 1 for when a marked crosswalk should be paired with one or more of the other countermeasures described.

To further increase visibility of pedestrian crossings, agencies often integrate multiple countermeasures. For example, the Pedestrian Hybrid Beacon is often installed in conjunction with advance stop markings and signs. Also, Road Diets present opportunities for adding pedestrian refuge islands and curb extensions at key crossing locations. Agencies should consider roadway geometry and the MUTCD when integrating multiple countermeasures.

Countermeasure Descriptions

This subsection describes considerations for implementation of each of the countermeasures included in Tables 1 and 2. The agency can review other guidance—such as the MUTCD, the AASHTO Pedestrian Guide, and/or agency policies and practices—to identify and select countermeasures for implementation.

Crosswalk visibility enhancements

High-visibility crosswalks may include a variety of crosswalk striping designs, such as ladder, continental, or bar pairs. A high-visibility crosswalk is much easier for

an approaching motorist to see than the traditional parallel lines. The agency should strongly consider providing high-visibility crosswalks at all established midblock pedestrian crossings. The high-visibility markings may be supplemented with the pedestrian crossing warning signs (sign W11-2 in the MUTCD) on each approach to the crosswalk. MUTCD Section 2C.50—*Non Vehicular Warning Signs* and Section 3B.18—*Crosswalk Markings* provide additional information.

The agency should also strongly consider implementing parking restrictions on the crosswalk approach at all established

pedestrian crossings (both approaches) so there is adequate sight distance for motorists on the approaches to the crossings and ample sight distance for pedestrians attempting to cross. The minimum setback is 20 feet where speeds are 25 mph or less, and 30 feet between 26 mph and 35 mph. If this cannot be done, the curbs should be "bulbed out" to allow the pedestrian to see past the parked vehicle along the street. Adjacent bus stops should be placed downstream of the crosswalk and not on the crosswalk approach.

The agency should consider providing an appropriate level of lighting at all established pedestrian crossings. Consideration should be given to placing the lights 10 to 15 feet in advance of the crosswalk on both sides of the street and on both approaches to better light the front of the pedestrian and avoid silhouette lighting (where possible).

In-street Pedestrian Crossing sign

In-street signs are placed in the middle of the road at a crossing and are often used in conjunction with refuge islands. These signs may be appropriate on 2-lane or 3-lane roads with speed limits of 30 mph or less. On higher-speed, higher-volume, and/or multilane roads, this treatment may not be as visually prominent; therefore, it may be less effective (drivers may not notice the signs in time to stop in advance of the crosswalk). For such roadways, more robust treatments will be needed. When making the choice to use these signs, the agency should consider making a plan and securing a funding source for the maintenance and prompt replacement of damaged signs. The MUTCD permits in-street pedestrian signs for installation on centerlines and along lane lines. MUTCD

Section 2B.12—*In-Street and Overhead Pedestrian Crossing Signs* contains additional information about these signs.

Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line

Advance Yield Here To (Stop Here For) Pedestrians signs are placed between 30 and 50 feet in advance of the marked crosswalk along with the stop line or "shark's teeth" yield line. This is a candidate treatment for any uncontrolled pedestrian crossing, and should be strongly considered for any established pedestrian crossing on roads with four or more lanes and/or roads with speed limits of 35 mph or greater. Stop Here For Pedestrians signs should only be used where the law specifically requires that a driver must stop for a pedestrian in a crosswalk. MUTCD Section 2B.11—*Yield Here To Pedestrians Signs and Stop Here For Pedestrians Signs* and Section 3B.16—*Stop and Yield Lines* contain additional information.

Curb extension

A curb extension or "bulbout" extends the sidewalk or curb line into the street or parking lane, thus reducing the street width and improving sight distance between the driver and pedestrian. A curb extension is a candidate treatment for any uncontrolled pedestrian crossing, particularly where parking lanes exist. Curb extensions should not extend into paths of travel for bicyclists.

Raised crosswalk

Raised crosswalks function as an extension of the sidewalk and allow a pedestrian to cross the street at a constant grade. A raised crosswalk is typically a candidate treatment on 2-lane or 3-lane roads with speed limits of 30 mph or less and AADTs below 9,000. Raised crossings are generally

avoided on truck routes, emergency routes, and arterial streets. Drainage needs to be accommodated. See MUTCD Section 3B.25—*Speed Hump Markings* for additional information about markings that can be used alongside raised crosswalks.

Pedestrian refuge island

A pedestrian island is typically constructed in the middle of a 2-way street and provides a place for pedestrians to stand and wait for motorists to stop or yield. This countermeasure is highly desirable for midblock pedestrian crossings on roads with four or more lanes, and should be considered for undivided crossings of four or more lanes with speed limits of 35 mph or greater and/or AADTs of 9,000 or greater. Median islands may also be a candidate treatment for uncontrolled pedestrian crossings on 3-lane or 2-lane roads, especially where the street is wide and/or where vehicle speed or volumes are moderate to high. Consideration should be given to creating a two-stage crossing with the island to encourage pedestrians to cross one direction of traffic at a time and look towards oncoming traffic before completing the second part of the crossing. The minimum pedestrian refuge island width is approximately 6 feet. MUTCD Section 3B.10—*Approach Markings for Obstructions*, Section 3B.18—*Crosswalk Markings*, and Section 3B.23—*Curb Markings* provide additional information.

Pedestrian Hybrid Beacon (PHB)

A PHB head consists of two red lenses above a single yellow lens, and is used in conjunction with pedestrian signal heads installed at each end of a marked crosswalk. Figure 6 shows a rendering of a PHB. The PHB has been referred to as the High-Intensity Activated crossWalk beacon (HAWK), but the MUTCD refers to this device as the PHB.

Unlike a traffic signal, the PHB rests in dark until a pedestrian activates it via pushbutton or other form of detection. When activated, the beacon displays a sequence of flashing and solid lights that control vehicular traffic while the pedestrian signal heads indicate the pedestrian walk interval and a pedestrian clearance interval.

The PHB should meet the installation guidelines—based on speed, pedestrian volume, vehicular volume, and crossing length—as provided in Section 4F.01 of the MUTCD (See Figure 4F-1 for speeds of 35 mph or less; Figure 4F-2 for speeds greater than 35 mph). Research indicates that PHBs are most effective at roads with three or more lanes that have AADTs above 9,000. PHBs should be strongly considered for all midblock crossings where the roadway speed limits are equal to or greater than 40 mph. Refer to Table 1 for other conditions where PHBs should be strongly considered. It should be noted that the PHB and RRFB are not both installed at the same crossing location.

PHBs have also been installed successfully at intersections under certain conditions. Since the current MUTCD guidance is to locate PHBs at least 100 feet away from an intersection, engineering judgment/engineering study must be carefully applied if considering an installation at an intersection.



Figure 6. Rendering of a PHB.

Source: FHWA STEP Countermeasure Tech Sheets.
(Note: Drawing not to scale.)

Road Diet

A road diet reconfigures the roadway. A frequently-implemented Road Diet involves converting a 4-lane, undivided roadway into a 3-lane roadway with a center turn lane. This is a candidate treatment for any undivided road with wide travel lanes or multiple lanes that can be narrowed or repurposed to improve pedestrian crossing safety.

After conducting a traffic analysis to consider its feasibility, the agency may determine that a Road Diet is a good candidate for use on roads with four or more lanes and traffic volumes of approximately 20,000 or less. In some cases, agencies have successfully implemented Road Diets on roads with AADTs of up to 25,000. By reducing the width of the roadway, pedestrians benefit from shorter crossing distances and often bike lanes or streetscape features can be added. Road Diets are often effectively accomplished during pavement resurfacing.

Rectangular Rapid-Flashing Beacon (RRFB)

An RRFB is a pedestrian-actuated conspicuity enhancement used in combination with a pedestrian, school, or trail crossing warning sign to improve safety at uncontrolled, marked crosswalks. The device includes two rectangular-shaped yellow indications, each with an LED-array-based light source, that flash with high frequency when activated.

RRFBs may be used to enhance the conspicuity of standard pedestrian and school crossing warning signs at

uncontrolled marked crosswalks. RRFBs are placed on both ends of a crosswalk. If the crosswalk contains a pedestrian refuge island or other type of median, an RRFB should be placed to the right of the crosswalk and on the median (instead of the left side of the crosswalk). The RRFB's irregular flashing pattern is unlit when not activated and can be activated manually by pedestrians using a push button or passively by a pedestrian detection system. This device is not currently included in the MUTCD, but FHWA has issued Interim Approval 21 (IA-21) for the use of the RRFB. State and local agencies must request and receive permission to use this interim approval before they can use the RRFB. IA-21 provides additional information about the conditions of use, including dimensions, placement, and flashing requirements. IA-21 does not provide guidance or criteria based on number of lanes, speed, or traffic volumes.

The RRFB is a treatment option at many types of established pedestrian crossings. Research indicates RRFBs can result in motorist yielding rates as high as 98 percent at marked crosswalks. However, yielding rates as low as 19 percent have also been noted. Compliance rates varied most per the city location, posted speed limit, crossing distance, and whether the road was one- or two-way.¹ RRFBs are particularly effective at multilane crossings with speed limits less than 40 mph. Consider the PHB instead of RRFBs for roadways with higher speeds. Table 1 provides specific conditions where practitioners should strongly consider the PHB instead of the RRFB.

¹Fitzpatrick, K., M. Brewer, R. Avelar, and T. Lindheimer. Will You Stop for Me? Roadway Design and Traffic Control Device Influences on Drivers Yielding to Pedestrians in a Crosswalk with a Rectangular Rapid-Flashing Beacon. Report No. TTI-CTS-0010. Texas A&M Transportation Institute, College Station, Texas. June 2016. <https://static.tti.tamu.edu/tti.tamu.edu/documents/TTI-CTS-0010.pdf>

RESOURCES

[PEDSAFE, Pedestrian Safety Guide and Countermeasure Selection System](#)

This online tool includes links to research studies, crash reduction statistics, and case studies for nearly 70 pedestrian safety countermeasures. Its Countermeasure Selection Tool provides countermeasure recommendations for uncontrolled crossing locations based upon variables such as AADT, vehicle speed, and number of lanes.

[Manual on Uniform Traffic Control Devices \(MUTCD\)](#)

This manual provides transportation engineers and planners with detailed guidance for the design and application of traffic control devices, including signage, roadway markings, and intersection controls. Refer to the specific sections of the MUTCD listed in the countermeasure descriptions and consult State-level supplements for additional information.

[FHWA Road Diet Desk Reference \(2015\)](#)

This resource includes sample policy, case studies, and design guidance for agencies and decision-makers considering Road Diets. The benefits of Road Diets include reducing vehicle speeds, reducing number of lanes to cross, and allocating space for pedestrian refuge islands.

[Highway Safety Manual](#)

This manual provides detailed guidance for the collection, analysis, and evaluation of roadway crash data, as well as related CMFs and treatment selection guidance.

[FHWA Design Resource Index](#)

This resource directs practitioners to the specific location of information about pedestrian and bicycle treatments or countermeasures, across various design guidelines published by organizations such as AASHTO, the Institute of Transportation Engineers, and National Association of City Transportation Officials.

[Informational Brief: Treatments for Uncontrolled Marked Crosswalks \(2017\)](#)

FHWA provided this information about optional treatments for uncontrolled pedestrian crossing locations.

[TCRP REPORT 112/NCHRP REPORT 562: Improving Pedestrian Safety at Unsignalized Crossings \(2006\)](#)

This document recommends treatments to improve safety for pedestrians crossing high-volume, high-speed roadways at unsignalized intersections, with particular focus on roadways served by public transportation.

[NHTSA "A Primer for Highway Safety Professionals" \(2016\)](#)

This resource outlines a comprehensive approach to improving safety for bicyclists and pedestrians and offers a summary of the most frequently used engineering, enforcement, and education safety measures. The resource identifies how certain treatments may be placed in relation to other treatments, such as the coordinated installation of a pedestrian refuge island and lighting.

[CMF Clearinghouse](#)

The CMF Clearinghouse is an online database of countermeasures and corresponding CMFs. The database describes the confidence of the study that produced the CMF with an assigned "star quality rating." The clearinghouse includes CMFs for most of the STEP countermeasures.

[NCHRP Report 841: Development of CMFs for Uncontrolled Pedestrian Crossing Treatments \(2017\)](#)

This report describes the safety benefits and CMFs for four types of pedestrian crossing treatments—rectangular rapid flashing beacons, PHBs, pedestrian refuge islands, and advance crosswalk signs and pavement markings.

[NCHRP Synthesis 498: Application of Pedestrian Crossing Treatments for Streets and Highways \(2016\)](#)

This is a compilation of existing practices regarding the selection and implementation of pedestrian crossing improvements, as well as a literature review of research on more than 25 pedestrian crossing treatments.

Appendix B: CRF and CMF Summary Table

Table 3. CRFs and CMFs by countermeasure.

Countermeasure	CRF	CMF	Basis	Reference
Crosswalk visibility enhancement ¹	—	—	—	—
Advance STOP/YIELD signs and markings	25%	0.75	Pedestrian crashes ²	Zegeer, et. al. 2017
Add overhead lighting	23%	0.77	Total injury crashes	Harkey, et. al. 2008
High-visibility marking ³	48%	0.52	Pedestrian crashes	Chen, et. al., 2012
High-visibility markings (school zone) ³	37%	0.63	Pedestrian crashes	Feldman, et. al. 2010
Parking restriction on crosswalk approach	30%	0.70	Pedestrian crashes	Gan, et. al., 2005
In-street Pedestrian Crossing sign	UNK	UNK	N/A	N/A
Curb extension	UNK	UNK	N/A	N/A
Raised crosswalk (speed tables)	45%	0.55	Pedestrian crashes	Elvik, et. al., 2004
	30%	0.70	Vehicle crashes	
Pedestrian refuge island	32%	0.68	Pedestrian crashes	Zegeer, et. al., 2017
PHB	55%	0.45	Pedestrian crashes	Zegeer, et. al., 2017
Road Diet – Urban area	19%	0.81	Total crashes	Pawlovich, et. al., 2006
Road Diet – Suburban area	47%	0.53	Total crashes	Persaud, et. al., 2010
RRFB	47%	0.53	Pedestrian crashes	Zegeer, et. al. 2017

¹This category of countermeasure includes treatments which may improve the visibility between the motorist and the crossing pedestrian.

²Refers to pedestrian street crossing crashes, and does not include pedestrians walking along the road crashes or “unusual” crash types.

³The effects of high-visibility pavement markings (e.g., ladder, continental crosswalk markings) in the “after” period is compared to pedestrian crashes with parallel line markings in the “before” period.

References

1. Zegeer, C., R. Srinivasan, B. Lan, D. Carter, S. Smith, C. Sundstrom, N.J. Thirsk, J. Zegeer, C. Lyon, E. Ferguson, and R. Van Houten. *NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments*. NCHRP, Transportation Research Board, Washington, DC, 2017.
2. Harkey, D.L., R. Srinivasan, J. Baek, F. Council, K. Eccles, N. Laffer, F. Gross, B. Persaud, C. Lyon, E. Hauer, and J. Bonneson. *NCHRP Report 617: Accident Modification Factors for Traffic Engineering and ITS Improvements*. NCHRP, Transportation Research Board, Washington, DC, 2008.

Appendix B

MaineDOT's Crosswalk Policy



Title: MaineDOT Guidelines on Crosswalks

Discipline: General Engineering

Originators: Stephen Landry and Regional
Traffic Engineers

Approved By: Kenneth L. Sweeney, P.E.,
Chief Engineer

Issue Date: March 6, 2013
Revised Date: January 17, 2019

Crosswalks are marked areas where pedestrians can safely cross a roadway. By law in the State of Maine (Title 29-A Subsection 2056, 4) any vehicle must yield the right-of-way to a pedestrian who has entered a marked crosswalk when a traffic control device is not in operation. This law makes it imperative that crosswalk placement, markings and usage be done in a uniform way.

Section 1: ADA (Required)

1. All crosswalks shall meet the criteria put forth in the American's with Disabilities Act (ADA) and at a minimum will include truncated domes, proper flares, slopes and tip downs for the appropriate configuration shown in Figures 3 through 11 below.

Section 2: MUTCD (Required)

2. All crosswalks shall meet the latest *Manual on Uniform Traffic Control Devices (MUTCD)* Section 3B.18 Crosswalk marking standards. They shall be a minimum of six (6) feet wide and marked with white paint as shown on the attached sheet Figure 2. Crosswalks shall be painted at least annually and shall be retro-reflective for nighttime visibility. Crosswalks should be lighted for nighttime use. For added visibility, the zebra (diagonal style markings) or the Continental (piano key style marking) should be used.

3. Crosswalks shall have the appropriate signage (W11-2 series from the *Manual on Uniform Traffic Control Devices*, see section 2C.50 of the MUTCD). These signs shall be black symbol on yellow background or black symbol on fluorescent yellow-green background. Signs of different background colors should not be mixed at a given site or area. (See Figure 12) In-Street signing will be allowed as a supplement to side of the road signing only and not in lieu of it. (See Figure 13)

4. No parking shall be allowed within 20 feet of any unsignalized crosswalk (includes mid-block) and 30 feet at a signalized intersection. Parking restrictions can be removed when bump-outs or curb extensions are built. These allow the pedestrian to be seen by the traveling public. Signs should be installed indicating that no parking is allowed. (see Figure 1)

Section 3: Required Safety

5. Crosswalks shall only be placed in areas where there is sufficient stopping sight distance for the posted speed limit as set forth in Table 1. Stopping sight distance for the purpose of evaluating a crosswalk shall be measured from a 3.5 foot driver eye height to a 3.5 foot pedestrian height.

Table 1 – Sight Distance

Posted Speed (MPH)	Sight Distance (Feet)
20	155
25	200
30	250
35	305
40	360

6. Crosswalks shall only be installed in areas where the speed limit is 40 mph or less, unless the intersection is controlled by a traffic signal.

7. If a municipality proposes a crosswalk on a roadway with more than 1 lane in any direction (does not include a center turn lane) or a crosswalk at 40 mph posted speed, the municipality is required to get approval from the State Traffic Engineer or his/her designee.

Table 2 – Number of Lanes Vs Speed

Roadway Lanes	≤ 35 MPH	40 MPH @	≥45 MPH *
2 Lanes	Allowed	Allowed, Consider pedestrian activated flashers	Allowed at fully actuated traffic signals only
3 Lanes	Allowed	Allowed with pedestrian activated flashers	Allowed at fully actuated traffic signals only
4 or more lanes	Allowed, Consider pedestrian activated flashers	Allowed with pedestrian activated flashers	Allowed at fully actuated traffic signals only

***Only at fully actuated signals with existing or proposed sidewalks.**

@ Crosswalks at unsignalized locations in 40 mph settings should be accompanied by yield bars and associated signage. In areas with 4 or 5 lanes that signage should be installed overhead. See Figure 14.

