



Downtown Walk Assessment Salem, MA

September 23, 2014

Massachusetts Department of Transportation
Bicycle and Pedestrian Safety Program
in partnership with Massachusetts Department of Public Health

MAKING MASSACHUSETTS MORE WALKABLE

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Report Scope and Purpose

WalkBoston conducted this walk assessment as part of the Massachusetts Department of Transportation Bicycle and Pedestrian Safety Program, in association with the Massachusetts Department of Public Health. 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 walk assessment report summarizes the observations made along the walk route and makes recommendations for improvements to the built environment. The observations vary from specific infrastructure deficits (e.g., faded crosswalk, uneven sidewalk) to general comments on traffic speeds or land use patterns (e.g., vacant storefronts). Likewise, the recommendations range from individual fixes (e.g., paint the crosswalk) to suggestions for further study (e.g., evaluate the feasibility of installing raised crosswalks). 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 these assessments as a means to build local capacity for improving the built environment for walking and not as a complete inventory of walking conditions. WalkBoston staff members are not licensed design or engineering professionals. This report may be used as a resource for municipal staff and for design professionals who may be engaged by municipalities to program and design infrastructure improvements.

Salem Walk Assessment

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

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

The City of Salem identified several high-priority intersections that are particularly dangerous for pedestrians and cyclists. With input from City officials and the Salem Police Department, WalkBoston established a walking route that incorporated several of these key intersections as well as the MBTA commuter rail station.

The walk assessment was conducted in Salem's downtown district on September 23, 2014, from 9 AM-10:30 AM.



Participants cross the right turn slip lane at the Bridge Street/Washington Street intersection near the courthouse

