



## Walk Assessment Watertown, MA

January 14, 2015

Prepared for the Massachusetts Department of Transportation Bicycle and Pedestrian Safety Awareness and Enforcement Program in partnership with the Massachusetts Department of Public Health

## Background

WalkBoston working with Toole Design Group (TDG) led a walk assessment in Watertown, Massachusetts on Friday, November 21, 2014. The assessment is part of the Massachusetts Department of Transportation's (MassDOT) Bicycle and Pedestrian Safety Awareness and Enforcement Program, funded by the Federal Highway Safety Improvement Program (HSIP), in association with the Massachusetts Department of Public Health. The MassDOT program is a collaboration among Federal, State, regional, and local agencies, along with advocacy groups, MassBike and WalkBoston, to improve bicyclist and pedestrian safety in identified high-crash areas.

WalkBoston is a pedestrian advocacy organization whose mission is to make walking safer and easier in Massachusetts to encourage better health, a cleaner environment and vibrant communities. The purpose of the walk assessment is to develop knowledge and awareness of the pedestrian environment at the State and municipal level.

This assessment report has been prepared by TDG based on comments and observations made by members of the assessment team during the assessment, as well as data collected by WalkBoston prior to the assessment. The report summarizes the observations made in the assessment area and makes recommendations for improvements to the built environment to increase walkability. The observations vary from specific infrastructure deficits, such as faded crosswalks or uneven sidewalks, to general comments on traffic speeds or land use patterns (e.g., vacant storefronts). Likewise, the recommendations range from specific fixes (e.g., paint crosswalk) to suggestions for further study (e.g., evaluate the feasibility of installing raised crosswalks).

The Town of Watertown is one of the twelve communities participating in the Massachusetts Department of Transportation's multi-disciplined program to improve bicycle and pedestrian safety in Massachusetts. One of the components of the MassDOT program is to conduct walk assessments. The assessments have three goals:

1. Foster an awareness of the infrastructure elements which contribute to the walking environment;
2. Evaluate the safety and quality of the walking environment along the route; and
3. Recommend infrastructure improvements.

The assessment is not meant to be a complete inventory of infrastructure deficiencies, nor is it meant to provide specific designs for improvement. WalkBoston leads the assessments as a means to build local capacity for improving the built environment for walking. This report may be used as a resource for municipal staff, traffic engineers, and design professionals who municipalities may engage to design and implement policies, programs, and infrastructure improvements.

## Assessment Team

Representatives from the Town of Watertown, Perkins School for the Blind, MassDOT, WalkBoston, and TDG participated in the walk assessment. The members and their affiliations are provided in **Table 1**.

**Table 1 - Assessment Team**

Team Member	Agency/Affiliation	Email Address
Gideon Schreiber	Watertown Community Development & Planning	<a href="mailto:gschreiber@watertown-ma.gov">gschreiber@watertown-ma.gov</a>
Matt Shuman	Watertown Department of Public Works	<a href="mailto:mshuman@watertown-ma.gov">mshuman@watertown-ma.gov</a>
Judi Cannon	Perkins School for the Blind	<a href="mailto:judi.cannon@perkins.org">judi.cannon@perkins.org</a>
Jim Denham	Perkins School for the Blind	<a href="mailto:jim.denham@perkins.org">jim.denham@perkins.org</a>
Ethan Davis	Watertown Bike/Pedestrian Committee Chair	<a href="mailto:ethanzane@gmail.com">ethanzane@gmail.com</a>
Melissa Green	MassRIDES – Safe Routes to School	<a href="mailto:melissa.green@dot.state.ma.us">melissa.green@dot.state.ma.us</a>
Courtney Dwyer	MassDOT – District 6	<a href="mailto:courtney.dwyer@state.ma.us">courtney.dwyer@state.ma.us</a>
Lou Rabito	MassDOT – Complete Streets Engineer	<a href="mailto:luciano.rabito@state.ma.us">luciano.rabito@state.ma.us</a>
Gonul Duren	MassDOT – Highway Design	<a href="mailto:gonul.duren@state.ma.us">gonul.duren@state.ma.us</a>
Olivia Lincoln	MassDOT – Highway Design	<a href="mailto:olivia.j.lincoln@state.ma.us">olivia.j.lincoln@state.ma.us</a>
Bonnie Polin	MassDOT – Safety Section	<a href="mailto:bonnie.polin@state.ma.us">bonnie.polin@state.ma.us</a>
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Stacey Beuttell	WalkBoston	<a href="mailto:sbeuttell@walkboston.org">sbeuttell@walkboston.org</a>
Brendan Kearney	WalkBoston	<a href="mailto:bkearney@walkboston.org">bkearney@walkboston.org</a>
Michelle Danila	Toole Design Group	<a href="mailto:mdanila@tooledesign.com">mdanila@tooledesign.com</a>

The assessment team was joined by Judi Cannon and Jim Denham from the Perkins School for the Blind. Both Judi and Jim are visually-impaired. Judi uses a seeing eye dog named Kirk to navigate the Town of Watertown’s roadways, while Jim uses a cane. Judi and Jim shared common navigating methods used by people with visual impairments and described the challenges they face on a daily basis.