Section 4: General Safety (Required unless a Program Manager indicates otherwise) #

8. All crosswalks should extend from one safe landing zone to another. A safe landing zone is an area where a pedestrian is safe from vehicle conflict while waiting to cross or when completing the crossing. Islands, walkways and sidewalks are typically considered safe landing zones, while road shoulders, driveways (under normal circumstances) and parking areas are not considered safe landing zones. Provisions should be made for winter maintenance of the landing zones, including but not limited to snow and ice removal. The safe landing area should not be confused with the “Turning Space” required at the top of each ramp.

9. Crosswalks should, to the maximum extent practicable, be perpendicular to the highway. No crosswalks shall be constructed more than 30 degrees from perpendicular, unless the angle of intersecting roadways is more than a 30 degree skew.

10. Crosswalks should be located a minimum distance of 400 feet apart. The July 2009 edition of *Complete Streets Design Guidelines* (p.23) indicates “pedestrians will not walk more than 200 feet laterally in order to cross a street, and pedestrians will begin to seek out mid-block crossing opportunities when spacing exceeds 400 feet.”

11. Crosswalks in school zones should have crossing guards for times when school is starting and ending. School crosswalks should be at roadway intersections. Mid-block crossings should only be used when a high concentration of students will be using them, as driver expectation is not to have to stop at a mid-block location.

12. Municipalities are entitled to place crosswalks on state or state aid highways, if they are in accordance with these guidelines. Municipalities are highly encouraged to create an ordinance, indicating at a minimum, that sections 1 through 3 are followed. If a municipality wants a crosswalk that does not meet one or more items in Section 4, they would need to submit a traffic study indicating that the location of the crosswalk would be safe. Placement of crosswalks other than as specified shall require approval by the State Traffic Engineer or his/her designee.

All crosswalks will be reviewed during the Project Development process. Unless the Program Manager or State Traffic Engineer approves otherwise, crosswalks not meeting the standards above will not be replaced in the field. The municipality will be contacted and informed that the said crosswalk(s) doesn't meet our standards and not to repaint the crosswalk. The Program Manager or State Traffic Engineer may allow a crosswalk to remain if it doesn't meet 1 or more of the standards in Section 4 providing there is documentation of the reasons it should remain and how it will impact the safety of the pedestrian.

Crosswalks at signalized intersections: All new crosswalks installed at signalized intersections or existing crosswalks at a signal intersections being modified or replaced shall be required to have pedestrian countdown heads installed as well as Accessible Pedestrian Signal (APS) technology. Signalized crosswalks will be allowed at all posted speeds. For signalized crosswalks above 40 mph, additional all red time should be considered for the safety of the pedestrian. This will help ensure that when the pedestrian phase starts, all vehicles have cleared the intersection.