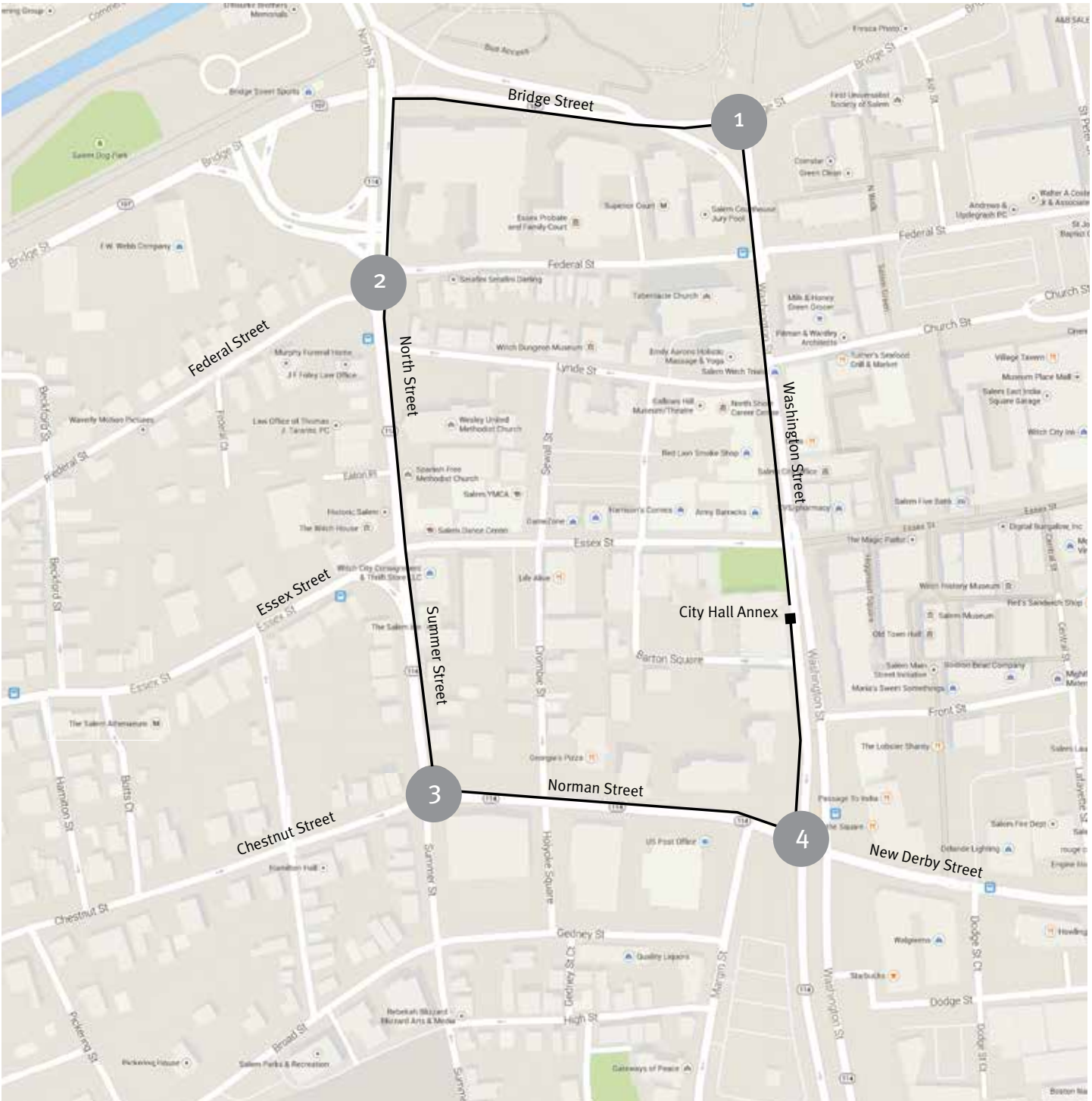
Study Area

The walk assessment focused on Salem's downtown district just west of the pedestrian mall and Peabody Essex Museum. The route began at the City Hall Annex; traveled north to Bridge Street and the Salem MBTA commuter rail station; turned west on Bridge Street; cut through a worn pathway along the North Street (Rt 114) ramps up to the Federal/North Street intersection; followed North Street to the Summer/Chestnut/Norman Street intersection; and returned to Washington Street at the intersection with New Derby Street.

The route included four intersections where the Salem Police Department has conducted enforcement/awareness activities:

- Washington Street/Bridge Street
- North Street/Federal Street
- Summer Street/Chestnut Street/ Norman Street
- Washington Street/New Derby Street

The Salem Police Department identified these intersections as dangerous for pedestrians and cyclists based on annual crash data collected between 2010 and 2013. As part of the safety awareness activities, the police have collected data on the reasons that road users behave dangerously to determine if there is an infrastructure deficiency contributing to the behavior. This walk assessment report will supplement the police reports, documenting infrastructure deficits and recommending short- and long-term solutions to improve pedestrian safety.



Map of walk assessment route in downtown Salem

● Enforcement locations

1. Washington Street/Bridge Street
2. North Street/Federal Street
3. Summer Street/Chestnut Street/ Norman Street
4. Washington Street/New Derby Street

Washington Street (between New Derby Street and Bridge Street)

Washington Street is the western edge of Salem’s downtown pedestrian mall, which is a vibrant retail district with restaurants, shops, tourist destinations and public spaces. City Hall and other municipal offices are on Washington Street with the Courthouse to the west along Bridge, Federal and North Streets. A pedestrian bridge allows access to the Salem MBTA commuter rail station platform at the northern end of Washington Street where it intersects with Bridge Street.

The tree-lined streetscape supports walkers with sidewalks on both sides of street. The sidewalks are a combination of concrete and brick with varying degrees of smoothness. The walking zone is adequate, although not generous given the volumes of pedestrians that use this corridor, particularly in October. Signs, bike racks and parking meters are grouped within the same zone as the trees, which help to keep the walking zone clear of obstructions. The Salem Heritage Trail – the red line painted on the sidewalk – runs along Washington Street connecting important historic and tourist destinations in Salem. The trail is mapped on several information kiosks in Salem, but there are few other signs that explain the purpose of the line.