The assessment took approximately two and a half hours and included a brief introduction to the assessment process, the walk of the assessment route, and a discussion and summary session.

### Assessment Location

WalkBoston worked with the Town of Watertown staff and police to identify the assessment study area where pedestrian deficiencies are present. Irving Street was not among the enforcement locations monitored by the Watertown police as part of MassDOT’s Bicycle and Pedestrian Safety Awareness and Enforcement Program. However, in thinking through areas of the Town that are in need of improvements which had yet to be studied in detail, Town staff chose Irving Street as their preferred assessment location. The Irving Street corridor functions as a cut-through for drivers accessing North Beacon Street and Charles River Road. There are few streets that connect through the residential neighborhood to the Charles River. In addition, the location of the assessment was in close proximity to the Perkins School for the Blind and allowed for their participation. This was a great partnership and opportunity to share knowledge and raise awareness of their needs to increase walkability. As a result, Irving Street carries significant volumes of traffic for a relatively narrow, residential street. Watertown staff members are interested in implementing traffic calming strategies, as well as addressing the pedestrian infrastructure needs of this corridor.

Irving Street is also an integral part of the road network used by students, faculty and staff at the Perkins School for the Blind. Members of the Perkins community use Irving Street to connect with MBTA bus

stops on both Arsenal and Mount Auburn streets. Improvements to the pedestrian environment will make their journey safer and promote continued use of public transit.

The assessment team walked the corridors of:

- Riverside Street;
- Irving Street; and
- Mount Auburn Street.

The assessment focused on the signalized intersections of:

- North Beacon Street/Irving Street;
- Arsenal Street/Irving Street;
- Mount Auburn Street/Irving Street/Palfrey Street; and
- Mount Auburn Street/Common Street/Parker Street.

The assessment area is shown in **Figure 1**.

## Assessment Observations and Recommendations

The assessment focused on providing pedestrian facilities that are easy and safe for all pedestrians to navigate. During the assessment, the topics covered included the potential for adding curbing, calming traffic, providing ADA-compliant curb ramps, pedestrian countdown indications, and accessible pedestrian signals with locator tones. Exclusive versus concurrent signal timing was also discussed when thinking about ways to improve pedestrian compliance with traffic signals. In addition, consistency of pedestrian facilities was discussed as a method to increase walkability.

The following section describes both the observations and recommendations that would apply throughout the assessment area. The observations and recommendations are divided by location including the Irving Street corridor and the intersections of Irving Street/North Beacon Street, Irving Street/Arsenal Street, Irving Street/Mount Auburn Street/Palfrey Street, and Mount Auburn Street/Common Street/Parker Street.