TYPICAL PARKING SPACE MARKINGS

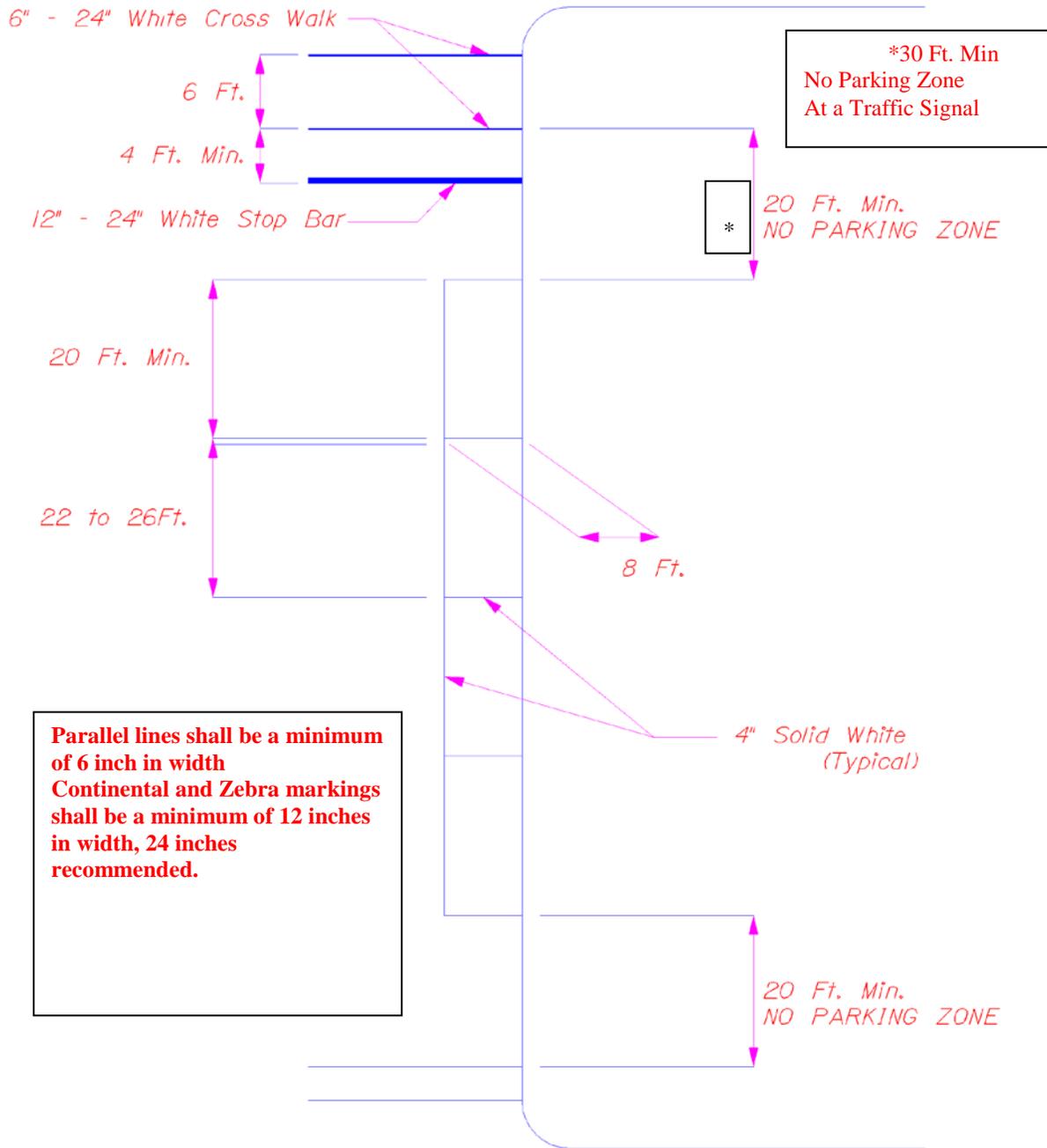


Figure 1

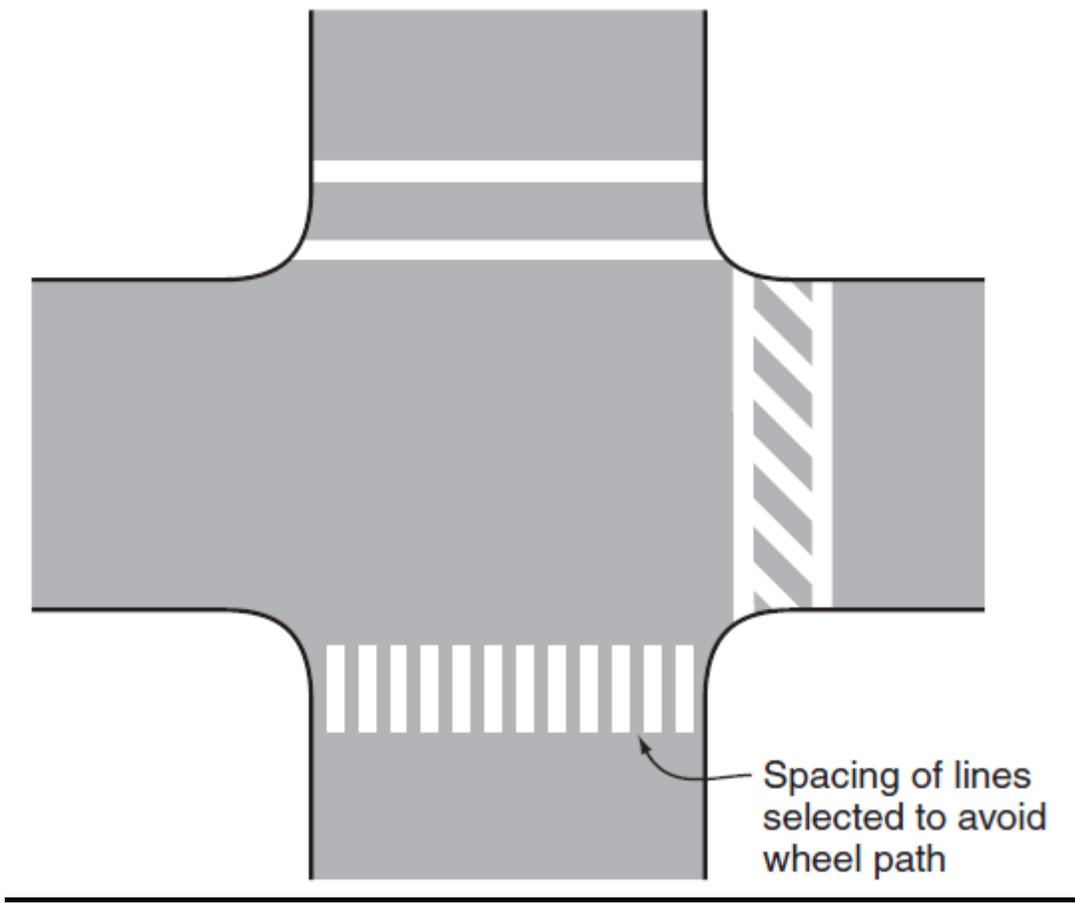


Figure 2

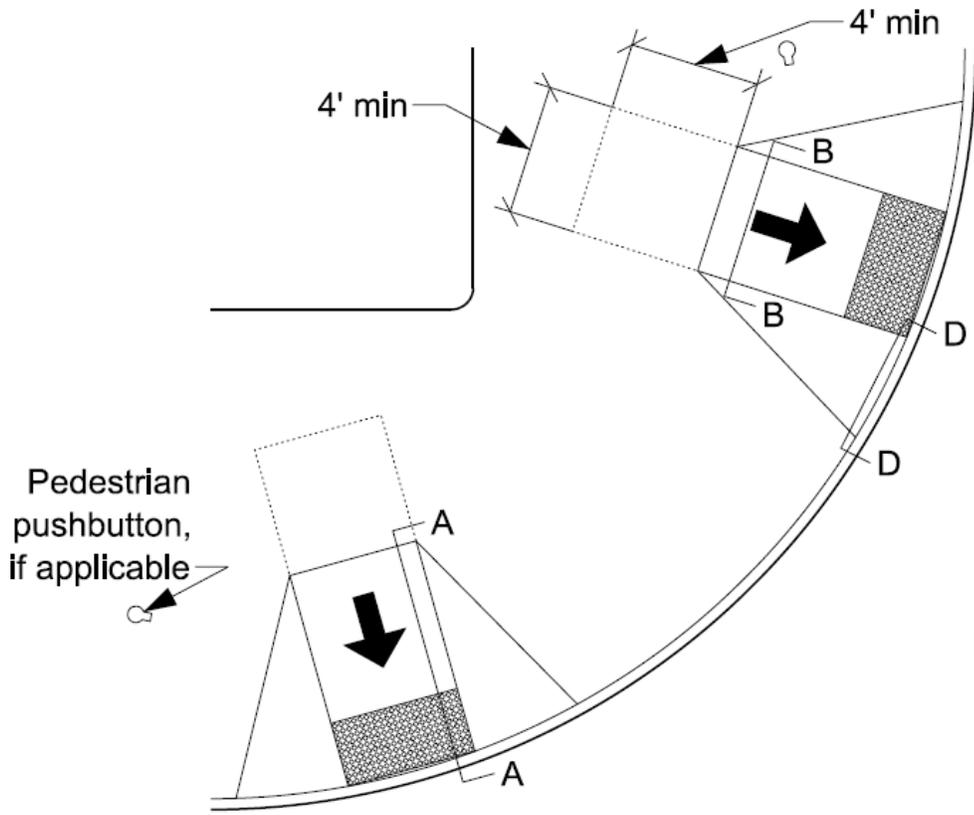


Figure 3

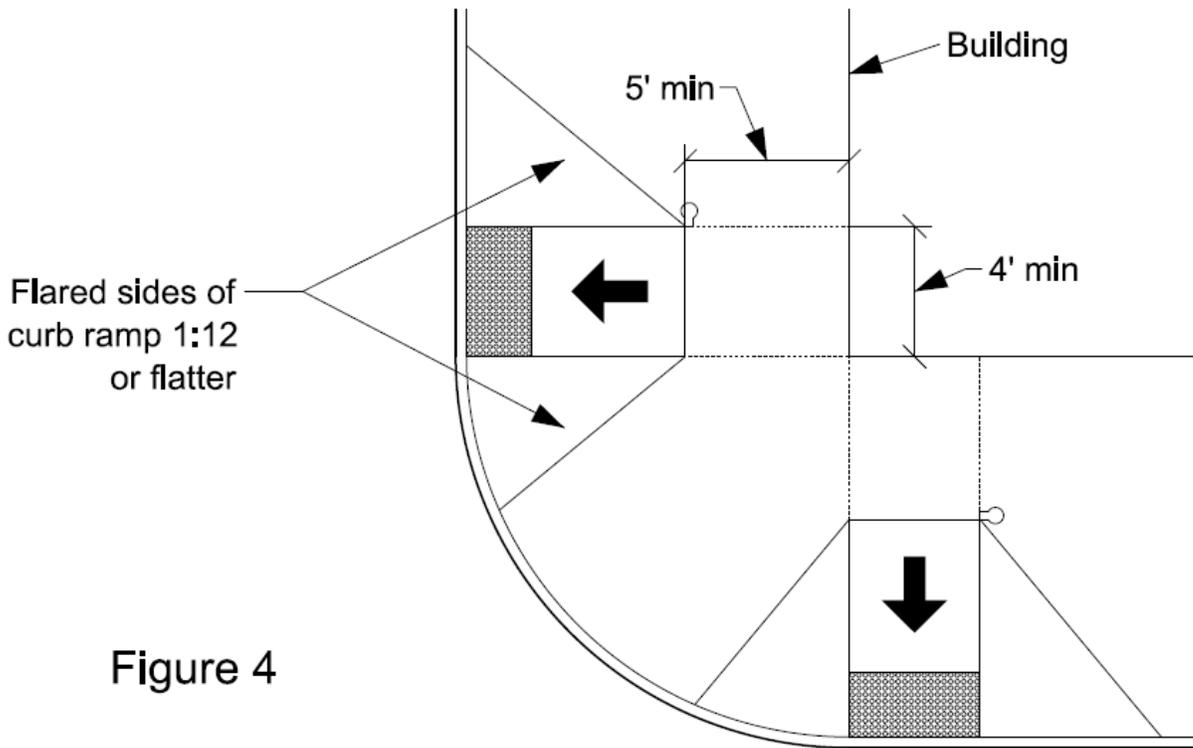


Figure 4

10/04/2016

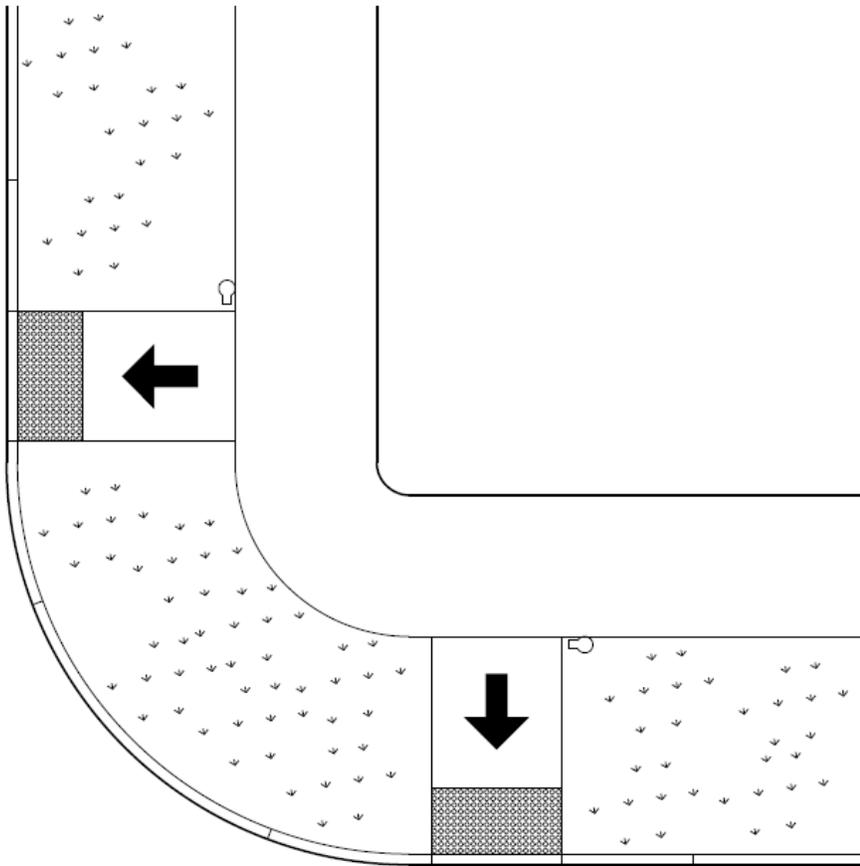


Figure 5

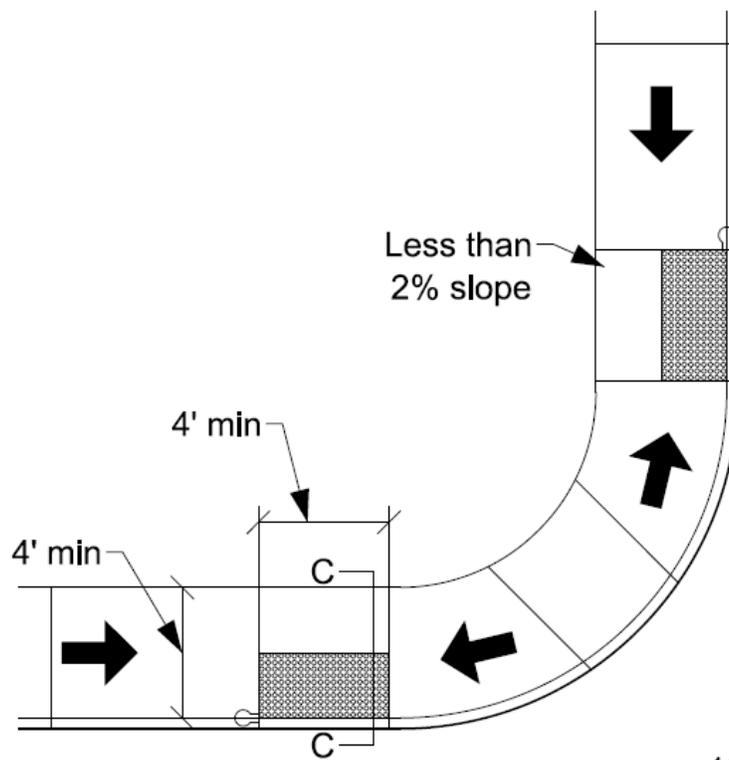


Figure 6

10/04/2016

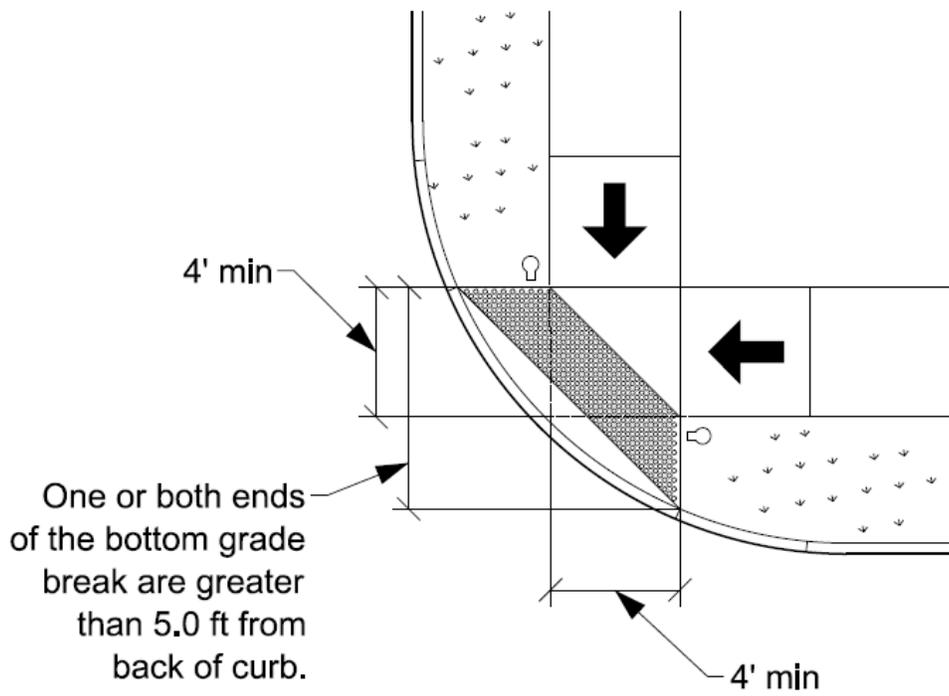
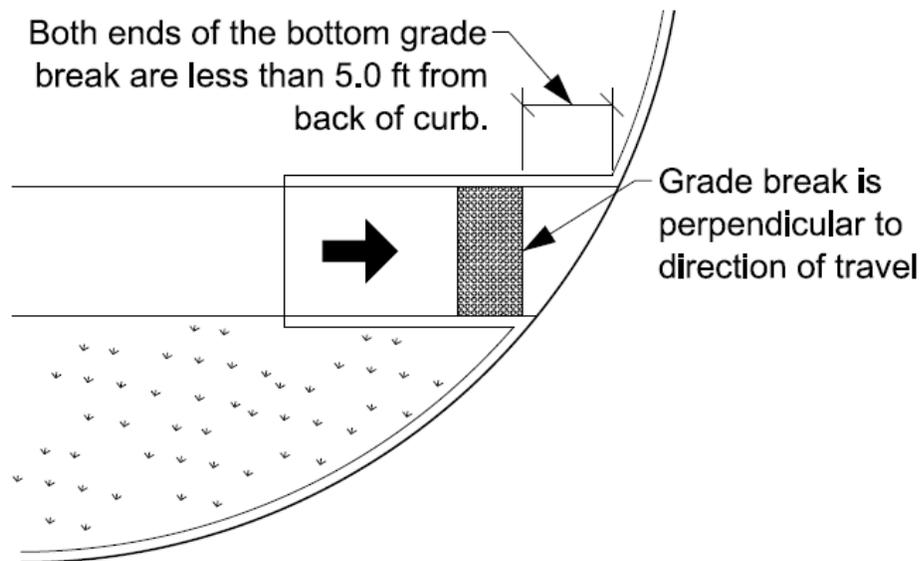


Figure 7

Figure 8



10/04/2016

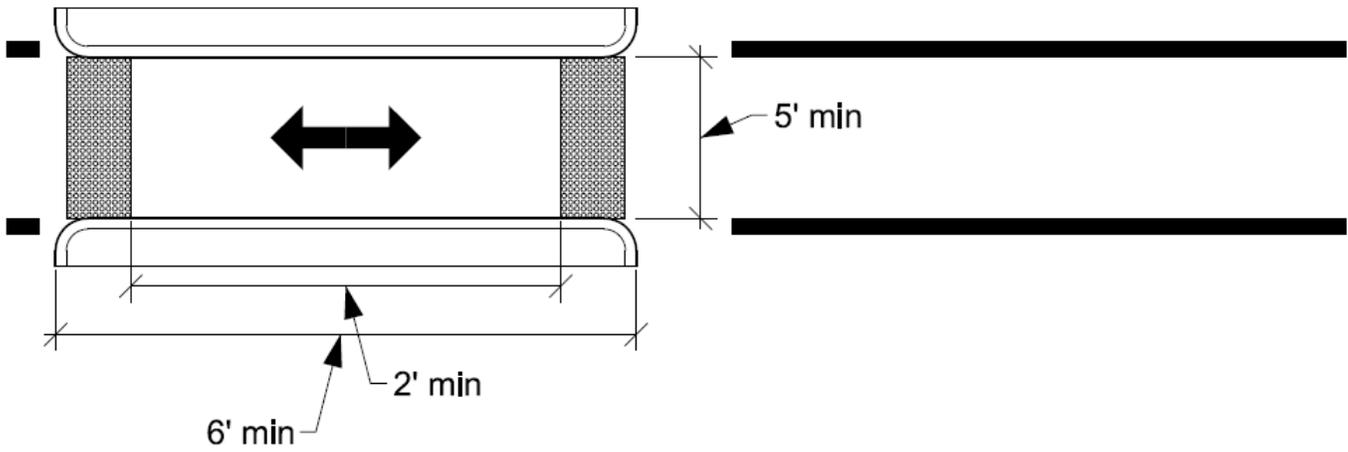


Figure 9 - Median Island at Grade

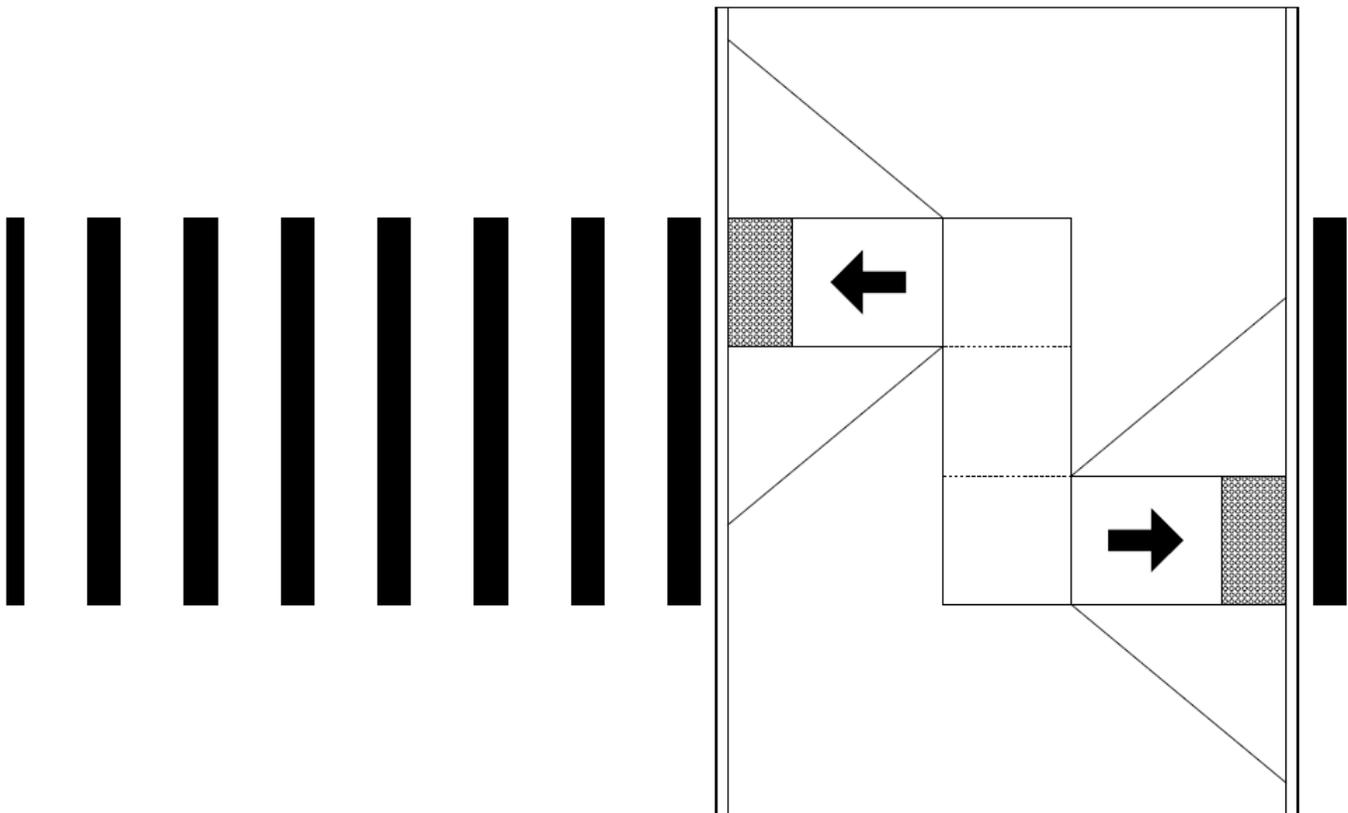


Figure 10 - Median Island at Grade or Raised

10/04/2016

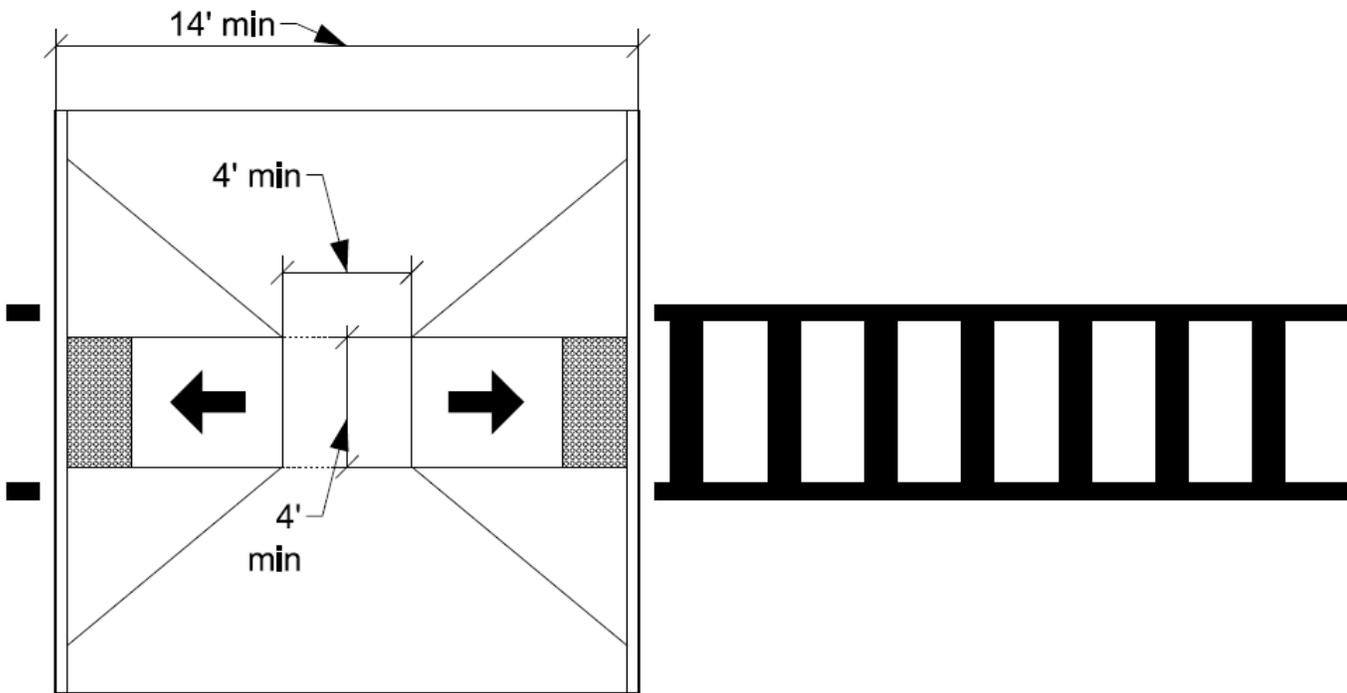


Figure 11 - Raised Median Island

Guidance from 2009 Edition MUTCD, Section 4E.08-Pedestrian Detectors

- 04 If pedestrian pushbuttons are used, they should be capable of easy activation and conveniently located near each end of the crosswalks. Except as provided in Paragraphs 5 and 6, pedestrian pushbuttons should be located to meet all of the following criteria:
- A. Unobstructed and adjacent to a level all-weather surface to provide access from a wheelchair;
 - B. Where there is an all-weather surface, a wheelchair accessible route from the pushbutton to the ramp;
 - C. Between the edge of the crosswalk line (extended) farthest from the center of the intersection and the side of a curb ramp (if present), but not greater than 5 feet from said crosswalk line;
 - D. Between 1.5 and 6 feet from the edge of the curb, shoulder, or pavement;
 - E. With the face of the pushbutton parallel to the crosswalk to be used; and
 - F. At a mounting height of approximately 3.5 feet, but no more than 4 feet, above the sidewalk.
- 05 Where there are physical constraints that make it impractical to place the pedestrian pushbutton adjacent to a all-weather surface, the surface should be as level as feasible.
- 06 Where there are physical constraints that make it impractical to place the pedestrian pushbutton between 1.5 and 6 feet from the edge of the curb, shoulder, or pavement, it should not be farther than 10 feet from the edge of curb, shoulder, or pavement.
- 07 Except as provided in Paragraph 8, where two pedestrian pushbuttons are provided on the same corner of a signalized location, the pushbuttons should be separated by a distance of at least 10 feet.
Option:
- 08 Where there are physical constraints on a particular corner that make it impractical to provide the 10-foot separation between the two pedestrian pushbuttons, the pushbuttons may be placed closer together or on the same pole.

10/04/2016

Figure 12 – Standard crosswalk signing uses both the S1-1 and W 16-7 P –
 Advanced assemblies use S1-1 and W 16-9 P

Crosswalk Warning Assembly	Pedestrian Warning Assembly
 <p data-bbox="321 674 391 705">S1-1</p>	 <p data-bbox="719 674 789 705">S1-1</p>
 <p data-bbox="215 909 337 940">W16-7P</p>	 <p data-bbox="605 909 727 940">W16-9P</p>
<p data-bbox="82 999 521 1031">2009 MUTCD Section 2C.50</p>	

School Crosswalk Warning Assembly	School Advanced Warning Assembly
	
<p data-bbox="94 1514 613 1545">2009 MUTCD Section 7B.08-11</p>	

Figure 13. - In-Street Pedestrian Signing

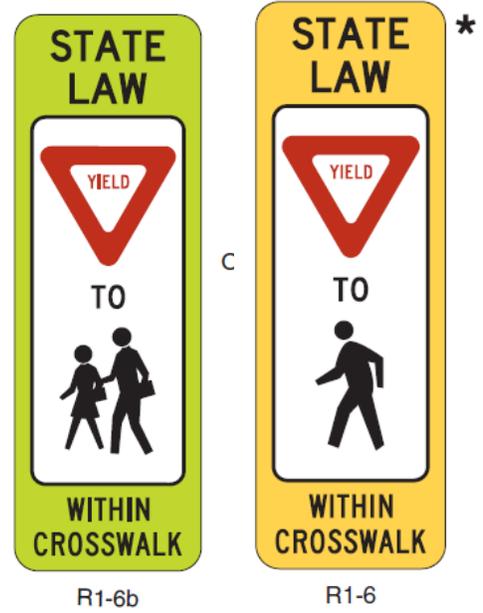
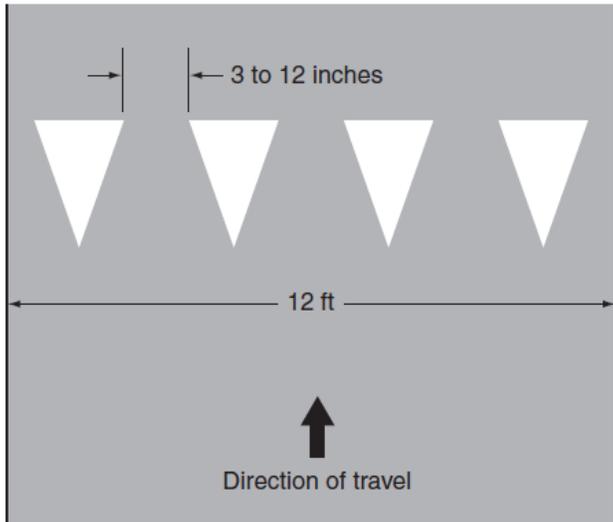
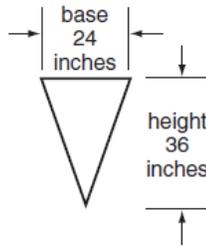


Figure 14 – Yield Bars and Associated Signage



(b) Maximum Dimensions



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.



Appendix C

MaineDOT Lane Width and Shoulder Width Engineering Instruction



MaineDOT

ENGINEERING INSTRUCTION

Title: Lane Width and Shoulder Width

Number: C1

Discipline: General Engineering

Originator: Stephen Bodge, P.E. Highway Program

Issue Date: November 10, 2010

Approved By: Joyce Taylor, P.E., Chief Engineer

Revised: April, 2019

Background:

Lane Width and Shoulder Width are Controlling Criteria for roadway design. Lane Width is the cross-sectional dimension of a lane, perpendicular to the direction of travel, measured from the center of marking on one side to the center of marking on the opposite side and is the width allocated for motorists, buses, and trucks. Lane Width has an impact on roadway speed as well as safety. Shoulder Width is the cross-sectional dimension of a shoulder and is the width adjacent to the travel lane that accommodates stopped vehicles, emergency use, and lateral support of subbase, base, and surface courses. In some cases the shoulder can accommodate bicyclists and pedestrians. Shoulder Width may have an impact on roadway speed and operational activities, as well as safety.