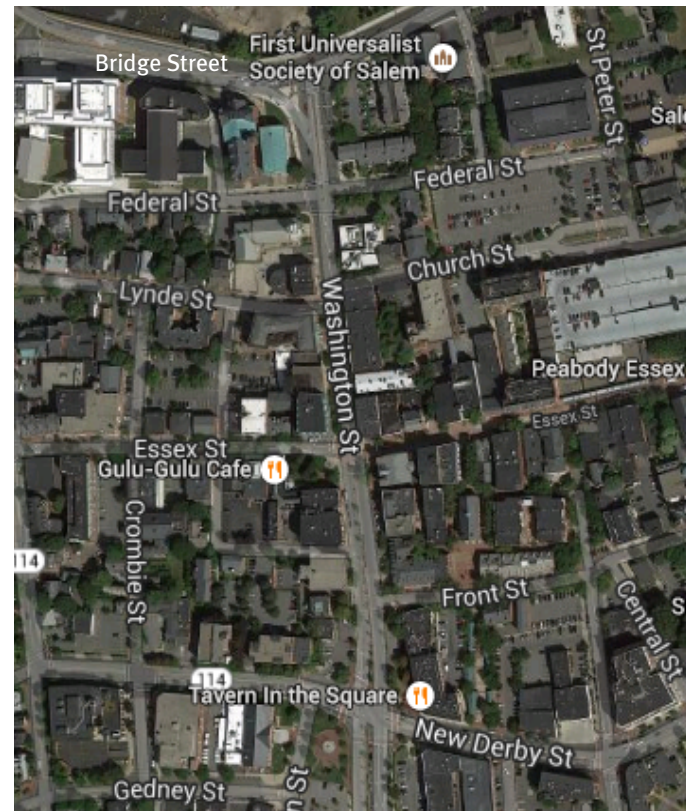


Sidewalk tables and Salem Heritage Trail on Washington Street

Washington Street sees high pedestrian volumes and high vehicular traffic volumes. The one-way streets and multiple lanes of traffic along the downtown corridors can be confusing to visitors both on foot and driving cars, particularly because there are few wayfinding signs. The street patterns may contribute to unpredictable motorist behavior as drivers try to correct wrong turns and adjust their routes to reach their intended destination.

The Washington Street roadway changes in configuration several times between Bridge Street and New Derby Street:

- Northbound from New Derby – 2 lanes, marked until Front Street; converts to 1 lane (although lane is wide enough to accommodate 2 lanes near angled parking zone)
- Median until intersection with Essex Street; 1 lane in each direction with parallel parking on both sides
- Road widens again at Federal Street (left turn lane); median begins again just north of Federal Street intersection; widens to 3 lanes (right turn, straight, left turn) to intersection with Bridge Street; no on-street parking



The Washington Street right-of-way widens and narrows and widens again through the downtown area

- Southbound from Bridge Street – 2 lanes, marked until Federal Street (right slip lane from Bridge Street); converts to 1 lane at Federal Street with parallel parking lane; expands to 3 lanes at New Derby (right turn, straight, left turn) – parking ends at Front Street

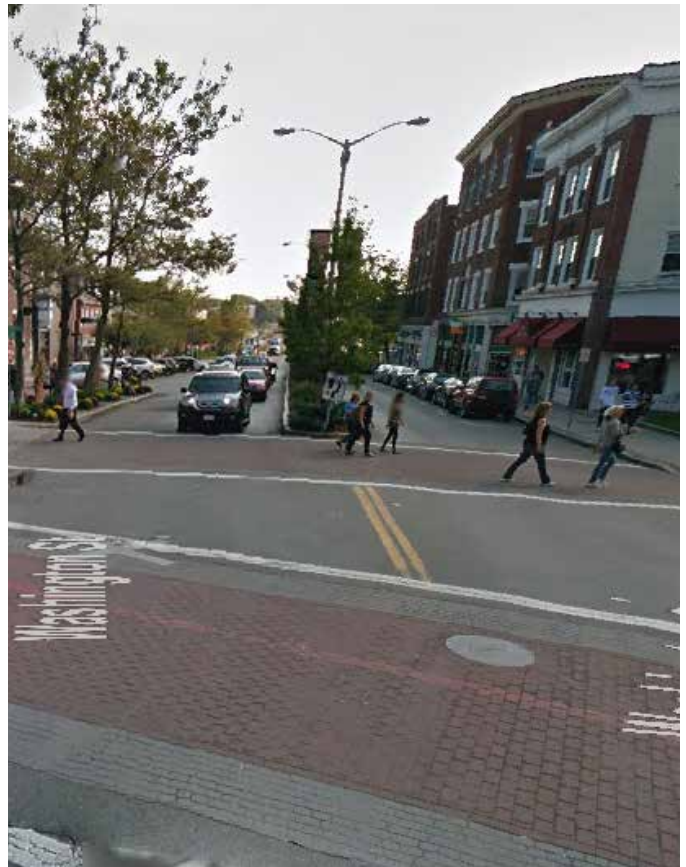
Below is a list of infrastructure deficiencies and proposed recommendations for the street crossings and intersections along this section of Washington Street.