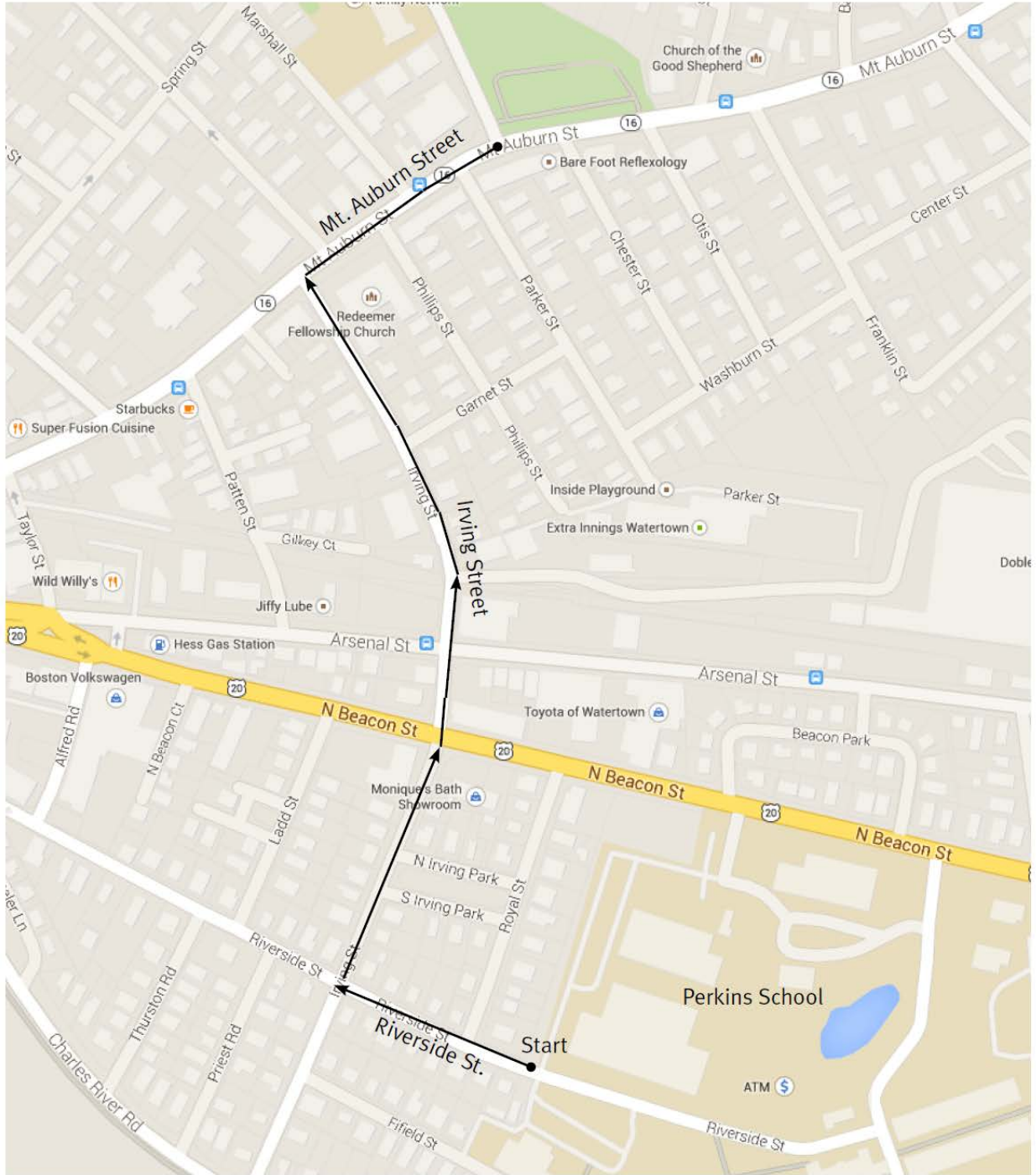


Figure 1 - Assessment Area Map



## Town-wide

During the assessment, the team noted observations that are applicable throughout the study area. The assessment team discussed the importance of maintaining a pedestrian access route free of utility poles, hydrants, signal posts, and other street furniture. Along the corridor, several street furniture items should be relocated especially the hydrant located on Irving Street near Irving Park which is dangerous for visually-impaired pedestrians. In addition, the sidewalks should be a continuous material with no tripping hazards and/or overgrown vegetation. Along



Figure 2: Hydrant in middle of sidewalk on Irving Street.

several of the corridors, there was no defined edge of roadway between the sidewalk and the travel and/or parking lane. In addition, there is no defined edge of the sidewalk when there are adjacent parking lots. The assessment team noted that curbing should be added along these corridors.



Figure 3: Apex curb ramp.

The assessment team noted that several of the intersections have apex ramps which are difficult for visually-impaired pedestrians to line themselves up at the intersection. It was noted that when the crosswalk and curb ramps are set back at an intersection, visually-impaired pedestrians have difficulty navigating the crossing or, in some cases, are unaware of the presence or location of the crossing and curb ramps. According to the assessment team, the visually-impaired community is taught to not rely on the alignment of the crosswalks or curb ramps rather to adjust their direction based on hearing the direction of vehicular

traffic. The assessment team recommends including ADA-compliant ramps at all crosswalk locations. The assessment team discussed how the visually-impaired community is taught to walk in straight lines including seeing eye dogs are taught to cross within the crosswalk. The assessment team noted that due to these teaching, the crosswalk should be provided in the correct location. Also, it was noted that several of the curb ramps lack detectable warning panels. During the assessment, it was noted that detectable warning panels should be provided within pedestrian crossing islands if the pedestrian is required to activate a pedestrian pushbutton to complete crossing the roadway. This would inform the visually-impaired pedestrians to stop and find the push button to continue crossing the roadway and not to walk out into oncoming traffic.

At signalized intersections, the assessment team noted that the pedestrian indications, audible tones, and pedestrian pushbuttons should be in working condition. It was also noted that the audible tones at several approaches to the intersection were similar, making it difficult to distinguish the direction pedestrians may cross. Consideration should be given to using different tones for each intersection crossing. The Town has received complaints about the noise of the



Figure 4: Assessment team member activating the pushbutton.

audible sounds. The Town should consider implementing audible tones that respond to ambient sound levels resulting in a quieter tone being used at night. The assessment team noted that pushbuttons were not always located adjacent to the curb ramps and curb ramps were not always located in a straight path to the intersection.

Participants discussed several issues including high pedestrian delays due to signal phasing and timing, as well as several maintenance issues with the pedestrian traffic signal equipment. The assessment team discussed the possibility of instituting concurrent pedestrian phasing to automatically occur at all intersections. If this were implemented, audible signals would be recommended so visually-impaired pedestrians would know when to cross the roadway.