Applicability:

This Instruction applies to all roadway and bridge projects. While the Instruction should allow for consideration of curbed sections, guardrail sections, and bridge approaches, the Design Exception process may be utilized if additional width or less width is warranted. Due consideration to the existing corridor is expected when determining widths.

Engineering Instruction:

This Instruction outlines the Department's direction regarding Lane Width and Shoulder Width. The following points should be considered when determining Lane and Shoulder widths.

- Reference should be made to the MaineDOT Complete Streets Policy and the MaineDOT Shoulder Surface Policy.
- A 2' shoulder/curb offset is acceptable in multilane urban situations and will not require a DE.
- In urban situations, consideration should be given to providing shoulder widths wide enough to accommodate all anticipated uses.
- Except for bridge spans and approaches, shoulders with curb or guardrail shall have a minimum combined lane and shoulder width of 16' to face of curb or guardrail where it is present on both sides of the roadway. Shoulders with curb or guardrail should have a minimum combined lane and shoulder

width of 16' to face of curb or guardrail where it is present on one side only. Discussion with the maintaining authority may allow for reduced width, but consideration should be given to the maintaining authority's operations relative to the centerline of the roadway.

The basic design criteria for Lane Width and Shoulder Width are as follows:

Highway Corridor Priority 1 (Interstate only):

- Lane Width: 12'
- Shoulder Width: 4' Left, 10' Right
- Interstate Ramps: 14' Lane, 4' Shoulder Left, 8' Shoulder Right, Reference AASHTO A Policy on Geometric Design of Highways and Streets, Chapter 10
- Turning Roadways: Reference AASHTO, A Policy on Geometric Design of Highways and Streets, Chapters 3 & 10

Highway Corridor Priority 1 (Non-interstate), 2-6:

- Lane Width: 11' - 12'
Note: 10' lane widths may remain in place on rehabilitation projects without DE
- Auxiliary Lanes 11' - 12'
- Continuous Two Way Left Turn Lane (CTWLTL): 12'
- Turning Roadways: Reference AASHTO, A Policy on Geometric Design of Highways and Streets, Chapter 3
- Shoulder Width*:

Design Speed	Less than or equal to 40 mph	45 mph and greater
HCP 1	3' - 6'	4' - 8'
HCP 2	3' - 5'	4' - 6'
HCP 3 & 4	3' - 4'	3' - 6'
HCP 6	1' - 3'	2' - 4'

* Additional offset may be justified to achieve 16' total width from centerline to face of curb or guardrail. Any additional width will not require a Design Exception.

Responsibility:

Program Managers

Appendix D

Auburn's Complete Streets Policy

Auburn, Maine Complete Streets Policy

Auburn City Ordinance

March 20, 2017

Sec. 46-3. - Complete streets policy.

- (a) *Complete streets.* The City of Auburn will plan for, design, construct, operate, and maintain an appropriate and integrated transportation system that will meet the needs of motorists, pedestrians, bicyclists, wheelchair users, transit vehicles and riders, freight haulers, emergency responders, and residents of all ages and abilities.
 - (1) Transportation facilities that support the concept of complete streets include, but are not limited to, pavement markings and signs; street and sidewalk lighting; sidewalk and pedestrian safety improvements; Americans with Disabilities Act and Title VI compliance; transit accommodations; bicycle accommodations including intersection detection and appropriate signage and markings; and streetscapes that appeal to and promote pedestrian use.
 - (2) The system's design will be consistent with and supportive of local neighborhoods, recognizing that transportation needs vary and must be balanced in a flexible, safe, and cost effective manner.
- (b) *Projects.* Those involved in the planning and design of projects within the public right-of-way will give consideration to all users and modes of travel from the start of planning and design work. Transportation improvements shall be viewed as opportunities to create safer, more accessible streets for all users. This shall apply to new construction, reconstruction, and rehabilitation. The complete streets committee shall be briefed on potential future projects of this nature during or immediately following the annual development of the city's capital improvement program. This will allow the committee to provide its views regarding complete streets policy early in the planning and design process.
- (c) *Exceptions.* Exceptions to this policy may be made under the circumstances listed below:
 - (1) Street projects may exclude those elements of this policy that would require the accommodation of street uses prohibited by law;
 - (2) Ordinary maintenance activities such as mowing, snowplowing, sweeping, spot repair, joint or crack sealing, or pothole filling do not require that elements of this policy be applied beyond the scope of that maintenance activity;
 - (3) Ordinary maintenance paving projects may only exclude the elements of this policy that would require increasing pavement width. However, when such projects do occur, the condition of existing facilities supporting alternate transportation modes should be evaluated as well as the appropriateness of modifying existing pavement markings and signage that supports such alternate modes. This exception does not apply to street reconstruction projects;
 - (4) Street reconstruction projects and maintenance paving projects which involve widening pavement may exclude elements of this policy when the accommodation of a specific use is expected to:
 - a. Require more space than is physically available; or
 - b. Be located where both current and future demand is proven absent; or
 - c. Drastically increase project costs and equivalent alternatives exist within close proximity; or

- d. Have adverse impacts on environmental resources such as streams, wetlands, floodplains, or on historic structures or sites above and beyond the impacts of currently existing infrastructure.
- (5) In order for an exception to be granted under the conditions stated above and prior to finalizing the design and budget for the intended project, the city engineer and director of public works must first consult with the city planner and city manager. If the city manager concludes that an exception to the policy is warranted, the administrator or the staff representative to the complete streets committee shall consult with the committee regarding the project and the requested exception. If, after this consultation, a difference of opinion exists between the committee and staff regarding an exception that has been granted, the committee may forward its concerns to the city council for its consideration.
- (6) The city council may grant such other exceptions as it sees fit.
- (d) *Intergovernmental cooperation.* The city will cooperate with the City of Lewiston and with other transportation agencies including the Maine Department of Transportation (MDOT) and Androscoggin Transportation Resource Center (ATRC) to ensure the principles and practices of complete streets are embedded within their planning, design, construction, and maintenance activities. The two cities will specifically cooperate to ensure the transportation network flows seamlessly between the two communities in accordance with local and regional road, transit, bicycle, and pedestrian plans and mutually agreed upon design criteria.
- (e) *Design criteria.* The city, through its public works department, shall develop and adopt design criteria, standards, and guidelines based upon recognized best practices in street design, construction, and operation. To the greatest extent possible, the city shall coordinate with the City of Auburn [Lewiston] to adopt the same standards with particular emphasis on pedestrian and bicycle markings and wayfinding signage. Resources to be referenced in developing these standards shall include, but not necessarily be limited to, the latest editions of: American Association of State Highway Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets, Guide for Planning, Designing, and Operating Pedestrian Facilities, and Guide for the Development of Bicycle Facilities; Institute of Transportation Engineers (ITE) Designing Walkable Urban Thoroughfares: A Context Sensitive Approach; National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide; U.S. Access Board Public Right-of-Way Accessibility Guidelines; Androscoggin Transportation Resource Center (ATRC) Complete Streets, A Guide to Best Management and Design Practice; Highway Capacity Manual and Highway Safety Manual; the Manual on Uniform Traffic Control Devices; and any applicable policies and guidance issued by the Maine Department of Transportation.

The cities will be permitted to consider innovative or non-traditional design options that provide a comparable level of safety and utility for users as those listed above.

- (f) *Community context.* Implementation of this Policy shall take into account the goal of enhancing the context and character of the surrounding built and natural environments. Transportation facilities, including roads, should be adapted to fit and enhance the character of the surrounding neighborhood.
- (g) *Network.* Special attention should be given to projects which enhance the overall transportation system and its connectivity. Specifically, high priority should be given to:
 - (1) Corridors providing primary access to one or more significant destinations such as a parks or recreation areas, schools, shopping/commercial areas, public transportation, or employment centers;
 - (2) Corridors serving a relatively high number of users of non-motorized transportation modes;
 - (3) Corridors providing important continuity or connectivity links to existing pedestrian or bicycle networks;
 - (4) Projects identified in regional or local bicycle pedestrian plans prepared by organizations such as the ATRC and other associated groups.

- (h) *Performance measures.* The city administrator and/or designee shall report to the planning board and city council on an annual basis on the transportation projects undertaken within the prior year and planned within the coming year and the extent to which each of these projects has met the complete streets ordinance.
- (i) *Implementation.* This policy will be primarily implemented through planning comprehensive complete streets networks regionally and within each city.

Additional implementation activities will include, but not be limited to: developing project checklists that incorporate complete streets elements in the cities' overall design processes; annual review of capital improvement plans and unified planning work programs; establishing design manuals that clearly set forth the complete streets standards; and directing the planning boards to evaluate changes to the cities' respective land development codes that will extend the complete streets concept into private developments through appropriate subdivision and site plan regulations.

(Ord. No. 03-03062017, 3-20-2017)

Cross reference— Complete streets committee, § 2-482.2 et seq.

Appendix E

Auburn's Ped Safety Forum Flyer

LET'S



Make Auburn Streets **SAFER!**

Let's take the first steps together to tackle our city's most dangerous streets, intersections and crosswalks!

Join Auburn, MaineDOT and the Bicycle Coalition of Maine to address the recent spike in pedestrian/vehicle crashes. Safety really is a two-way street and we want to hear your ideas about dangerous locations and the dangerous habits of pedestrians and motorists. You'll leave with reflective safety gear and the satisfaction of knowing you've made Auburn streets safer!

June 7, 2017, 5 PM - 7 PM
Auburn City Hall

(Community Room, 60 Court St., Auburn)



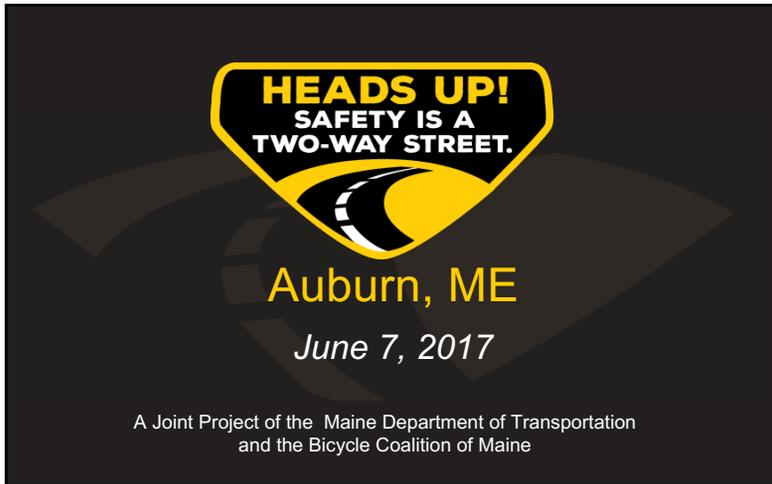
FMI: *The Bicycle Coalition of Maine, 623-4511.*

mainedot.gov

Appendix F

Auburn's Heads Up Pedestrian Safety Forum Presentation

June 7, 2017



HEADS UP!
SAFETY IS A
TWO-WAY STREET.

Auburn, ME
June 7, 2017

A Joint Project of the Maine Department of Transportation
and the Bicycle Coalition of Maine

Welcome

- Maine Department of Transportation Staff
- Bicycle Coalition of Maine Staff
- Town Staff
- School District Staff
- Police Staff
- LA Bicycle and Pedestrian Committee
- Residents—Name, Street/Neighborhood



Welcome--Agenda

- Welcome: Intros, Agenda, Using Clicker Tech
- Perceptions and Realities of Pedestrian Safety
- Identification and Discussion of Problem Locations
- Open Mic for Public Feedback
- Prioritization Activity
- Next Steps



Welcome—What Is a “Pedestrian”?

"Pedestrian" means a person on foot or an operator of a wheelchair or a 4-wheeled or 3-wheeled motorized wheelchair.

Maine Revised Statutes, Title 29-A, Chapter 19, §101 "Definitions"



Welcome—Goals

- To start a conversation about pedestrian safety in Maine.
- To learn about your views on pedestrian safety and practices.
- To discuss how to improve pedestrian safety.
- To learn about locations of concern in your community.



Welcome—Goals

- To get you engaged with the first step of a process that will include a SWOT analysis, site visits, and a mitigation plan for your town. (More on this later)
- To help MaineDOT plan for feasible projects in the short, medium and long term that will have a positive effect on pedestrian safety.



Welcome—Clicker Tech

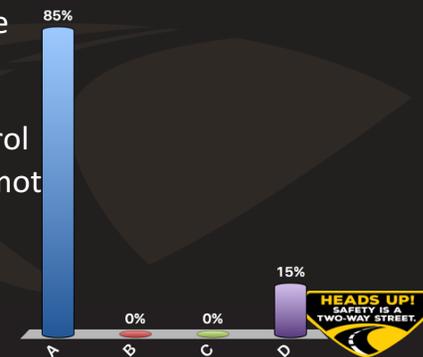
ResponseCard Clickers

- Better audience participation
- Easy to use
- Saves data
- Anonymous



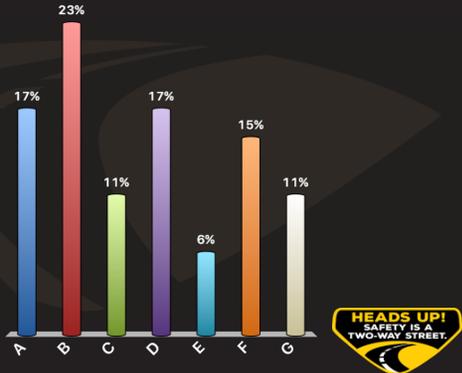
What other things can the clickers be used for? (Pick one.)

- A. They can only be used for these meetings
- B. TV remote control
- C. Garage door remote control
- D. All of the above



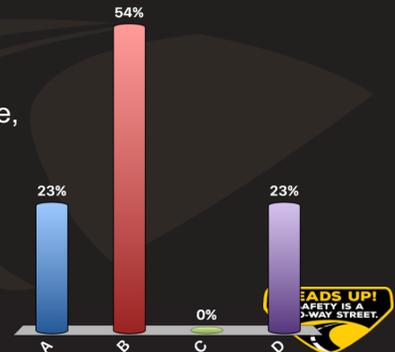
Select your favorite foods. (Pick all that apply.)

- A. Pizza
- B. Lobster Roll
- C. Hamburgers
- D. Steak
- E. Artichokes
- F. Clams
- G. Chicken



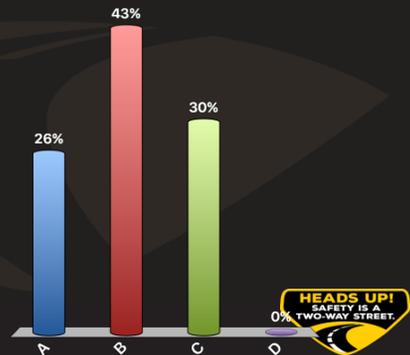
What statement best describes you? (Pick one.)

- A. General Public
- B. Municipal Staff (town management, planning, DPW, police, etc.)
- C. Elected Official
- D. Stakeholder/Interest Group (AARP, social service org, etc.)



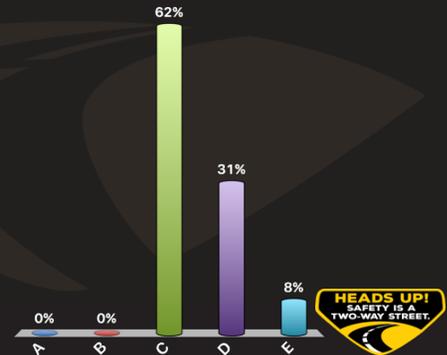
What statement best describes you? (Pick all that apply.)

- A. I live in town.
- B. I work in town.
- C. I shop/recreate in town.
- D. I go to school in town.



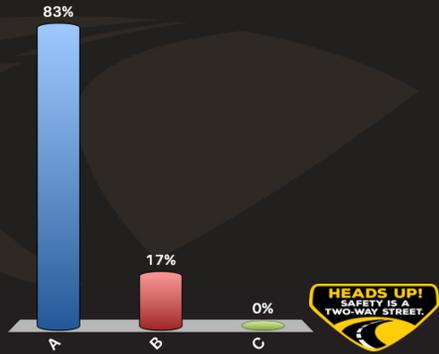
What is your age range?

- A. Under 14
- B. 15-29
- C. 30-49
- D. 50-69
- E. Over 70



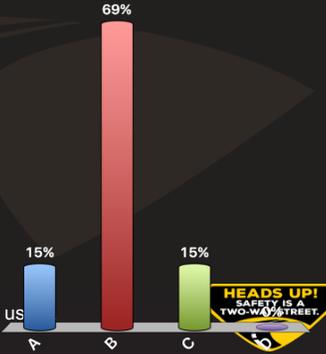
How do you self-identify?

- A. Male
- B. Female
- C. Other identifier



Tell us about your pedestrian habits. (Pick * one.)

- A. I walk everywhere
- B. I walk for exercise and short errands
- C. I mostly walk from my car to the office or store
- D. I don't walk very much



*Remember, "pedestrian" includes wheelchair users.



Facts About Pedestrian Safety



Facts About Pedestrian Safety

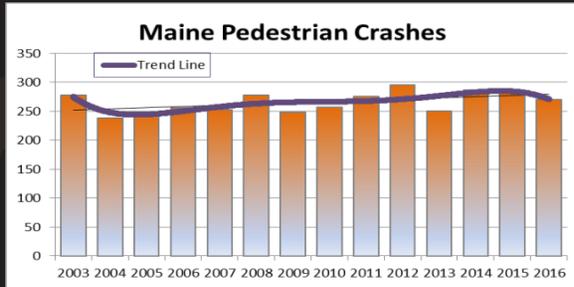
CRASHES are not accidents. There are usually avoidable causes for crashes.

- A reportable crash in Maine involves:
- A moving vehicle hitting someone/something,
 - Causing personal injury or death, or
 - Causing \$1000 in property damage.

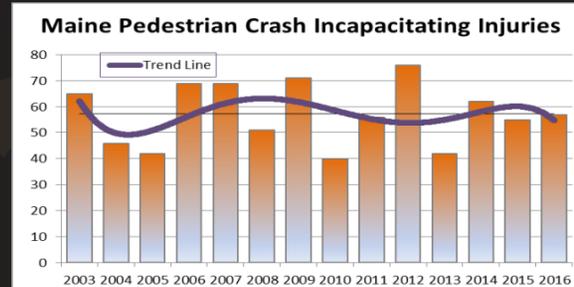
Many more incidents occur that do not meet this definition which are not in the database.