Current infrastructure deficiencies:

- Sidewalks vary in their condition: bricks loose, broken curbing, popped tree grates, overgrown vegetation, litter and trash

Recommendations:

- Evaluate sidewalk conditions on both sides of Washington Street and repair where needed



Double threat location at the Washington and Essex intersection



Loose bricks along Washington Street

Washington/Essex intersection

Current infrastructure deficiencies:

- Drivers use wide right-of-way to form two lanes when traveling northbound on Washington Street. Causes double threat location – one motorist stops to allow a pedestrian to cross, but motorist traveling in adjacent lane does not see the pedestrian in the crosswalk and does not stop
- Drivers use pedestrians crossing the street as shield to take left onto Washington Street from Essex Street

- Signs and trees near this intersection and in median limit driver visibility of pedestrians crossing the street
- Curb ramps are not ADA compliant – missing detectable warning strips

Recommendations:

- Narrow northbound lane after angled parking ends before the Essex Street intersection to discourage use of width as two travel lanes
 - » Short-term: paint edge line or other pavement markings to delineate travel lane
 - » Long-term: move curb line out to narrow the travel lane
- Identify and relocate signs that block visibility of pedestrians in crosswalks; trim or remove vegetation that blocks visibility of oncoming traffic and pedestrians in the crosswalk
- Ensure that curb ramps meet ADA requirements; install detectable warning strips

Mid-block Crosswalk in front of City Hall

Current infrastructure deficiencies:

- Cars parked close to the crosswalk limit pedestrian visibility and drivers ability to see pedestrians
- Curb ramps are not ADA compliant – missing detectable warning strips and manhole cover at ramp entrance
- No pedestrian crossing signage alerting drivers to presence of crosswalk

Recommendations:

- Eliminate parking spaces within 20' of crosswalk
- Install curb extensions (bump-outs) to increase visibility of pedestrians; curb extensions also discourage parking too close to the crosswalk
- Redesign curb ramps to meet ADA standards
- Add pedestrian warning signs on both sides of Washington Street
- Evaluate intersection for Rectangular Rapid Flashing Beacon (RRFB) or High-Intensity Activated crossWalk beacon (HAWK) signal



Curb bump-outs would increase pedestrian visibility at this mid-block crossing on Washington Street

Washington/Federal Street Intersection

Washington Street widens when traveling northbound from one lane to three lanes and narrows when traveling southbound from three lanes to one lane. There is no clear delineation or warning when the southbound lane drops. The change in road width may affect vehicular speed; motorists drive faster when road opens up, and drive slower when road narrows. The crosswalk on the north side of the intersection connects a large municipal surface parking lot to the courthouse.

Current infrastructure deficiencies:

- No signage indicating lane changes along this section of Washington Street
- On-street parking on southbound side is too close to the crosswalk; limits pedestrian visibility
- Cars turning right out of Federal Street onto Washington Street are looking left for oncoming traffic and may accelerate into crosswalk before looking for pedestrians
- Crosswalk on north side of intersection is narrow; median is too narrow to function as a pedestrian refuge island; plants in median may obstruct views of pedestrians waiting in median to cross
- Road signs in median facing Federal Street are listing to the right; obstruct views
- No marked crosswalk across Federal Street at east side of Washington Street



Crosswalk and median at the intersection of Federal Street and Washington Street

Recommendations:

- Install signage to warn drivers of lane changes along this section of Washington Street
- Remove parking spaces within 20' of crosswalk
- Assuming pedestrian volumes substantiate the need for a crosswalk on the north side of the intersection, improve the safety of this crossing:
 - » Crosswalks - improve pavement markings – widen crosswalk, paint ladder or continental design or use brick-colored style similar to other crossings on Washington Street
 - » Median - Short-term: trim vegetation in median to improve visibility; Long-term: redesign median to function as a pedestrian refuge island
- Repair road signs facing Federal Street; consider additional or improved “yield to pedestrian” signs
- Paint crosswalk across Federal Street on the east side of Washington Street



Pedestrian connection across Bridge Street to reach the Salem Commuter Rail Station from Washington Street

Washington/Bridge Street intersection

The pedestrian connection to the commuter rail station is on the north side of the Washington/Bridge Street intersection. The sidewalk of the northern side of Bridge Street seems narrow because of its location adjacent to the commuter rail station. The new MBTA parking structure and station entrance was under construction during the assessment, so pedestrian patterns were not representative of the future patterns to the station.