The assessment team noted that signal phasing and clearance intervals may need to be reviewed and consideration should be given to providing a leading pedestrian interval where feasible. None of the signalized intersections observed as part of the assessment have countdown pedestrian indications.

It was noted by members of the assessment team that sidewalks, curb ramps, and detectable warning panels should be shoveled during the winter. In addition, adequate pedestrian accommodations should be provided within work zones.

#### **Short-term Recommendations:**

- Install detectable warning panels at all curb ramps.
- Provide ADA-compliant curb ramps located in a straight path to the crossing for all crosswalks and reduce use of apex ramps when possible.
- Trim vegetation adjacent to sidewalks to maintain pedestrian access route.
- Reduce tripping hazards along sidewalks by repairing raised sidewalk panels or providing smooth transitions with patched segments.
- Maintain a hazard-free pedestrian access route including the detectable warning panels, especially in snow.
- Maintain adequate pedestrian accommodations in work zones.
- Maintain audible pedestrian tones where provided.
- At signalized intersections with concurrent pedestrian phases, consider implementing leading pedestrian phases.
- Repair driveway aprons to fix potholes within the pedestrian path.
- Install vertical separation between parking areas and adjacent sidewalks missing.

#### **Long-term Recommendations:**

- Define edge of sidewalk with curbing.
- Define edge of sidewalk adjacent to parking lots with change in material or joint.
- Maintain a hazard-free pedestrian access route of street furniture such as hydrants, utility poles, etc. especially the hydrant on Irving Street near Irving Park.

- At signalized intersections, provide accessible pedestrian signals and detectors including countdown pedestrian indications, audible tones such as speech messages, vibrotactile walk indications, pushbutton locator tone, tactile arrows, and/or vibrating buttons.
- Consider using different audible tones for each intersection crossing.
- Consider implementing audible tones that respond with ambient sound levels.
- At signalized intersections, pushbuttons should be placed adjacent to the curb ramps and away from other street furniture.
- Improve access management through reducing the width of and defining large curb cuts.

## Irving Street/North Beacon Street

Irving Street is a relatively narrow, two-way residential street that crosses three Town arterials, North Beacon Street being one of the three. North Beacon Street is a two-way arterial with one lane of traffic in each direction. North Beacon Street has a wide right-of-way, but the Town has narrowed it by installing bicycle lanes, parking lanes, and pavement markings that delineate the travel lanes. Land uses along North Beacon Street include restaurants, retail, car dealerships and repair shops, a hotel, and some residential properties. Traffic volumes seem high and speeds can feel excessive, particularly for cars traveling westbound, which is downhill.

At the signalized intersection of Irving Street and North Beacon Street, the team noted that there are no detectable warning panels and the curb ramps are apex ramps. The audible pedestrian signals were also not working properly.

On the northeast corner of the intersection, the street name sign for North Beacon Street blocks the pedestrian indication and the pushbutton does not work. In addition, a member of the assessment team noted that a sign on the northeast corner is mounted too low and is a hazard for pedestrians.



**Figure 5: North Beacon Street name sign blocking the pedestrian indication.**

On several of the corners, utility poles are located close to the pedestrian pushbutton posts. The visually-impaired pedestrians informed the assessment team that multiple poles at corners create confusion in finding the pushbuttons. The team discussed that utility poles and other posts should not be placed in close proximity to curb ramps to reduce confusion with pushbuttons.

The crosswalks and stop lines on all sides of the intersection were worn and minimal in their markings. Guide dogs are trained to follow lines running perpendicular to the intersection. Any enhanced crosswalks should maintain the crosswalk edge lines, (e.g., ladder design would be acceptable).

### Short-term Recommendations:

- Install detectable warning panels at all corners of the intersection.
- Provide ADA-compliant curb ramps at all crosswalks and reduce use of apex ramps when possible.



- Relocate street name sign for North Beacon Street on the northeastern corner as it blocks the walk indication.
- Adjust signage to the correct mounting height.
- Fix the audible signals as they were not functioning properly at the time of the assessment.
- Repaint crosswalks and stop lines; use ladder crosswalk design to increase visibility of crosswalks.
- Evaluate signal timing to ensure adequate crossing time during pedestrian phase. Add into consideration the visually impaired population near this intersection.

#### Long-term Recommendations:

- Relocate utility poles from adjacent pedestrian pushbutton posts.
- Consider installing curb extensions along North Beacon Street to shorten crossing distances.

### Irving Street/Arsenal Street

Arsenal Street is the second of the three Town arterials that Irving Street crosses. The right-of-way is similar in width to North Beacon Street; however, there are few lane markings and no bicycle lanes. Parking is permitted along Arsenal Street. Motorists create multiple lanes in heavy traffic, particularly when there are no parked cars along the roadway. These unpredictable traffic patterns make it more difficult for pedestrians to anticipate motorist behavior. Watertown staff described potential new development projects along this corridor which include streetscape improvements. The development projects have not yet been permitted.