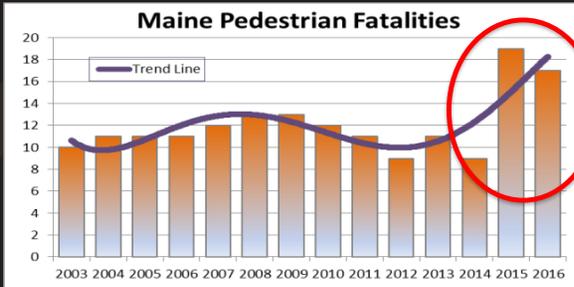
Facts About Pedestrian Safety



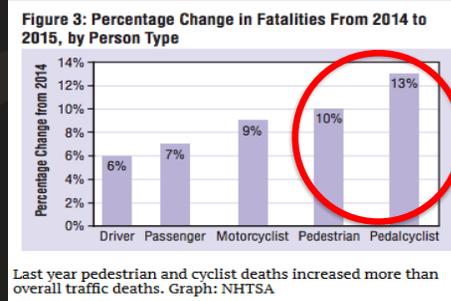
Facts About Pedestrian Safety



Facts About Pedestrian Safety



Facts About Pedestrian Safety



Last year pedestrian and cyclist deaths increased more than overall traffic deaths. Graph: NHTSA



Facts About Pedestrian Safety

Odds a Maine Crash Will Be Fatal:

- Pedestrian: 1 out of 24
- Head On: 1 out of 23
- Went Off Road: 1 out of 120
- Intersection: 1 out of 485
- Rear End: 1 out of 1425

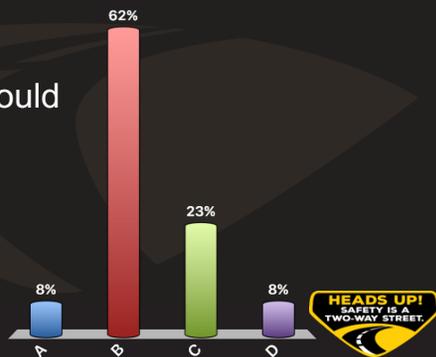


Perceptions and Realities of Pedestrian Safety



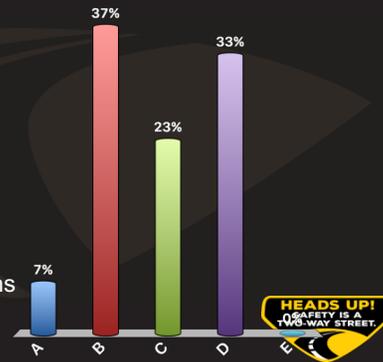
How safe do you feel walking in Auburn? (Pick one.)

- A. Not safe at all
- B. Not bad, but could be better
- C. Pretty safe
- D. Very safe



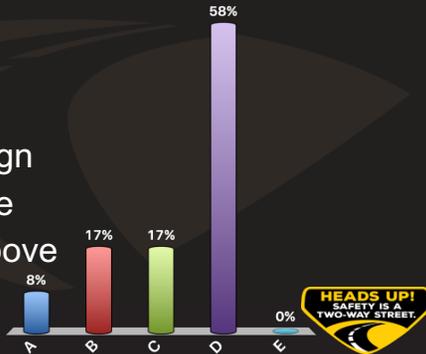
Are your concerns about road safety linked to...? (Pick all that apply.)

- A. Problems with neighborhood security, crime, strangers
- B. Problems with roadway behavior on the part of drivers
- C. Problems with the sidewalk or crosswalk network
- D. Problems with road maintenance or conditions (e.g. snow removal)
- E. I don't have concerns about road safety



Who/what do you think is most responsible for the safety of pedestrians on roadways? (Pick one.)

- A. Pedestrians
- B. Drivers
- C. Roadway Design
- D. All of the Above
- E. None of the Above



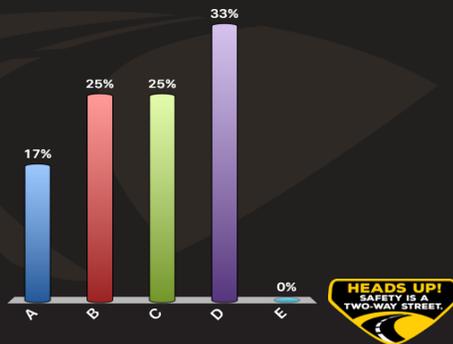
Who do you think is most responsible for the safety of pedestrians on roadways?

- The data doesn't provide a perfectly clear answer. There is no one group that appears *most* responsible.
- "Safety is a Two-Way Street"
- We are *all* responsible for making our roads safer.



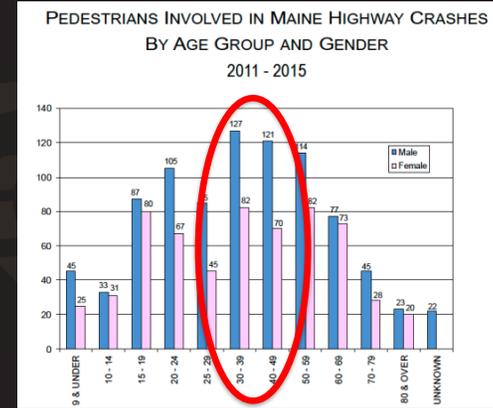
What age group do you think are most involved in pedestrian crashes? (Pick one.)

- A. Under 14
- B. 15-29
- C. 30-49
- D. 50-69
- E. Over 70



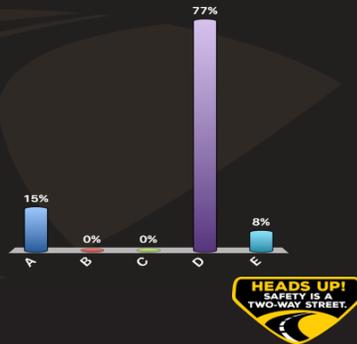
Perceptions and Realities of Pedestrian Safety

- MaineDOT statistics indicate that people aged 30-49 are the most often involved in pedestrian crashes.
- Adults are the most represented group in crash data!



What pedestrian behavior do you think contributes most to pedestrian crashes? (Pick one.)

- A. Walking in road with traffic
- B. Walking in road against traffic
- C. Standing in road
- D. Crossing road without marked crosswalk
- E. Crossing with marked crosswalk



Perceptions and Realities of Pedestrian Safety

Between 2011-2015:

- 82 crashes in marked crosswalk with signal
- 80 crashes in marked crosswalk against signal
- 283 crashes in marked crosswalks
- 360 crashes with no crosswalk



Perceptions and Realities of Pedestrian Safety

- MaineDOT stats show that a marked crosswalk with a signal is the safest place to cross (even if you don't have the signal!)
- Don't automatically trust crosswalks to keep you safe! Marked crosswalks without signals are only somewhat safer than locations with no crosswalk at all
- PEDS: Don't take your safety for granted *anywhere* on a roadway. Don't automatically expect drivers see you or will yield.
- DRIVERS: May need to comply better with the requirement to yield at crosswalks!



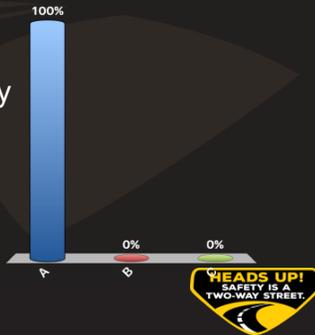
Safe Crossings

1. Use the Crosswalk with a signal. Obeying the signal is safest, and also makes the overall traffic system work best.
1. Push the Button!!
1. If available, cross where there is a Rapid Rectangular Flashing Beacon (RRFB, pictured). Push the Button!



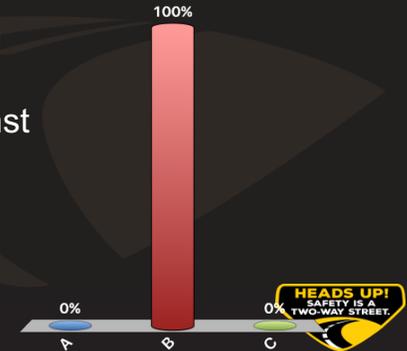
Where is the safest place to cross?
(Pick one.)

- A. At a crosswalk, with the signal
- B. At a crosswalk without any signal
- C. Wherever you can.



If there is no sidewalk available, what side of the street should you walk on? (Pick one.)

- A. On the right, with traffic
- B. On the left, against traffic
- C. Either- it really doesn't matter



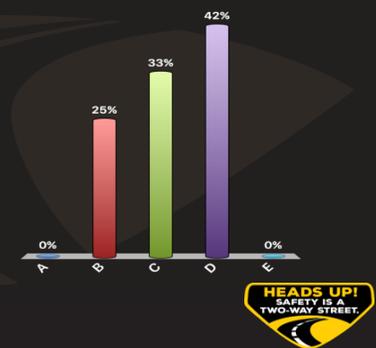
If there is no sidewalk available, what side of the street should you walk on?

ON THE LEFT, FACING TRAFFIC. MaineDOT Stats from 2011 to 2015 show that 108 pedestrian crashes occurred with the Pedestrian walking with their back to traffic; only 46 occurred facing traffic.



What driver behavior do you think contributes most to pedestrian crashes? (Pick one.)

- A. Improper backing up
- B. Driving too fast for conditions
- C. Failure to yield
- D. Reckless, negligent, or aggressive driving
- E. Disregarding road markings



What driver behavior do you think contributes most to pedestrian crashes?

- MaineDOT stats show that failure to yield is the most common cause of pedestrian crashes by a large margin, with aggressive driving a distant second.^{318/79}
- PEDS: Don't take your safety for granted anywhere on a roadway.
- DRIVERS: Slow down, pay attention, and yield for pedestrians no matter where they are!



What does YIELD mean?

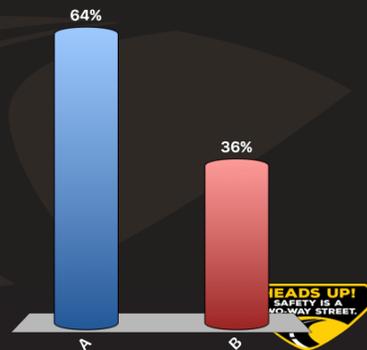
Yield means "let other road users go first."

<https://drivesed.com/resources/terms/yield.aspx>, March 27, 2017.



When do you think the majority of pedestrian crashes occur? (Pick one.)

- A. During daylight, when visibility is good
- B. During darkness, when visibility is bad



Perceptions and Realities of Pedestrian Safety

MaineDOT stats show that the majority of pedestrian crashes occur in daylight, in clear weather, on dry roads.

Don't assume that drivers see you!

Month?



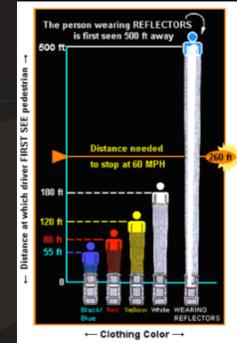
Perceptions and Realities of Pedestrian Safety

BUT keep in mind, 2/3rds of FATAL pedestrian crashes occur from dusk to dawn... in dark conditions.



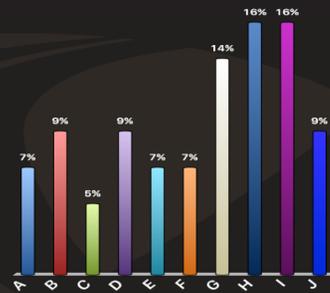
Being Reflective Matters!!

- Wearing Reflective Material on your arms or legs almost doubles the distance from which cars first see you after dark.
- Lights work even better.
- Don't assume that drivers see you!



What are your concerns about roadway infrastructure affecting pedestrian safety in Auburn? (Pick all that apply.)

- A. Not enough sidewalks
- B. Not enough crosswalks
- C. Crosswalks are too long
- D. Crosswalks are not visible enough
- E. Roads/crosswalks are not lit well enough at night
- F. Signals not present or not working well
- G. Problems with maintenance and condition
- H. Roads are too wide
- I. Roads encourage speeding
- J. Lack of ADA access



Identification of Problem Locations: Activity

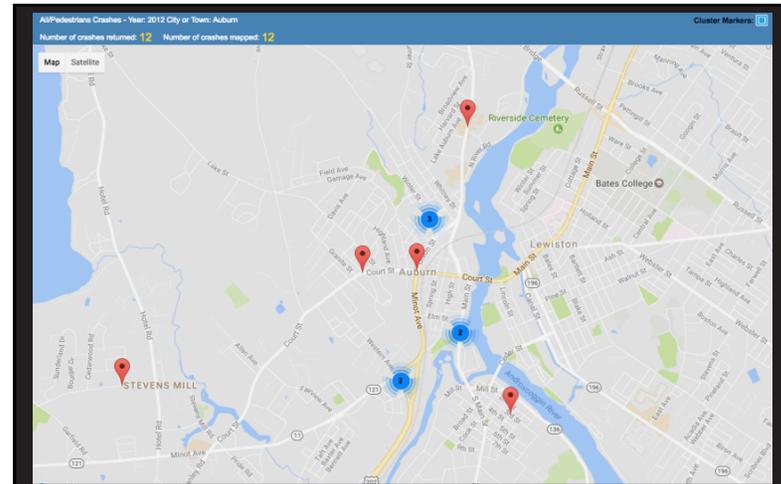
What are the locations in your town that you feel are unsafe for pedestrians? (20 minutes)

1. Complete your worksheet
2. Talk to your neighbors
3. Mark up the maps
4. Tell the note taker



Discussion of Problem Locations

Please tell the group about the places that concern you.



Discussion of Problem Locations

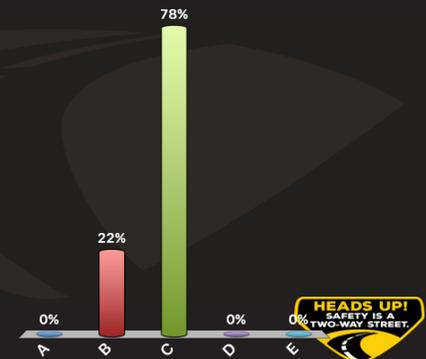
What your local officials have to say.



Prioritization of Problem Locations

Using your Clicker, tell us if Location 1 is an area that is:

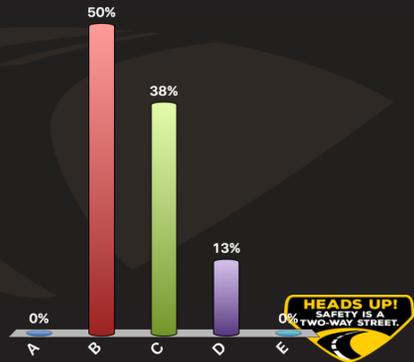
- A. Highest priority
- B. High priority
- C. Of some concern
- D. Not a big deal
- E. Doesn't need attention



Prioritization of Problem Locations

Using your Clicker, tell us if Location 2 is an area that is:

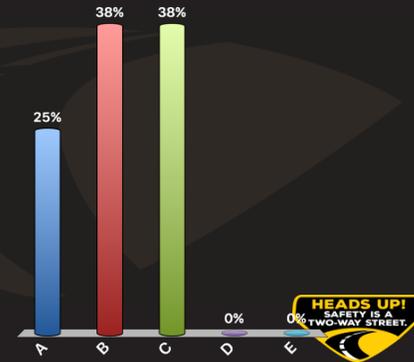
- A. Highest priority
- B. High priority
- C. Of some concern
- D. Not a big deal
- E. Doesn't need attention



Prioritization of Problem Locations

Using your Clicker, tell us if Location 3 is in an area that is:

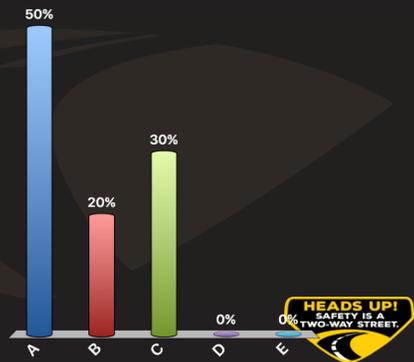
- A. Highest priority
- B. High priority
- C. Of some concern
- D. Not a big deal
- E. Doesn't need attention



Prioritization of Problem Locations

Using your Clicker, tell us if Location 4 is an area that is:

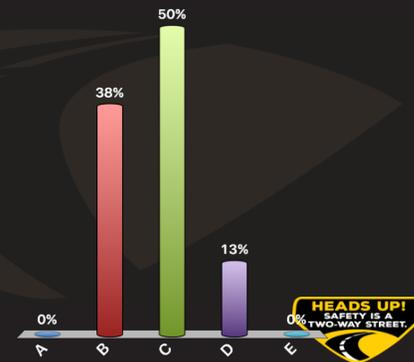
- A. Highest priority
- B. High priority
- C. Of some concern
- D. Not a big deal
- E. Doesn't need attention



Prioritization of Problem Locations

Using your Clicker, tell us if Location 5 is an area that is:

- A. Highest priority
- B. High priority
- C. Of some concern
- D. Not a big deal
- E. Doesn't need attention



Prioritization of Problem Locations

Using your Clicker, tell us if Location 6 is an area that is:

- A. Highest priority
- B. High priority
- C. Of some concern
- D. Not a big deal
- E. Doesn't need attention



Prioritization of Problem Locations

Using your Clicker, tell us if Location 7 is an area that is:

- A. Highest priority
- B. High priority
- C. Of some concern
- D. Not a big deal
- E. Doesn't need attention



Next Steps

- Strength, Weaknesses, Opportunities, Threats Analysis
- Site Visit and Pedestrian Safety Review of Up to 5 Locations
- Development of Mitigation Plan to include Infrastructure and Educational Interventions
- **Sign Up to Get Involved on Your Way Out!**



Please Remember:

- "Safety is a Two-Way Street"
- We are all responsible for making our roads safer.
- As a Walker: Be Alert, Be Visible, Be Careful.
- As a Driver: Slow Down, Pay Attention, Put Down Your Phone!