Current infrastructure deficiencies:

- Pedestrian crossing time seems short given distance to walk (5 travel lanes with no median) when crossing Bridge Street on east side of intersection
- Pavement markings on all sides of intersection are minimal - two parallel lines; could be more prominent given the predicted high volumes of pedestrians accessing the T station at this location
- Slip lane for eastbound traffic on Bridge Street to turn right onto Washington Street creates unsafe traffic pattern - drivers do not always respect RED signal and pedestrians think RED signal for drivers indicates a protected crossing for them. Right signal indication is blocked by a tree.
- Cars traveling northbound on Washington turn right quickly onto Bridge Street due to generous curb radii
- Few wayfinding signs to tourist or downtown Salem destinations for transit riders arriving on commuter rail
- Some traffic signs are faded



This right turn slip lane from Bridge Street onto Washington Street is confusing to pedestrians and drivers - it is unclear who has the right of way

Recommendations:

- Evaluate pedestrian signal timing to ensure adequate time for pedestrians to cross Bridge Street
- Consider upgrading pavement markings to match those on Washington Street; welcoming message to transit riders

- Evaluate the operation of the slip lane from Bridge Street to Washington Street. Consider prohibiting Right Turn on Red (RTOR) and sign the intersection appropriately. If RTOR continues to be allowed, consider installing an overhead sign that states drivers must yield to pedestrians or painting STOP on the pavement.
- Evaluate possibility of reducing curb radii to slow traffic down and shorten crossing distance to transit station entrance on the northside of Bridge Street
- Improve wayfinding to downtown retail/tourist district. Red line (Salem Heritage Trail) leads from commuter rail into downtown, however no obvious explanation for red line
- Replace faded traffic signs

Bridge Street/Access to MBTA Commuter Rail Station (between Washington Street and North Street)

Walking along Bridge Street (Rt 107) between Washington and North Streets is not a pleasant walk. When traveling west from the Washington Street intersection, people walk down hill into a tunnel-like environment. Retaining walls supporting the ramps to Route 114 are on the north side and a high wall and fence defining the back entrance to the courthouse complex are on the south side. The travel lanes are wide and it feels like cars are moving quickly. As mentioned above, the MBTA parking structure and commuter rail platform were under construction during the assessment which also included sidewalk replacement and road reconfiguration. While the traffic patterns may change and sidewalks may be improved, there are several deficiencies that should be addressed.



Bridge Street is walled in between the courthouse complex Rt. 114 ramps and overpass

Current infrastructure deficiencies:

- Wide travel lane at previous location for “Kiss and Ride” drop-off zone. Signs are still posted, but it is unclear as to whether this location will be moved after construction ends
- Crosswalk located on eastside of Rt. 114 overpass is unprotected with minimal pavement markings
- Light conditions are dark due to overpass; crosswalk often in shadow, hard to see pedestrians in crosswalk
- Crosswalk on west side of Rt. 114 overpass has many pedestrians and cyclists that come from neighborhood to the north, and cross RR tracks and Bridge Street (in crosswalk) and proceed up informal pathway to reach the top of the hill at North Street; minimal pavement markings and no curb ramps
- Minimal pedestrian crossing signs; some needing maintenance – leaning, faded, etc.



Crosswalk pavement markings on Bridge Street are minimal



Informal pedestrian path from the courthouse complex down to Bridge Street - a desire line not satisfied by the current pedestrian network

Recommendations:

- Paint edge/fog lines on Bridge Street to narrow travel lanes
- Narrow travel lane on north side of Bridge Street
 - » Short term: if Kiss and Ride remains, improve pavement markings and signage
 - » Long-term: if Kiss and Ride remains, formalize drop off with curb extensions that define a pull-out/drop-off zone
- Supplement pavement markings on both crosswalks on either side of the overpass; crosswalks should be painted in ladder or continental design or similar to those in retail district
- Improve lighting under overpass for both pedestrians and drivers
- Consider additional pedestrian crossing signage at both crosswalks and in-street pedestrian signs

North Street/Federal Street intersection

This is an unfortunate design that basically ignores movement on foot. This intersection was re-designed when the off-ramp from Rt. 114 – Bridge turning south onto North Street into Salem was discontinued, and this awkward series of roadways off the state road were built. The intersection looks like a highway interchange design rather than a residential scale intersection. Crossing the intersection is contorted; pedestrians cannot directly cross, but must go around the intersection. To cross legally would take close to 3 minutes.