The current traffic volumes and speeds, road layout, and automobile-dominated land uses make this an unattractive walking corridor. While the sidewalk network is complete, most businesses cater to the car by providing parking lots along the street edge rather than welcoming pedestrian-friendly building entrances. There are frequent curb cuts and many blank building facades. Lighting is scaled for the roadway. Traffic calming combined with changes in policies to promote walk-friendly businesses on the street edge would greatly improve the Arsenal Street corridor.

The 70 and 70A MBTA bus routes stop near this intersection. The eastbound bus stop is at the nearside of the intersection and the westbound stop is at the farside of the intersection. MBTA prefers to locate bus stops on the farside of intersections, but does make exceptions based on specific circumstances. Any proposed changes to the intersection should include provisions for the bus.

The audible signals were faint and difficult to distinguish the direction to cross. In addition, the curb ramps and pushbuttons are not located properly. Arsenal Street is a wide intersection with undefined space.

The assessment team noted that the pavement markings were faint and that curb extensions would reduce the crossing distance.



Figure 6: Apex curb ramp and pushbutton location at the Irving Street and Arsenal Street intersection.

Similar to the intersection of Irving Street and North Beacon Street, there is a sign mounted low that creates a hazard to pedestrians.

The assessment team noted that the pedestrian indication on the northwest corner of the intersection was not properly operating at the time of the assessment.

#### **Short-term Recommendations:**

- Install detectable warning panels.
- Reinstall pavement markings throughout the intersection.
- Adjust signage to the correct mounting height.
- Provide ADA-compliant curb ramps at all crosswalks and reduce use of apex ramps when possible.
- Fix pedestrian indications on the northwest corner as the signal appears to be out at the time of the assessment.
- Fix the pedestrian pushbutton on the northeast corner as it was not working properly at the time of the assessment.
- Fix the audible signals as they were not functioning properly at the time of the assessment.
- Evaluate signal timing to ensure adequate crossing time during pedestrian phase. Add into consideration the visually impaired population near this intersection.

#### **Long-term Recommendations:**

- Consider curb extensions to narrow the roadway width.
- Relocate pushbutton poles to be located adjacent to curb ramps.
- Install pedestrian-scale lighting.
- Relocate the signal cabinet and lighting at the northeast corner to maintain the clear pedestrian access route.

### **Irving Street/Mount Auburn Street/Palfrey Street**

Mount Auburn Street is the third and final arterial Irving Street crosses. Mount Auburn Street, like North Beacon and Arsenal streets, has a wide right-of-way. Mount Auburn Street carries two lanes of traffic in both directions, and has the Massachusetts Bay Transportation Authority (MBTA) electric-powered bus route 76 leading to Harvard Square. Despite its width and traffic volumes, Mount Auburn Street is a much more pleasant walking environment in part due to the large trees and residential neighborhoods it bisects. The section of road within the study area is primarily residential with the high school and historic cemetery nearby.

The assessment team observed the signal operations and geometry of the intersection of Irving Street, Mount Auburn Street, and Palfrey Street. Irving Street terminates at Mount Auburn Street and Palfrey Street is a one-way street that operates away from the intersection.



**Figure 7: Missing crosswalk on the eastern side of Mount Auburn Street at Irving Street.**

The assessment team noted that no crosswalk was provided on the eastern side of the intersection. In addition, the assessment team noted there was no curb ramp located on the northern side of the intersection. On the southwest corner of the intersection, there are two pushbuttons on the traffic signal pole. The one signed “BLIND ONLY” was installed in response to neighborhood complaints about the audible signal. If pushed, the audible signal attached to this pole does not operate, while the others in the intersection still sound. The “BLIND ONLY” pushbutton should be removed and the other pushbutton should be located at the appropriate height.

It was noted that vehicles tend to turn onto Irving Street during the pedestrian phase. One consideration the assessment team discussed is that these vehicles may be turning left onto Irving Street from Mount Auburn Street during the signal clearance phase. The team suggested reviewing the clearance timings for the intersection.

The assessment team discussed the potential to conduct enforcement at the intersection to determine if vehicles are running the red signal.



**Figure 8: Separate pushbutton provided at Mount Auburn Street and Irving Street to activate the audible signals.**

### Short-term Recommendations

- Remove “BLIND ONLY” pedestrian pushbutton.
- Install curb ramp on the northern side of Mount Auburn Street.
- Install detectable warning panels.
- Provide ADA-compliant curb ramps at all crosswalks and reduce use of apex ramps when possible.
- Study the intersection clearance times to ensure vehicles have cleared prior to the pedestrian phase.
- Provide enforcement at the intersection during peak hours.

### Long-term Recommendations

- Evaluate a crosswalk and ADA-compliant curb ramps on the eastern side of the intersection; if added, the crosswalk should maintain perpendicular lines, such as in the ladder design.