For More Info

Patrick Adams, MaineDOT
patrick.adams@maine.gov

Jim Tassé, Bicycle Coalition of Maine
jim@bikemaine.org



Appendix G

Auburn's Heads Up Pedestrian Safety Forum Comments

Auburn Forum Comments, June 7, 2017

Public

Submitted via email:

1. I cannot attend the meeting at 7pm in Auburn Hall but I would like to voice my concerns.
 - a) Manley to Minot Ave. in Auburnthe sidewalk is not plowed after a snowstorm and I feel it is dangerous. The city says there isn't enough foot traffic to warrant it and I disagree. They sort of do it and not very good way days after the storm.
 - b) Minot Ave. from Western St. to High...in autumn the leaves on the sidewalks are ankle deep.....and in winter is isn't plowed in a timely fashion or not at all.
 - c) Bedard's Pharmacy on Minot Ave. to Western ave. not plowed or shoveled on sidewalks in places
 - d) Center St. Auburn on the McDonalds side not plowed
 - e) Cars and trucks not stopping for people in flashing crosswalks by Roopers and the Big Apple
 - f) Crosswalk at Minot Ave./High St. needs to be fixed
 - g) Time for crosswalk needs to be a few seconds longer for disabled and elderly to cross safely
 - h) No crosswalk across Minot Ave. by Hotel Rd (bank and McDonalds)
 - i) the increasing running red lights by cars and trucks
 - j) how many people are talking or texting on their phones being distracted from safe driving

2. I will be unable to be at the Auburn pedestrian meeting tonight, but wanted to share a few thoughts and ideas.

First, I live near Court Street and also bicycle and drive frequently in Auburn. My children attend Auburn Schools and we are in the walking zone for every age for the schools. I also have the unfortunate experience of being struck by a vehicle while a pedestrian in a crosswalk. You will be happy to know I was out of state on vacation at the time.

I am very concerned about pedestrian safety in crossing Court Street. Vehicles travel frequently at high rates of speed and sometimes do not stop for pedestrians waiting to cross. The light and crosswalks at Park Avenue are very helpful, but have led to more difficulty for pedestrian and vehicle traffic further down Goff Hill.

In thinking about some lower cost solutions, I propose the following:

A pedestrian initiated blinking light for Court Street at the intersection of Harris St.

A crosswalk, possibly with a signal, for Court St. at the intersection of Western Avenue. A more frequent schedule of street sweeping for the safety of all travelers.

Feel free to share my thoughts or contact me for more information. Thank you for your work.

Notes on microphone comments

Question: How do pedestrian crossing signals work?

Speaker 2:

1. Minot Ave. at Court St. – very hard intersection, a challenge for both drivers and pedestrians
2. Court Street – 4 lanes between Minot and bridge

3. Crosswalks on Turner Street at YMCA – parking too close to crosswalk, parking should be removed
4. Main Street before Academy Street – parking too close to crosswalks
5. Minot Ave, near Office Max (technically Union Street) – Increase in crashes
6. Minot Ave by High School – Increase in crashes as kids cross to restaurants
7. ATRC Bike Ped Plan – need comprehensive plan for neighborhoods and Riverwalk

Speaker 3: Police

1. Currently doing traffic calming and plainclothes operations
2. Crosswalk signs for education
3. Vulnerable User enforcement day
4. w/ Maine DOT – signage for bikes around Lake Auburn and Hotel Road

Speaker 4: Eric Cousens, Dep. Director of Economic and Commercial Development

1. Shifted Focus to pedestrians- extra striping

Speaker 5: Doug Greene, Urban and Economic Development

1. Develop plan for New Auburn – safety review
2. Residents demanding pedestrian safety and access
3. More liveable, walkable

Appendix H

Auburn's Heads Up Pedestrian Safety Forum Worksheets



Pedestrian Safety Forum Worksheet

Name (optional):

Email (optional):

Help us identify problem areas for pedestrians in your community. Problem areas are spots at which one or more of the following situations are present:

- | | | |
|----------------------------|--|--|
| 1. Roads seem too wide | 6. Crosswalks are not visible enough | 9. Problems with maintenance and condition |
| 2. Speeding traffic | 7. Roads/crosswalks poorly lit | 10. Lack of ADA features and access |
| 3. No crosswalks | 8. Signals not present or not working well | 11. Other ? |
| 4. No sidewalks | | |
| 5. Crosswalks are too long | | |

Please give your address or the nearest intersection to where you live: e.g., Broadway and Morse Street

Please list up to 5 pedestrian "problem locations" & use problem #'s from above:

#6,8 Location: Crossing Court St Near ELHS Problem #: 6,8

Location: Problem #:

#5 Location: Court St Downtown Problem #: 5

#5 Location: Broad/Mill/S. main - New Auburn Problem #: 5

Location: Problem #:

Comments: Please use the space below and the back if needed to tell us more about pedestrian safety in your community.

Would you be interested in participating in additional safety assessment activities?

Name _____ Contact _____



Pedestrian Safety Forum Worksheet

Name (optional):

Email (optional):

Help us identify problem areas for pedestrians in your community. Problem areas are spots at which one or more of the following situations are present:

- | | | |
|----------------------------|--|--|
| 1. Roads seem too wide | 6. Crosswalks are not visible enough | 9. Problems with maintenance and condition |
| 2. Speeding traffic | 7. Roads/crosswalks poorly lit | 10. Lack of ADA features and access |
| 3. No crosswalks | 8. Signals not present or not working well | 11. Other ? |
| 4. No sidewalks | | |
| 5. Crosswalks are too long | | |

Please give your address or the nearest intersection to where you live: e.g., Broadway and Morse Street

Second St. New Auburn

Please list up to 5 pedestrian "problem locations" & use problem #'s from above:

- | | |
|--|----------------------|
| Location: <u>most streets</u> | Problem #: <u>2</u> |
| Location: <u>2nd & Mill Sts.</u> | Problem #: <u>5</u> |
| Location: <u>most sidewalks and to in New Auburn 2nd St.</u> | Problem #: <u>10</u> |
| Location: <u>most sidewalks</u> | Problem #: <u>9</u> |
| Location: <u>most side streets</u> | Problem #: <u>3</u> |

Comments: Please use the space below and the back if needed to tell us more about pedestrian safety in your community.

*Need to slow traffic. Enforce laws on the books and stiffen laws pertaining to distracted drivers. People running red lights, stop signs. *Not stopping for walkers at crosswalks.**

Would you be interested in participating in additional safety assessment activities?

Name [Redacted]

Contact [Redacted]

3 min to pass Bike + Rd.



Pedestrian Safety Forum Worksheet

Name (optional):

Email (optional):

Help us identify problem areas for pedestrians in your community. Problem areas are spots at which one or more of the following situations are present:

- 1. Roads seem too wide
- 2. Speeding traffic
- 3. No crosswalks
- 4. No sidewalks
- 5. Crosswalks are too long
- 6. Crosswalks are not visible enough
- 7. Roads/crosswalks poorly lit
- 8. Signals not present or not working well
- 9. Problems with maintenance and condition
- 10. Lack of ADA features and access
- 11. Other ?

Please give your address or the nearest intersection to where you live: e.g., Broadway and Morse Street

CENTER ST. AND NORTH CIVIER RD

Please list up to 5 pedestrian "problem locations" & use problem #'s from above:

- Location: ~~AEA~~ CTL ST on 070 ramp Problem #:
- Location: Problem #:
- Location: Problem #:
- Location: Problem #:
- Location: Problem #:

Comments: Please use the space below and the back if needed to tell us more about pedestrian safety in your community.

Would you be interested in participating in additional safety assessment activities?

Name _____ Contact _____



Pedestrian Safety Forum Worksheet

Name (optional):



Email (optional):



Help us identify problem areas for pedestrians in your community. Problem areas are spots at which one or more of the following situations are present:

- 1. Roads seem too wide
- 2. Speeding traffic
- 3. No crosswalks
- 4. No sidewalks
- 5. Crosswalks are too long
- 6. Crosswalks are not visible enough
- 7. Roads/crosswalks poorly lit
- 8. Signals not present or not working well
- 9. Problems with maintenance and condition
- 10. Lack of ADA features and access
- 11. Other ?

Please give your address or the nearest intersection to where you live: e.g., Broadway and Morse Street

Washington & Danville Corner Rd

Please list up to 5 pedestrian "problem locations" & use problem #'s from above:

- Location: Center St @ Turner Rd Problem #: 2, 6
- Location: Center St @ YMCA Problem #: 2, 6
- Location: Center St No of Vets Bridge Problem #: 4, 6, 2
- Location: Problem #:
- Location: Problem #:

Comments: Please use the space below and the back if needed to tell us more about pedestrian safety in your community.

Map of good walking routes - to encourage use & highlight gaps in walking routes that ~~will~~ ^{could} be addressed

Would you be interested in participating in additional safety assessment activities?

Name _____

Contact _____



Pedestrian Safety Forum Worksheet

Name (optional): [Redacted]

Email (optional): [Redacted]

Help us identify problem areas for pedestrians in your community. Problem areas are spots at which one or more of the following situations are present:

- 1. Roads seem too wide
- ✓ 2. Speeding traffic
- 3. No crosswalks
- 4. No sidewalks
- 5. Crosswalks are too long
- 6. Crosswalks are not visible enough
- 7. Roads/crosswalks poorly lit
- ✓ 8. Signals not present or not working well
- ✓ 9. Problems with maintenance and condition
- 10. Lack of ADA features and access
- 11. Other ?

Please give your address or the nearest intersection to where you live: e.g., Broadway and Morse Street

Bennett + Valley Sts.

Please list up to 5 pedestrian "problem locations" & use problem #'s from above:

- 2 Location: Jct. Minot Ave. E + Washington Ave. N. Problem #: cycling merge into traffic (speeding)
- 9 Location: Minot Ave E. + W. Problem #: cycling roadsides conditions - rough - dirt - trash
- Location: Problem #:
- Location: Problem #:
- Location: Problem #:

Comments: Please use the space below and the back if needed to tell us more about pedestrian safety in your community.

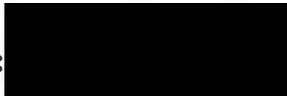
Would you be interested in participating in additional safety assessment activities?

Name _____ Contact _____



Pedestrian Safety Forum Worksheet

Name (optional):



Email (optional):



Help us identify problem areas for pedestrians in your community. Problem areas are spots at which one or more of the following situations are present:

- | | | |
|----------------------------|--|--|
| 1. Roads seem too wide | 6. Crosswalks are not visible enough | 9. Problems with maintenance and condition |
| 2. Speeding traffic | 7. Roads/crosswalks poorly lit | 10. Lack of ADA features and access |
| 3. No crosswalks | 8. Signals not present or not working well | 11. Other ? |
| 4. No sidewalks | | |
| 5. Crosswalks are too long | | |

Please give your address or the nearest intersection to where you live: e.g., Broadway and Morse Street



Howe St. Auburn

Please list up to 5 pedestrian "problem locations" & use problem #'s from above:

Location: Mint Ave & High St.

Problem #: 2+8

Location: Stevens Mill Rd

Problem #: 2

Location:

Problem #:

Location:

Problem #:

Location:

Problem #:

Comments: Please use the space below and the back if needed to tell us more about pedestrian safety in your community.

Would you be interested in participating in additional safety assessment activities?

Name



Contact



Appendix I

Auburn's Heads Up Pedestrian Safety Forum Voting Summary

Auburn Voting Summary

June 7, 2017

Generally, in Auburn, people walk for exercise and short errands and few use walking as their primary mode of transportation. People feel safe enough but are aware that there are improvements that could be made to make walking in Auburn safer. Their largest safety concern, with ~37% of respondents citing it, was improper driver behavior. Other significant concerns voiced included problems with maintenance or conditions (~33%) and problems with the sidewalks or crosswalk networks (~23%). When discussing infrastructure concerns, Auburn residents put more emphasis on roads that encourage speeding and roads being too wide. Little concern was given to crosswalks being too long. These findings are not statistically different than the rest of the population. Residents within the target towns in general want these things.

While most towns disagreed on almost all questions, respondents in Auburn tended to agree on many questions. The questions asking, “Where is the safest place to cross?” and “If there is no sidewalk available, what side of the street should you walk on?” Answers to both questions had 100% agreement from respondents, answering “at a crosswalk, with a signal,” to the former and “on the left side, against traffic,” to the latter. It should be noted that most towns showed a fair amount of disagreement on these questions.

The view identified during the Heads Up Pedestrian Safety Forum reflects the perspective of all those who participated in the forum and elected to voice an opinion. There are no indicators that the group’s perceptions of pedestrian safety within Auburn mirror the city’s population as a whole and the project team would discourage making any assumptions or extrapolating the data for the information collected. This information has been provided for informational purposes only.

Appendix J

Auburn's Heads Up Pedestrian Safety Forum Voting Detail

Voting Results by Question

Auburn - June 7, 2017

Session Name
Auburn Ped Forum 6-7-2017

Date Created
Wednesday, June 07, 2017

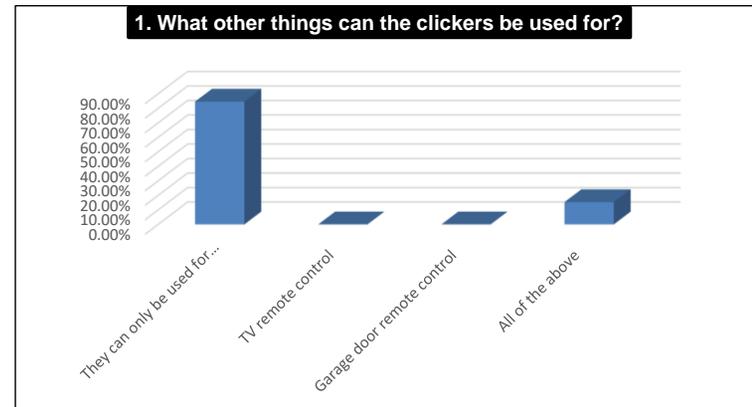
Active Participants
13

Total Participants
13

Results by Question

1. What other things can the clickers be used for? (Pick one.) (Multiple Choice)

Responses		
	Percent	Count
They can only be used for these meetings	84.62%	11
TV remote control	0.00%	0
Garage door remote control	0.00%	0
All of the above	15.38%	2
Totals	100%	13

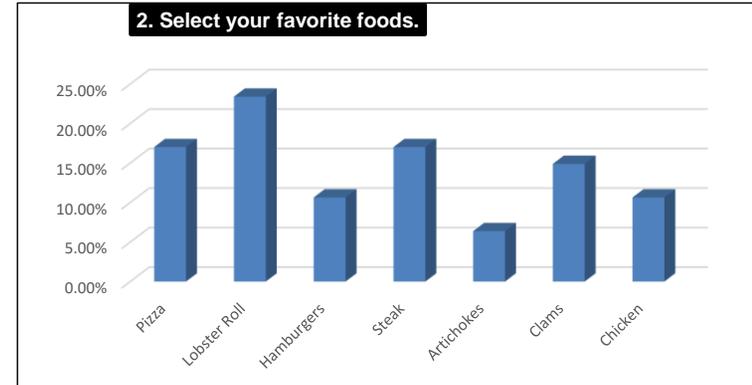


Voting Results by Question

Auburn - June 7, 2017

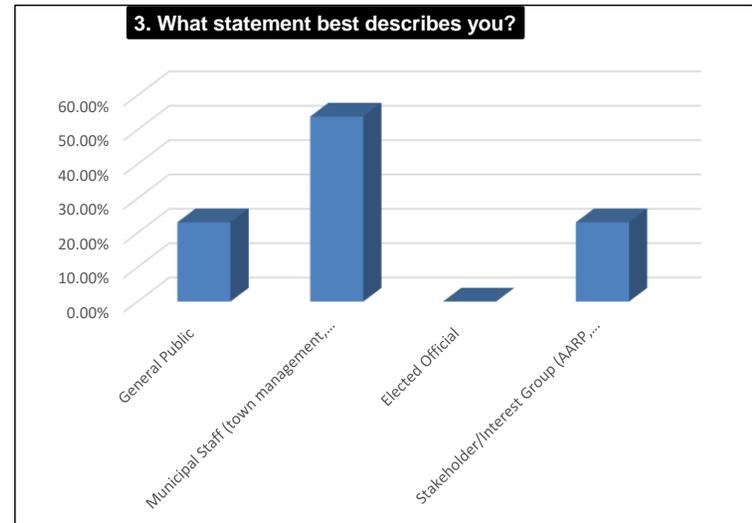
2. Select your favorite foods. (Pick all that apply.) (Multiple Choice - Multiple Response)

Responses		
	Percent	Count
Pizza	17.02%	8
Lobster Roll	23.40%	11
Hamburgers	10.64%	5
Steak	17.02%	8
Artichokes	6.38%	3
Clams	14.89%	7
Chicken	10.64%	5
Totals	100%	47



3. What statement best describes you? (Pick one.) (Multiple Choice)

Responses		
	Percent	Count
General Public	23.08%	3
Municipal Staff (town management, planning, DPW, police, etc.)	53.85%	7
Elected Official	0.00%	0
Stakeholder/Interest Group (AARP, social service org, etc.)	23.08%	3
Totals	100%	13

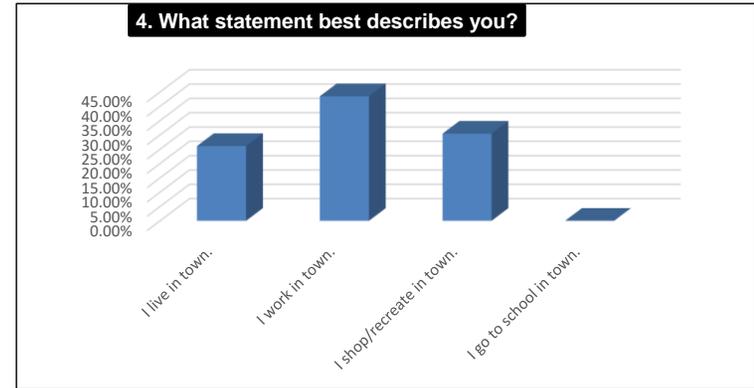


Voting Results by Question

Auburn - June 7, 2017

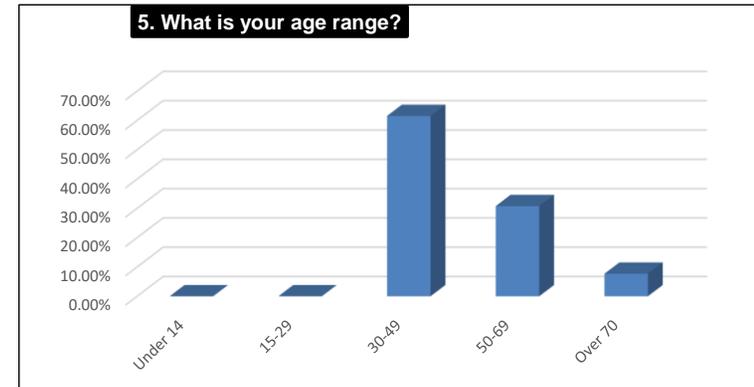
4. What statement best describes you? (Pick all that apply.) (Multiple Choice - Multiple Response)