North Street/Federal Street intersection is out of scale with residential district. The infrastructure does not facilitate pedestrian movements.

Current infrastructure deficiencies:

- Missing pedestrian signal button for pedestrians on Federal Street trying to cross North Street from west to east; pedestrians dependent on others crossing the intersection to push for a WALK signal
- No crosswalk across ramp from Bridge Street – no legal crossing from pedestrian island on east side of intersection; pedestrians cross mid-ramp where worn grass path intersects to reach Federal Street neighborhood “regularly” according to Salem participants
- Median installed to prevent left turns from Federal Street onto North Street – ineffective, watched multiple cars and trucks turn around median to proceed south onto North Street. Trucks making U-turns travel over the sidewalk. Median built to prevent cut-throughs into Federal Street neighborhood
- “Don’t Block the Box” pavement markings seem to be ineffective in allowing traffic to exit Federal Street on a GREEN signal while northbound traffic on North Street is stopped; doesn’t fully address issue of Bridge Street ramp and Federal Street being offset
- Pedestrian signal is exclusive; may not be necessary on east side of North Street when crossing Federal Street – long wait to stop one-way traffic from courthouse
- Vegetation at northeast corner of Federal Street is worn due to foot traffic



Upon observation, pavement markings and traffic median and sign do not manage traffic effectively at this intersection.

Recommendations:

- Northeast corner of Federal street should be redesigned to reflect pedestrian desire lines
- Install pedestrian push button at right turn slip lane on northbound North Street exit to Bridge Street
- Evaluate safety of painting a marked crosswalk across ramp to and from Bridge Street at the intersection with North Street; may require redesign of the traffic medians
- Re-evaluate effectiveness of median blocking traffic from continuing into Federal Street neighborhood; clarify legal turning movements at and around the median
- Clarify the meaning of “Don’t Block the Box” pavement markings through signage or modification of markings
- Evaluate the pedestrian phase of traffic signal – currently exclusive, but some movements may allow concurrent phases that could increase pedestrian compliance



Worn path leading from Bridge Street up to North/Federal Street intersection

North Street/Lynde Street intersection

Current infrastructure deficiencies:

- Wide curb radii and long pedestrian crossing distance at Lynde Street

Recommendations:

- Tighten curb radii and consider curb extensions to reduce travel distance across Lynde Street



Lynde Street crossing could be shortened with curb extensions

North Street/Essex Street/Summer Street intersection

Current infrastructure deficiencies:

- Slip lane for motorists turning right from Essex Street onto Summer Street – crosswalk present, but no yield to pedestrian signs or crosswalk signs; unprotected crossing
- Pedestrian phase may not allow adequate time to cross Essex/Summer Street intersection

Recommendations:

- Consider installing additional warning signs if deemed appropriate
- Review signal timing to ensure it meets guidelines

Summer Street/Chestnut Street/ Norman Street intersection

A major marked State Route (Rt 114) meets both an historic district and a downtown street at this intersection. Chestnut Street is in the McIntire Historic District which is listed on the National Registry of Historic Places. The intersection is unsignalized, and only two of the four legs of the intersection have traffic control signs: (1) a stop sign on Chestnut Street and (2) a yield sign on Norman Street. Northbound and southbound traffic on Summer Street have no yield or stop signs. The predominant flow of traffic remains on Rt 114 in both directions (south from Summer to east on Norman Street and west on Norman Street to north on Summer Street). Chestnut Street is one way eastbound from Flint Street to Summer Street.

The high traffic volumes prohibit fast-moving traffic. The current intersection control may not meet the needs and expectations of drivers. Drivers attempting to turn left from Norman Street onto Summer Street have the most difficult movement, and often “barge and block” traffic lanes to make the turn. Drivers turning right from Norman Street often assume the right-of-way from drivers heading north on Summer Street. Pedestrians wait for a gap in traffic to cross – sometimes using the crosswalk, sometimes outside the crosswalk when traffic is at a halt.