### Mount Auburn Street/Common Street/Parker Street

The assessment team observed the signal operations and geometry of the intersection of Mount Auburn Street, Common Street, and Parker Street. The intersection is offset as Common Street terminates at Mount Auburn Street on the northern side of the intersection and Parker Street terminates at Mount Auburn Street on the southern side of the intersection. The intersection has one ADA-compliant ramp with a detectable warning panel on the western side of the crosswalk crossing Common Street.

The assessment team noted that the crosswalks on Mount Auburn Street are located far apart from each other. In addition, there is a MBTA bus stop located adjacent to the intersection.

It was noted that vehicles tend to turn onto Parker Street during the pedestrian phase. One consideration the assessment team discussed is that these vehicles may be turning left onto Parker Street after turning right from Common Street on to Mount Auburn Street. Due to the offset intersection, a green signal is provided on Mount Auburn Street within the intersection permitting vehicles to turn left onto Parker Street. The team suggested reviewing the signal phasing to remove the conflict. Another potential consideration to reduce potential conflicts with pedestrians is to install “NO TURN ON RED” signs for all intersection approaches. In addition, the audible signals were faint and difficult to distinguish the direction to cross.



Figure 9: New curb ramp at the intersection of Mount Auburn Street and Common Street.

The assessment team discussed the potential to conduct enforcement at the intersection to determine if vehicles are operating correctly during the peak hours.

### Short-term Recommendations

- Install detectable warning panels.
- Provide ADA-compliant curb ramps at all crosswalks and reduce use of apex ramps when possible.
- Evaluate the addition of a crosswalk and ADA-compliant curb ramps between Parker Street and Common Street.
- Evaluate signal phasing and remove the conflict of vehicles turning onto Parker Street.
- Study adding “NO TURN ON RED” signs at all the intersection approaches.
- Provide enforcement at the intersection during peak hours.

**Appendix A** lists all the observations and recommendations that were discussed during the assessment and described in the previous sections. The observations and recommendations are divided by location. For each observation and recommendation, the appendix includes the estimated time frame for completion, estimated construction costs, and the responsible agency. The time frame is categorized as short-term (0 to 3 years) or long-term (>3 years). The costs are categorized as low (<\$10,000), medium (\$10,001 to \$50,000), or high (>\$50,000).

**Appendix B** provides a toolkit of pedestrian facilities that summarizes typical pedestrian treatments and provides a description. The treatments may or may not be recommendations outlined in this report. This toolkit may be used by the Town of Watertown to assist in developing a pedestrian-friendly town.

## Appendix A: Table of Recommendations


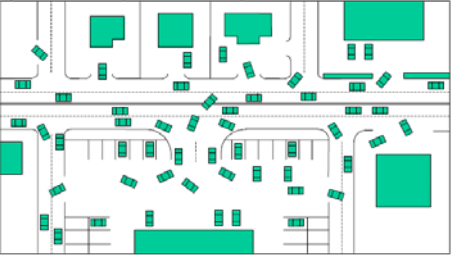



Location	Observation	Recommendation	Time Frame	Cost	Responsible Agency
Town-Wide	Lack of Pedestrian Accommodations	Install detectable warning panels.	Short-term	Low	Town of Watertown
		Provide ADA-compliant curb ramps.	Short-term	Medium	Town of Watertown
	Inadequate Intersection Signal Operations	Provide accessible pedestrian signals and detectors.	Long-term	Medium	Town of Watertown
		Consider using different audible tones for each intersection crossing.	Long-term	Medium	Town of Watertown
		Consider implementing audible tones that respond with ambient sound levels.	Long-term	Medium	Town of Watertown
		Pushbuttons should be placed adjacent to the curb ramps.	Long-term	Medium	Town of Watertown
		Consider implementing leading pedestrian intervals.	Short-term	Low	Town of Watertown
	Maintenance Needed	Trim vegetation adjacent to sidewalk.	Short-term	Low	Town of Watertown
		Reduce tripping hazards along sidewalks especially the hydrant on Irving Street near Irving Park.	Short-term	Medium	Town of Watertown
		Maintain hazard-free sidewalk passage during winter.	Short-term	Low	Town of Watertown
		Maintain adequate pedestrian accommodations in work zones.	Short-term	Low	Town of Watertown
		Maintain audible pedestrian tones.	Short-term	Low	Town of Watertown
		Maintain sidewalk hazard-free zone of street furniture.	Short-term	High	Town of Watertown
	Lack of Sidewalk Edge	Define edge of sidewalk with curbing.	Long-term	High	Town of Watertown
	Irving Street/ North Beacon Street	Lack of Pedestrian Accommodations	Install detectable warning panels.	Short-term	Low
Provide ADA-compliant ramps			Short-term	Medium	Town of Watertown
Inadequate Intersection Signal Operations		Fix the audible signals.	Short-term	Low	Town of Watertown
		Evaluate signal timings.	Short-term	Low	Town of Watertown