Responses		
	Percent	Count
I live in town.	26.09%	6
I work in town.	43.48%	10
I shop/recreate in town.	30.43%	7
I go to school in town.	0.00%	0
Totals	100%	23



5. What is your age range? (Multiple Choice)

Responses		
	Percent	Count
Under 14	0.00%	0
15-29	0.00%	0
30-49	61.54%	8
50-69	30.77%	4
Over 70	7.69%	1
Totals	100%	13

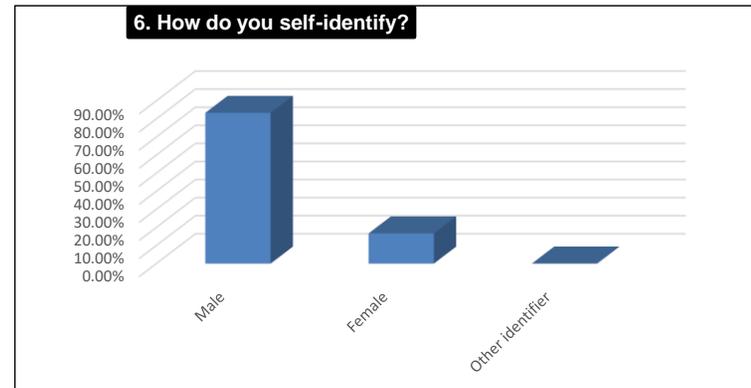


Voting Results by Question

Auburn - June 7, 2017

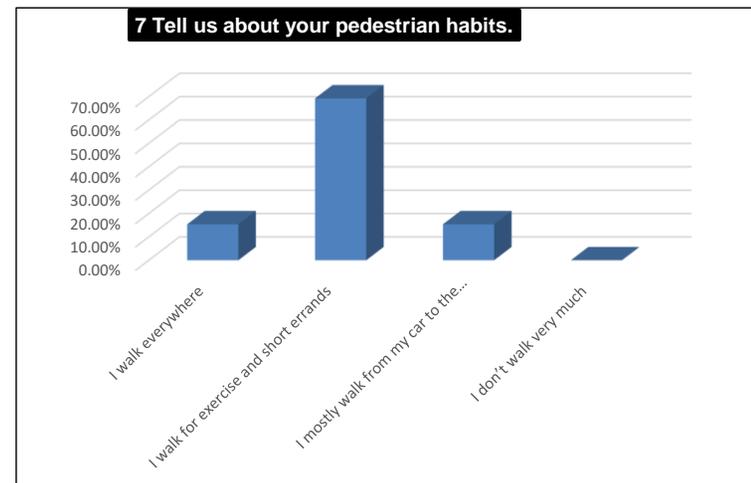
6. How do you self-identify? (Multiple Choice)

Responses		
	Percent	Count
Male	83.33%	10
Female	16.67%	2
Other identifier	0.00%	0
Totals	100%	12



7. Tell us about your pedestrian habits. (Pick one.) (Multiple Choice)

Responses		
	Percent	Count
I walk everywhere	15.38%	2
I walk for exercise and short errands	69.23%	9
I mostly walk from my car to the office or store	15.38%	2
I don't walk very much	0.00%	0
Totals	100%	13

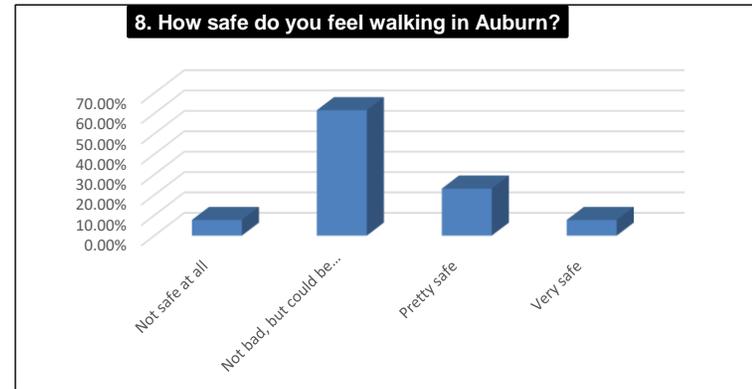


Voting Results by Question

Auburn - June 7, 2017

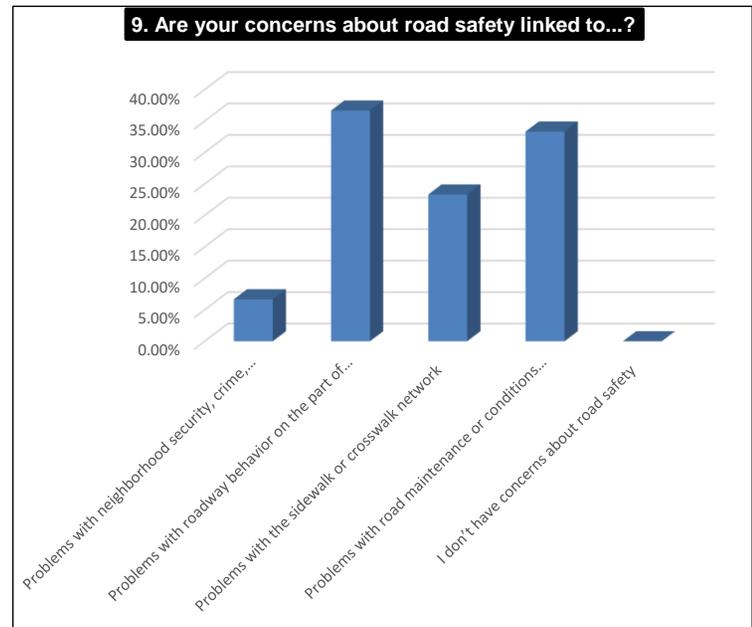
8. How safe do you feel walking in Auburn? (Pick one.) (Multiple Choice)

Responses		
	Percent	Count
Not safe at all	7.69%	1
Not bad, but could be better	61.54%	8
Pretty safe	23.08%	3
Very safe	7.69%	1
Totals	100%	13



9. Are your concerns about road safety linked to...? (Pick all that apply.) (Multiple Choice - Multiple Response)

Responses		
	Percent	Count
Problems with neighborhood security, crime, strangers	6.67%	2
Problems with roadway behavior on the part of drivers	36.67%	11
Problems with the sidewalk or crosswalk network	23.33%	7
Problems with road maintenance or conditions (e.g. snow removal)	33.33%	10
I don't have concerns about road safety	0.00%	0
Totals	100%	30

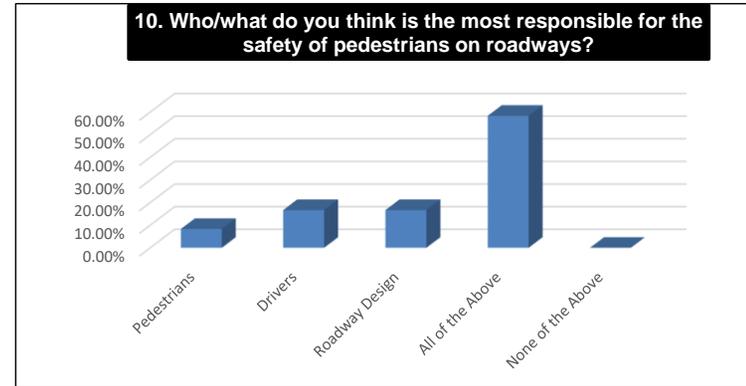


Voting Results by Question

Auburn - June 7, 2017

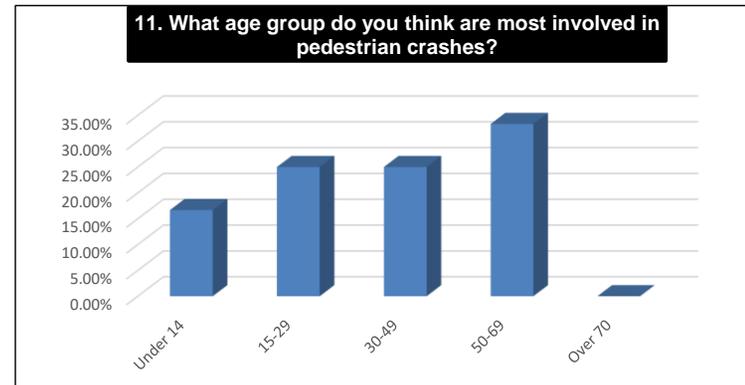
10. Who/what do you think is most responsible for the safety of pedestrians on roadways? (Pick one.) (Multiple Choice)

Responses		
	Percent	Count
Pedestrians	8.33%	1
Drivers	16.67%	2
Roadway Design	16.67%	2
All of the Above	58.33%	7
None of the Above	0.00%	0
Totals	100%	12



11. What age group do you think are most involved in pedestrian crashes? (Pick one.) (Multiple Choice)

Responses		
	Percent	Count
Under 14	16.67%	2
15-29	25.00%	3
30-49	25.00%	3
50-69	33.33%	4
Over 70	0.00%	0
Totals	100%	12

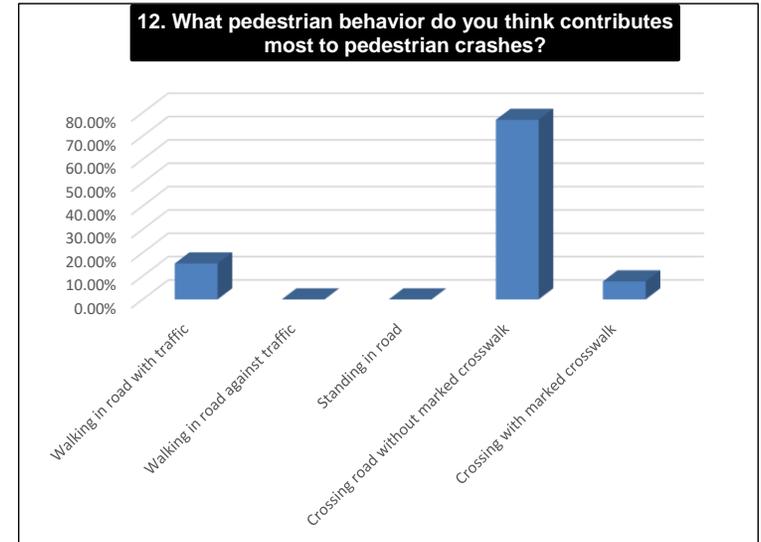


Voting Results by Question

Auburn - June 7, 2017

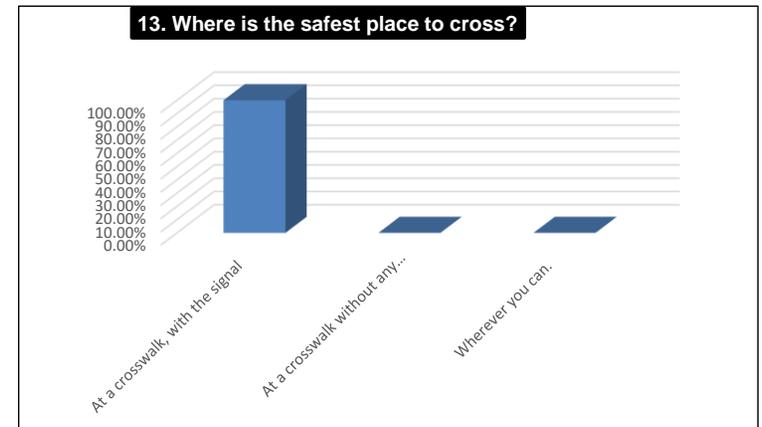
12. What pedestrian behavior do you think contributes most to pedestrian crashes? (Pick one.) (Multiple Choice)

	Responses	
	Percent	Count
Walking in road with traffic	15.38%	2
Walking in road against traffic	0.00%	0
Standing in road	0.00%	0
Crossing road without marked crosswalk	76.92%	10
Crossing with marked crosswalk	7.69%	1
Totals	100%	13



13. Where is the safest place to cross? (Pick one.) (Multiple Choice)

	Responses	
	Percent	Count
At a crosswalk, with the signal	100.00%	12
At a crosswalk without any signal	0.00%	0
Wherever you can.	0.00%	0
Totals	100%	12



Voting Results by Question

Auburn - June 7, 2017

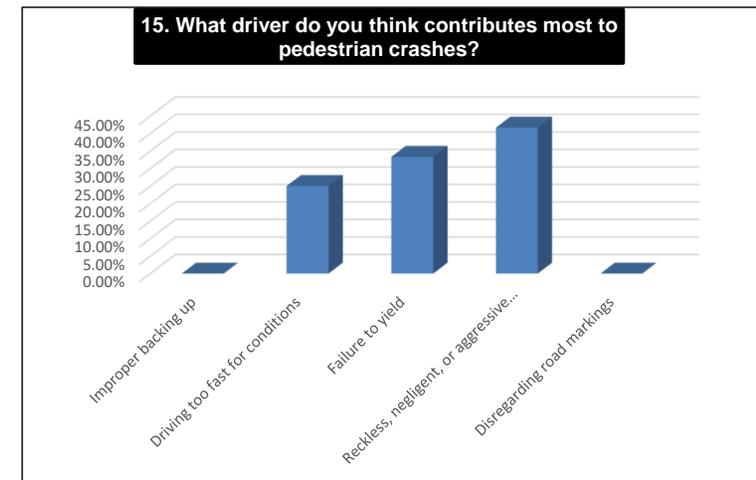
14. If there is no sidewalk available, what side of the street should you walk on? (Pick one.) (Multiple Choice)

Responses		
	Percent	Count
On the right, with traffic	0.00%	0
On the left, against traffic	100.00%	11
Either- it really doesn't matter	0.00%	0
Totals	100%	11



15. What driver behavior do you think contributes most to pedestrian crashes? (Pick one.) (Multiple Choice)

Responses		
	Percent	Count
Improper backing up	0.00%	0
Driving too fast for conditions	25.00%	3
Failure to yield	33.33%	4
Reckless, negligent, or aggressive driving	41.67%	5
Disregarding road markings	0.00%	0
Totals	100%	12

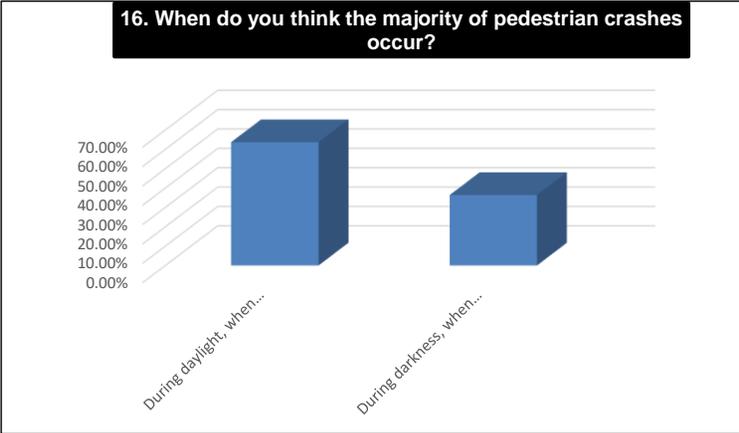


Voting Results by Question

Auburn - June 7, 2017

16. When do you think the majority of pedestrian crashes occur? (Pick one.) (Multiple Choice)

Responses		
	Percent	Count
During daylight, when visibility is good	63.64%	7
During darkness, when visibility is bad	36.36%	4
Totals	100%	11

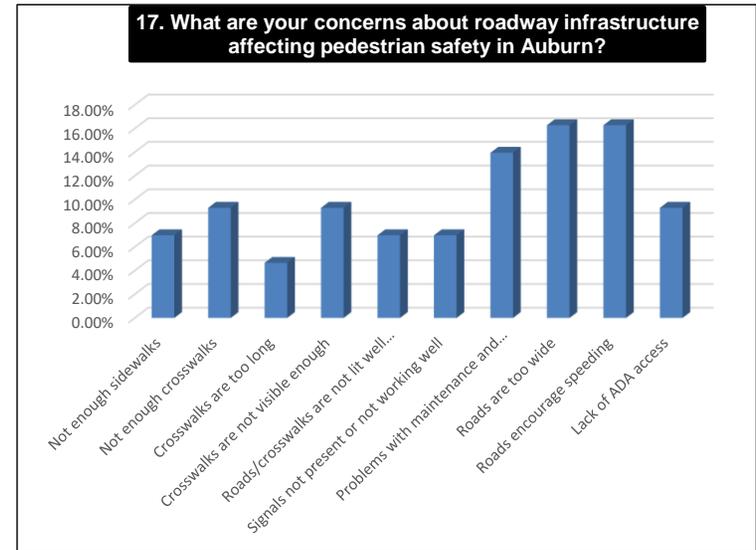


Voting Results by Question

Auburn - June 7, 2017

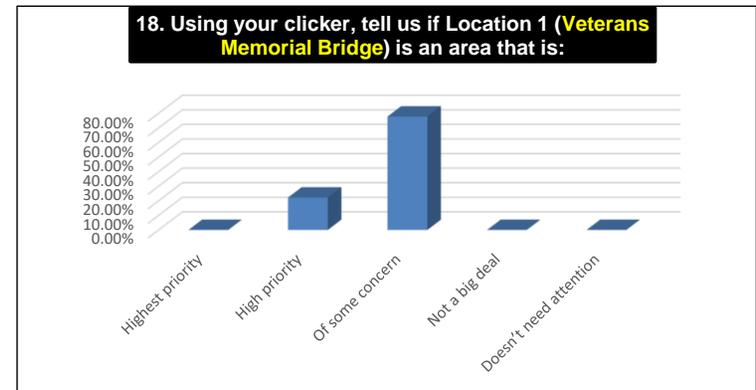
17. What are your concerns about roadway infrastructure affecting pedestrian safety in Auburn? (Pick all that apply.) (Multiple Choice - Multiple Response)

	Responses	
	Percent	Count
Not enough sidewalks	6.98%	3
Not enough crosswalks	9.30%	4
Crosswalks are too long	4.65%	2
Crosswalks are not visible enough	9.30%	4
Roads/crosswalks are not lit well enough at night	6.98%	3
Signals not present or not working well	6.98%	3
Problems with maintenance and condition	13.95%	6
Roads are too wide	16.28%	7
Roads encourage speeding	16.28%	7
Lack of ADA access	9.30%	4
Totals	100%	43



18. Using your Clicker, tell us if Location 1 (Veterans Memorial Bridge) is an area that is: (Multiple Choice)

	Responses	
	Percent	Count
Highest priority	0.00%	0
High priority	22.22%	2
Of some concern	77.78%	7
Not a big deal	0.00%	0
Doesn't need attention	0.00%	0
Totals	100%	9