Assessment participants watch traffic moving through the unsignalized intersection

Current infrastructure deficiencies:

- No pedestrian signals at the intersection
- Parking on east side of Summer Street south of Norman Street limit pedestrian visibility; light conditions and overhanging trees make it difficult to see people in the crosswalk
- Minimum pavement markings on all four crosswalks through the intersection
- Limited number of pedestrian crossing signs

Recommendations:

- Evaluate the current intersection control and update for improved safety, efficiency and expectations of all users
- Consider installing curb extensions on both northern and southern corners of Norman Street – make pedestrians more visible without changing traffic patterns – would require tightening of curb radii and narrowing travel lane
- Remove parking spaces proximate to crosswalk on eastern side of Summer Street
- Upgrade pavement markings to at least ladder or continental crosswalk; consider treating crosswalks like those in retail district – red stamped pavement or brick
- Install additional pedestrian crossing signs or yield to pedestrian warnings; add only if does not clutter intersection with signage – may not conform to goals of National Historic District



Chestnut Street is in the McIntire Historic District and considered one of the most beautiful streets in New England

New Derby/Washington Street intersection

Current infrastructure deficiencies:

- Size of intersection and signal timing causes long wait times for exclusive pedestrian phase; pedestrian crossing time seems short; unclear if phase is designed as a two-phased crossing. If two-phased, pedestrians are not using the intersection that respects phased crossing.
- Curb ramps, but no detectable warning strips

Recommendations:

- Evaluate pedestrian signal timing to see if concurrent phasing is possible on some legs of intersection; consider automatic pedestrian phase
- Determine if pedestrian crossing time is adequate and meets code for two-phased or single phased crossing. Pedestrians want to cross the entire intersection in one phase.
- Install detectable warning strips where required



New Derby Street and Washington Street intersection sees high volumes of cars and pedestrians



The length of the pedestrian phase at this crossing does not seem to allow the entire intersection to be crossed in one phase

Appendix A. Summary of Issues and Recommendations

Washington Street (between New Derby Street and Bridge Street)

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Sidewalks vary in their condition: bricks loose, broken curbing, popped tree grates, overgrown vegetation, litter and trash	Evaluate sidewalk conditions on both sides of Washington Street and repair where needed	Short-term	City of Salem

Washington/Essex intersection

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Drivers use wide right-of-way to form two lanes when traveling northbound on Washington Street	Narrow northbound lane after angled parking ends before the Essex Street intersection to discourage use of width as two travel lanes		
	» paint edge line or other pavement markings to delineate travel lane	Short-term	City of Salem
	» Long-term: move curb line out to narrow the travel lane	Long-term	City of Salem
Signs and trees near this intersection and in median limit driver visibility	Identify and relocate signs that block visibility of pedestrians in crosswalks; trim or remove vegetation that blocks visibility of oncoming traffic and pedestrians in the crosswalk	Short-term	City of Salem
Curb ramps are not ADA compliant – missing detectable warning strips	Ensure that curb ramps meet ADA requirements; install detectable warning strips	Mid-term	City of Salem

Mid-block Crosswalk in front of City Hall

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Cars parked close to the crosswalk limit pedestrian visibility and drivers ability to see pedestrians	Eliminate parking spaces within 20' of crosswalk	Short-term	City of Salem
	Install curb extensions (bump-outs) to increase visibility of pedestrians; curb extensions also discourage parking too close to the crosswalk	Long-term	
Curb ramps are not ADA compliant – missing detectable warning strips, manhole cover at ramp entrance, granite curb at ramp rather than concrete	Redesign curb ramps to meet ADA standards	Short-term	City of Salem
No pedestrian crossing signage alerting drivers to presence of crosswalk	» Add pedestrian warning signs on both sides of Washington Street	Short-term	City of Salem
	» Evaluate intersection for Rectangular Rapid Flashing Beacon (RRFB) or High-Intensity Activated crossWalk beacon (HAWK) signal	Long-term	City of Salem

Washington/Federal Street Intersection

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
No signage indicating lane changes along this section of Washington Street	Install signage to warn drivers of lane changes along this section of Washington Street	Short-term	City of Salem
On-street parking on southbound side is too close to the crosswalk; limits pedestrian visibility	Remove parking spaces within 20' of crosswalk	Short-term	City of Salem
Crosswalk on north side of intersection is narrow; median is too narrow to function as a pedestrian refuge island; plants in median may obstruct views of pedestrians waiting in median to cross	Assuming pedestrian volumes substantiate the need for a crosswalk on the north side of the intersection, improve the safety of this crossing: crosswalks - improve pavement markings – widen crosswalk, paint ladder or continental design or use brick-colored style similar to other crossings on Washington Street	Short-term	City of Salem
Plants in median may obstruct views of pedestrians waiting in median to cross; road signs in median facing Federal Street are listing to the right; obstruct views	Trim vegetation in median to improve visibility; repair road signs facing Federal Street; consider additional or improved “yield to pedestrian” signs	Short-term	City of Salem
	Redesign median to function as a pedestrian refuge island	Long-term	City of Salem
No marked crosswalk across Federal Street at east side of Washington Street	Paint crosswalk across Federal Street on the east side of Washington Street	Short-term	City of Salem