Location	Observation	Recommendation	Time Frame	Cost	Responsible Agency
Irving Street/ North Beacon Street (cont.)	Modifications to Pavement Markings and Sign	Repaint crosswalks and stop lines.	Short-term	Low	Town of Watertown
		Adjust signage to the correct mounting height.	Short-term	Low	Town of Watertown
		Relocate street name sign for North Beacon Street as it blocks the walk indication.	Short-term	Low	Town of Watertown
	Street Furniture Conflict	Relocate utility poles from adjacent pedestrian pushbutton posts.	Long-term	High	Town of Watertown
	Traffic Calming	Consider curb extensions.	Long-term	High	Town of Watertown
Irving Street/ Arsenal Street	Lack of Pedestrian Accommodations	Install detectable warning panels.	Short-term	Low	Town of Watertown
		Provide ADA-compliant ramps	Short-term	Medium	Town of Watertown
	Lack of Lighting	Provide pedestrian-scale lighting.	Long-term	Medium	Town of Watertown
	Modifications to Pavement Markings and Sign	Reinstall pavement markings.	Short-term	Low	Town of Watertown
		Adjust signage to the correct mounting height.	Short-term	Low	Town of Watertown
	Inadequate Intersection Signal Operations	Fix pedestrian indications on northwest corner.	Short-term	Low	Town of Watertown
		Fix pedestrian pushbutton on northeast corner.	Short-term	Low	Town of Watertown
		Fix audible signals.	Short-term	Low	Town of Watertown
		Evaluate signal timings.	Short-term	Low	Town of Watertown
		Pushbuttons should be placed adjacent to the curb ramps.	Long-term	Medium	Town of Watertown
Traffic Calming	Consider curb extensions.	Long-term	High	Town of Watertown	
Irving Street/ Mount Auburn Street/ Palfrey Street	Lack of Pedestrian Accommodations	Install detectable warning panels.	Short-term	Low	Town of Watertown
		Provide ADA-compliant ramps	Short-term	Medium	Town of Watertown
		Evaluate the addition of a crosswalk and curb ramps on the eastern side.	Long-term	Medium	Town of Watertown
	Inadequate Intersection Signal Operations	Remove "BLIND ONLY" pedestrian pushbutton.	Short-term	Medium	Town of Watertown
		Evaluate signal phasing and remove the conflict of vehicles turning onto Parker Street.	Short-term	Low	Town of Watertown
	Enforcement Needed	Provide enforcement at the intersection.	Short-term	Low	Town of Watertown

Location	Observation	Recommendation	Time Frame	Cost	Responsible Agency
Mount Auburn Street/ Common Street/ Parker Street	Lack of Pedestrian Accommodations	Install detectable warning panels.	Short-term	Low	Town of Watertown
		Provide ADA-compliant ramps	Short-term	Medium	Town of Watertown
	Inadequate Intersection Signal Operations	Evaluate the addition of a crosswalk and curb ramps within the intersection.	Long-term	Medium	Town of Watertown
		Study the intersection clearance times.	Short-term	Low	Town of Watertown
		Study adding "NO TURN ON RED" signs.	Short-term	Low	Town of Watertown
	Enforcement Needed	Provide enforcement at the intersection.	Short-term	Low	Town of Watertown

## Appendix B: Pedestrian Facility Toolbox

Facility Type	Description	Sample Photo
<p><b>Accessible Pedestrian Signals (APS)</b></p>	<p>Accessible pedestrian signals systems are the components used at a signalized intersection to alert pedestrians when they may cross a roadway. Accessible pedestrian signals include audible feedback during the pedestrian crossing phase, vibrotactile feedback, and locator tones to assist visually-impaired pedestrians.</p>	
<p><b>Access Management</b></p>	<p>Access management is the process to regulate the amount of driveways or median openings along a corridor. Access management can increase roadway capacity and limit conflicts with motorists and pedestrians.</p>	
<p><b>Chicanes</b></p>	<p>Chicanes are a traffic calming device that horizontally deflects motor vehicles resulting in reducing vehicular speeds. Chicanes are typically designed by the addition of a median or by shifting on-street parking from one side of the roadway to the other side of the roadway.</p>	
<p><b>Crosswalks</b></p>	<p>Crosswalks indicate to pedestrians the appropriate place to cross the street and inform drivers of potential pedestrian movements in the street. Crosswalk pavement markings may vary in styles; however, must follow the guidelines in the MUTCD. Additional enhancement measures should be used when the speed limit is greater than 40 mph, on multi-lane roadways, or based on engineering judgment.</p>	
<p><b>Curb Ramps</b></p>	<p>ADA-compliant curb ramps provide ramped access and detectable warning for persons with disabilities. Curb ramps are typically at least 5 feet wide with a level landing pad. Detectable warning panels should be a contrasting color to the adjacent surface.</p>	