Voting Results by Question

Auburn - June 7, 2017

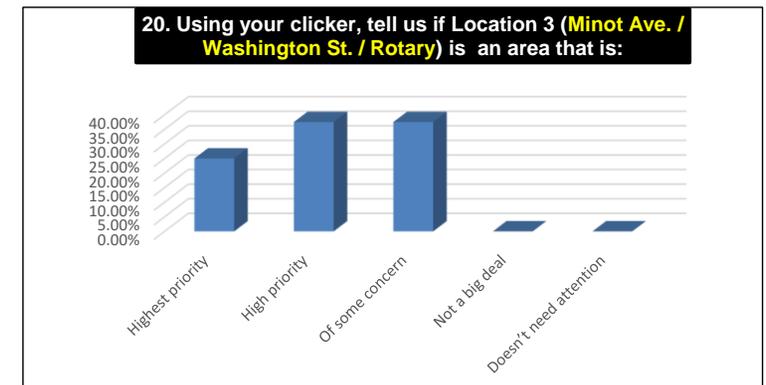
19. Using your Clicker, tell us if Location 2 (Center Street Heading to the Mall) is an area that is: (Multiple Choice)

Responses		
	Percent	Count
Highest priority	0.00%	0
High priority	50.00%	4
Of some concern	37.50%	3
Not a big deal	12.50%	1
Doesn't need attention	0.00%	0
Totals	100%	8



20. Using your Clicker, tell us if Location 3 (Minot Ave. / Washington St. / Rotary) is in an area that is: (Multiple Choice)

Responses		
	Percent	Count
Highest priority	25.00%	2
High priority	37.50%	3
Of some concern	37.50%	3
Not a big deal	0.00%	0
Doesn't need attention	0.00%	0
Totals	100%	8

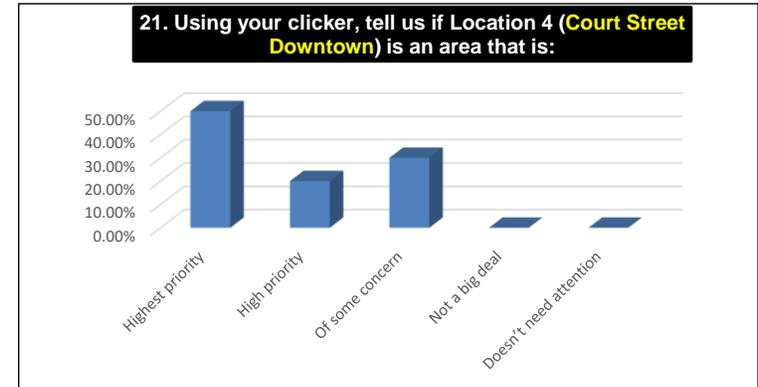


Voting Results by Question

Auburn - June 7, 2017

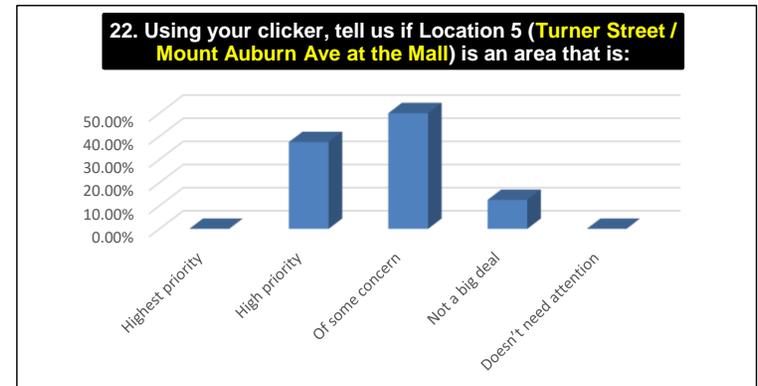
21. Using your Clicker, tell us if Location 4 (Court St. Downtown) is an area that is: (Multiple Choice)

Responses		
	Percent	Count
Highest priority	50.00%	5
High priority	20.00%	2
Of some concern	30.00%	3
Not a big deal	0.00%	0
Doesn't need attention	0.00%	0
Totals	100%	10



22. Using your Clicker, tell us if Location 5 (Turner St. / Mount Auburn Ave. at the Mall) is an area that is: (Multiple Choice)

Responses		
	Percent	Count
Highest priority	0.00%	0
High priority	37.50%	3
Of some concern	50.00%	4
Not a big deal	12.50%	1
Doesn't need attention	0.00%	0
Totals	100%	8



Appendix K

Auburn's Priority Locations

Auburn Priority Locations Identified

June 7, 2017

Location	% high priority	Rank	Notes about problems
Court Street Downtown	70	1	Crosswalks not visible enough, Signals not present or not working well, Crosswalks too long
Minot Ave/Washington St/Rotory St.	63	2	Speeding Traffic
Center Street heading to the Mall	50	3	Speeding Traffic, No Crosswalks, Crosswalks not visible enough, Signals not present or not working well, Problems with maintenance and condition, No Sidewalks
Turner Street/Mount Auburn Ave at Mall	38	4	Apartments don't have pedestrian access
Veterans Memorial Bridge	22	5	High speed traffic, no accomodation

ALL LOCATIONS MAPPED:

<https://drive.google.com/open?id=1qvoxz7JsSi6bzbkZMTPWGcOCEpYn7bkX&usp=sharing>

Auburn Priority Locations Identified

June 7, 2017

General Comments & other areas
Edward little High School no crosswalks, signs are not working well
New Auburn sidewalk is paved looks like street, speeding traffic, crosswalk not very visible
Turner St lack of ADA, no sidewalks
Plowing issues on Minot Ave. Sidewalk is not always cleared very quickly
Lots of speeding traffic in the downtown esp. around Minot Ave and Court St
Police working on Traffic calming and plains clothes police for enforcement
Need to slow traffic

Key to roadway problems that could be present at a location:
1. Roads seem too wide
2. Speeding traffic
3. No crosswalks
4. No sidewalks
5. Crosswalks are too long
6. Crosswalks are not visible enough
7. Roads/crosswalks poorly lit

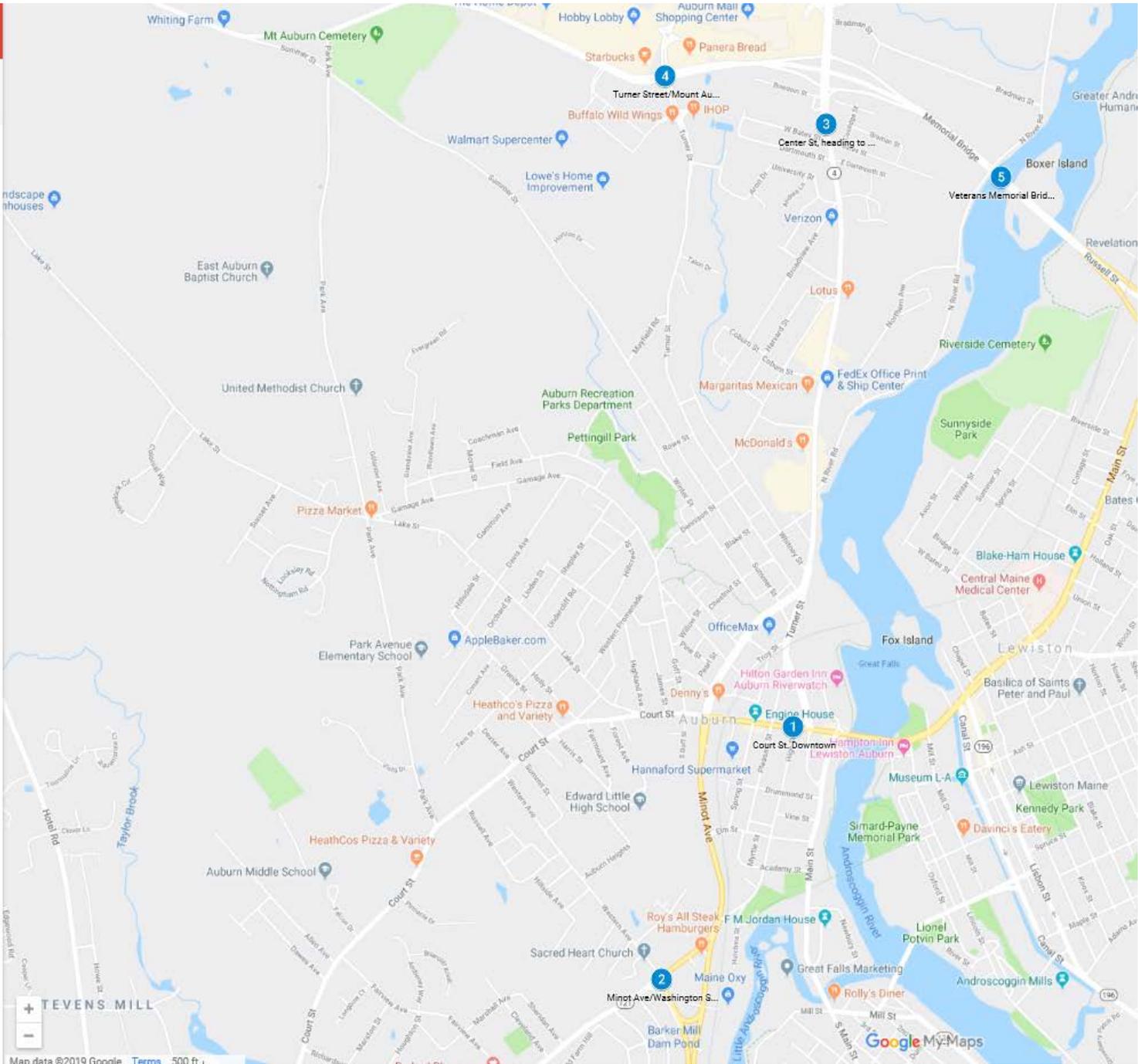
Auburn Priority Locations Identified

June 7, 2017

General Comments & other areas
Enforce laws on the books and stiffen laws pertaining to Distracted drivers, people running red lights stop signs.
Drivers are not stopping for pedestrians at crosswalks
Create a map of good walking routes to encourage use and highlight gaps in walking routes that could be addressed
Solutions: a pedestrian initiated blinking light for Court St and Harris St
Solution: a crosswalk, possibly with a signal, for Court St and Western Ave.
A more frequent schedule of street sweeping for the safety of all travelers

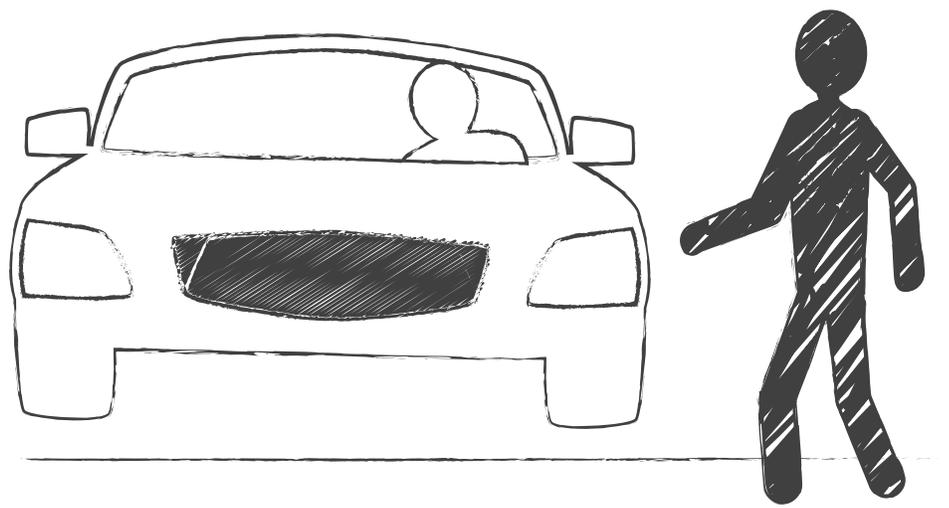
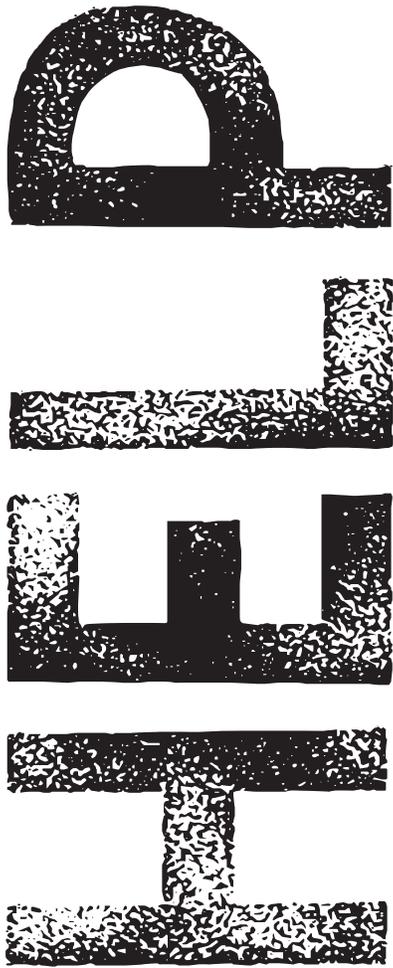
Key to roadway problems that could be present at a location:
8. Signals not present or not working well
9. Problems with maintenance and condition
10. Lack of ADA features and access
11. Other ?

- Untitled layer**
- 1 Court St. Downtown
 - 2 Minot Ave/Washington St/Rotary St.
 - 3 Center St, heading to Mall
 - 4 Turner Street/Mount Auburn Ave at Mall
 - 5 Veterans Memorial Bridge



Appendix L

Auburn's Safer Walking Forum Flyer



Make Auburn Streets SAFER!

Let's take the first steps together to tackle our city's most dangerous streets, intersections and crosswalks!

Join Auburn, MaineDOT and the Bicycle Coalition of Maine to address the recent spike in pedestrian/vehicle crashes. Safety really is a two-way street and we want to hear your ideas about dangerous locations and the dangerous habits of pedestrians and motorists. You'll leave with reflective safety gear and the satisfaction of knowing you've made Auburn streets safer!

June 7, 2017, 5 PM - 7 PM
Auburn City Hall

(Community Room, 60 Court St., Auburn)



FMI: *The Bicycle Coalition of Maine, 623-4511.*

mainedot.gov

Appendix M

Auburn's Safer Walking Forum Notes

Auburn Safer Walking Forum, May 23, 2018 - NOTES

General Comments

- Pedestrians have responsibility, along with drivers
- Veterans Memorial Bridge is like a highway....like a race
- What about intersections in New Auburn?
- Brick sidewalks have to go! Impossible for wheelchairs...forces them onto the street
- Need more street lights at certain places that are not well lit
- Turner Street:
 - has peds walking in wrong side of the street when there's a sidewalk on the other side
 - Crosswalks are 0.9 miles apart!
 - Parking was taken away so road appears wider
 - poorly lit also.
 - French's Lane needs a crosswalk, where sidewalk ends
 - Near the Veterans Memorial Bridge, there's a chain link fence that keeps getting a hole cut in it by pedestrians who want to walk that way
 - Near Walmart and the southern roundabout the crosswalks are after the circle and cars don't stop for peds....need enforcement, maybe a sting operation
 - No speed limits on Turner near the roundabouts

Comments on Pedestrian Behavior

- Peds blending into the background, like wearing white when snowy out
- Unplowed sidewalks pose problems for peds & wheelchairs
- Difficult to cross street when cars don't stop at a red light
- L-A cabs use phone while driving
- Failing to push the button, or giving up on the signal change
- Crosswalks not painted yet and it is June!

*Most problematic ped behavior = Crossing at unmarked locations

Comments on Bike Behaviors

- Not allowed to ride on sidewalks in Auburn
- Riding two or more abreast a problem
- Center St. - 5 lanes, no shoulder for bikes, has lots of trucks, too. There have been many studies seeking solutions but none have been acceptable.

*Most problematic bike behavior = ignoring traffic signals

Comments on Driver Behavior

- Snow Plowing: sidewalks have been plowed and then someone puts snow from their driveway onto the sidewalk, also plowing it into intersections
- Parking facing the wrong way

*Most problematic driver behavior = Speeding

The National Highway Traffic Safety Association has some new ideas for addressing speeding.

Education Ideas

- There was a fatality in an unmarked location on Court St. A change was proposed but the “city went ballistic”. Why couldn’t the street be changed?

Jim: In the report for Auburn, there are proposed changes for Court St.

**Seems like Court St is ripe for a demonstration project. Need to have public input.

- Schools need to take advantage of the FREE Bicycle & Pedestrian Safety Education offered by BCM/MaineDOT
- Creative Crosswalks + Education
- Learn from the Pedestrians
- Signs at Crosswalks, at RRFBs
- Increase the number of crossing guards
- Drivers Ed needs to reinforce key point for bike & ped safety - how can we influence the instruction?
 - How many bike/ped questions on test?
 - Talk to Drivers Ed instructors
 - Provide an “Info Sheet” on tips for new drivers for parents
 - Provide a parent refresher course when child is getting their license
 - Provide education on RR crossings
 - Work w/ AARP to educate drivers
- There are major employers in town - educate them - have a Lunch ‘n Learn
- Educational opportunities at major events: Liberty Fest = July 4th Celebration or Balloon Festival - Main St. is shut to vehicles
- How about a “Pedestrian Safety Week” or Auburn Walk Week 2019 in Auburn with activities each day of the week:
 - Walk to Church on Sunday, Moving Monday, etc
 - Involve neighborhood associations & watch groups
 - Have crossing guards to emphasize proper ped behavior
 - Work w/ Healthy Androscoggin & emphasize the health benefits of walking
 - Highlight walking opportunities like the River Walk & other trails, etc
 -

Ideas to combat Speeding

- Put up signs like “Drive like your kid lives here”, “This is a neighborhood”
- Dynamic speed signs are educational
- Have a poster contest addressing speeding for students

Ideas for Enforcement

- Use more dynamic speed signs w/ enforcement - Auburn has 6 of them
- Use speed cameras...towns need to be able to have a share in any revenue generated
- Communities need to get a share of the speeding fines

- Minot Ave & High St = road in disrepair, trucks can't stop at intersection....need a warning for "Stop Ahead"

Volunteers who would like to spearhead ped activities & safety

██████████, ██████████, ██████████

Supplemental Survey Data - Auburn (There was 1 individual who was not able to be present at the ██████████ Heads Up forum whose responses were recorded remotely)

- When asked to select what they thought is the most significant pedestrians behavioral problem the participant selected "walking on the wrong side".
- When asked to identify the most significant behavioral problem with bicycle riders the participant selected "Ignoring traffic signs/signals."
- In the case of Driver's Behavioral Problems, the participant selected "Distracted Driving" to be most prominent.
- To combat some of these safety concerns, the participant opted for educational measures in the form of "School-Based Education".
- In terms of enforcement, the individuals opted for "More enforcement of laws governing driver behavior near pedestrians".