Facility Type	Description	Sample Photo
<p><b>Curb Extensions</b></p>	<p>A curb extension is an extension of the sidewalk at intersections or mid-block to reduce the pedestrian crossing distance and provide greater visibility for pedestrians waiting to cross a street. Curb extension should not impede on bicycle travel along the roadway.</p>	
<p><b>Curb Radii Improvements</b></p>	<p>Curb radii improvements are modifications to existing curb lines or edges of the pavement at an intersection. These modifications typically are used to decrease crossing distances for pedestrians, increase pedestrian visibility, and/or to reduce vehicular speed by tightening the turning radii at the intersection corners.</p>	
<p><b>Edge Lines</b></p>	<p>Edge lines are solid white lines painted along the roadside curb that defines the driving lane and visually narrows the travel lane.</p>	
<p><b>In-Street Pedestrian Crossing Sign</b></p>	<p>A high-visibility sign placed on the centerline of a street prior to a crosswalk to alert motorists to yield when pedestrians are present in the crosswalk. When the sign is present, there tends to be an improved compliance of motorists yielding to pedestrians.</p>	
<p><b>Leading Pedestrian Interval (LPI)</b></p>	<p>A pedestrian crossing indication that permits pedestrians to move into the intersection 3-7 seconds before a green light is given to turning motorists that may cross the crosswalk. This increases visibility of pedestrians and reduces conflicts.</p>	

Facility Type	Description	Sample Photo
<p><b>Parklet</b></p>	<p>Temporary gathering area installed in the street adjacent to the curb as an extension of sidewalk space. This is temporary retrofit until a permanent curb extension is installed.</p>	
<p><b>Pedestrian Hybrid Beacon</b></p>	<p>An overhead pedestrian activated signal that requires traffic to stop during the pedestrian walk phase. When the beacon is not activated, the signals are dark.</p>	
<p><b>Pedestrian Crossing Island</b></p>	<p>Raised median or island that provides in-street refuge at a pedestrian crossing. The island reduces the amount of exposure time for the pedestrian.</p>	
<p><b>Pedestrian-Scale Lighting</b></p>	<p>Light fixtures used to illuminate a sidewalk or pathway typically closer to the ground and placed closer together than roadway lighting.</p>	
<p><b>Raised Crosswalk</b></p>	<p>A crosswalk raised from street-level to sidewalk-level. This elevated crosswalk increases pedestrian priority and visibility and slows approaching vehicles.</p>	



Facility Type	Description	Sample Photo
<p><b>Raised Intersection</b></p>	<p>An entire intersection raised from street-level to sidewalk-level. This elevated intersection slows approaching vehicles and increases pedestrian visibility.</p>	
<p><b>Rectangular Rapid Flash Beacon (RRFB)</b></p>	<p>An on-demand activated flashing beacon with a strobe “wig-wag” pattern that alerts motorists to pedestrians in the crosswalk. The RRFB is currently an interim approved device in the MUTCD.</p>	
<p><b>Shared Street</b></p>	<p>The road surface is typically at the same level as the sidewalk surface to create a continuous pedestrian space. A shared street is for motorists, pedestrians, bicyclists, and heavy vehicles.</p>	
<p><b>Shared-use Path</b></p>	<p>A two-way path that is open for bicyclists, pedestrians, and other non-motorized users. The path wide may vary depending on demand according to AASHTO guidelines.</p>	
<p><b>Sidewalk</b></p>	<p>A concrete pathway adjacent to the roadway. A sidewalk must meet minimum dimensions and smoothness for ADA-compliance. Sidewalks may have decorative paving or plantings as a buffer from the roadway and should be wider where high pedestrian volumes are present or desired.</p>	

Facility Type	Description	Sample Photo
<b>Suggested References &amp; Design Guidance</b>	FHWA <i>Manual on Uniform Traffic Control Deveices</i> – 2009 Edition AASHTO <i>Guide for Planning, Design, and Operation of Pedestrian Facilities</i> – 1 <sup>st</sup> Edition – 2004 MassDOT <i>Project Development &amp; Design Guide</i> – 2006 Edition NACTO <i>Urban Bikeway Design Guide</i> – 2 <sup>nd</sup> Edition – 2014 NACTO <i>Urban Street Design Guide</i> – 1 <sup>st</sup> Edition – 2013 ITE <i>Designing Walkable Urban Throughfares: A Context Sensitive Approach Community</i> – 2010 Edition U.S. Access Board – <a href="http://www.access-board.gov">www.access-board.gov</a> ITE Traffic Calming Library – <a href="http://www.ite.org/traffic">www.ite.org/traffic</a> Pedestrian and Bicycle Information Center – <a href="http://www.pedbikeinfo.org">www.pedbikeinfo.org</a>	