Washington/Bridge Street intersection

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Pedestrian crossing time seems short given distance to walk (5 travel lanes with no median) when crossing Bridge Street on east side of intersection	Evaluate pedestrian signal timing to ensure adequate time for pedestrians to cross Bridge Street	Short-term	City of Salem
Pavement markings on all sides of intersection are simple crosswalks; could be more prominent given the predicted high volumes of pedestrians accessing the T station at this location	Consider upgrading pavement markings to match those on Washington Street; welcoming message to transit riders	Short-term	City of Salem, MBTA
Slip lane for eastbound traffic on Bridge Street to turn right onto Washington Street creates unsafe traffic pattern - drivers do not always respect RED signal and pedestrians think RED signal for drivers indicates a protected crossing for them. Right signal indication is blocked by a tree.	Evaluate the operation of the slip lane from Bridge Street to Washington Street. Consider prohibiting Right Turn on Red (RTOR) and sign the intersection appropriately. If RTOR continues to be allowed, consider installing an overhead sign that states drivers must yield to pedestrians or painting STOP on the pavement.	Short-term	City of Salem

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Cars traveling northbound on Washington turn right quickly onto Bridge Street due to generous curb radii	Evaluate possibility of shortening curb radii to slow traffic down and shorten crossing distance to transit station entrance on the northside of Bridge Street	Long-term	City of Salem
Few wayfinding signs to tourist or downtown Salem destinations for transit riders arriving on commuter rail	Improve wayfinding to downtown retail/tourist district. Salem Heritage Trail leads from commuter rail into downtown, however no obvious explanation for red line	Long-term	City of Salem
Some traffic signs are faded	Replace faded traffic signs	Short-term	City of Salem

Bridge Street/Access to MBTA Commuter Rail Station (between Washington and North Streets)

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Wide travel lane at previous location for “Kiss and Ride” drop-off zone. Signs are still posted, but it is unclear as to whether this location will be moved after construction ends	Paint edge/fog lines on Bridge Street to narrow travel lanes	Short-term	City of Salem, MBTA
Crosswalk located on eastside of Rt. 114 overpass is unprotected with minimal pavement markings	Narrow travel lane on north side of Bridge Street		
	» if Kiss and Ride remains, improve pavement markings and signage	Short-term	City of Salem, MBTA
	» Long-term: if Kiss and Ride remains, formalize drop off with curb extensions that define a pull-out/drop-off zone	Long-term	City of Salem, MBTA
Light conditions are dark due to overpass; crosswalk often in shadow, hard to see pedestrians in crosswalk	Supplement pavement markings on both crosswalks on either side of the overpass; crosswalks should be painted in ladder or continental design or similar to those in retail district	Short-term	City of Salem, MBTA
Crosswalk on west side of Rt. 114 overpass has many pedestrians and cyclists that come from neighborhood to the north, and cross RR tracks and Bridge Street (in crosswalk) and proceed up informal pathway to reach the top of the hill at North Street; minimal pavement markings and no curb ramps	Improve lighting under overpass for both pedestrians and drivers	Long-term	City of Salem
Minimal pedestrian crossing signs; some needing maintenance – leaning, faded, etc.	Consider additional pedestrian crossing signage at both crosswalks and in-street pedestrian signs	Short-term	City of Salem

North Street/Federal Street intersection

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Missing pedestrian signal button for pedestrians on Federal Street trying to cross North Street from west to east; pedestrians dependent on others crossing the intersection to push for a WALK signal	Install pedestrian push button at right turn slip lane on northbound North Street exit to Bridge Street	Short-term	City of Salem, MA Dept of Transportation
No crosswalk across ramp from Bridge Street – no legal crossing from pedestrian island on east side of intersection; pedestrians cross mid-ramp where worn grass path intersects to reach Federal Street neighborhood “regularly” according to Salem participants	Evaluate safety of painting a marked crosswalk across ramp to and from Bridge Street at the intersection with North Street; may require redesign some of the traffic medians	Mid-term	City of Salem, Mass Dept of Transportation
Median installed to prevent left turns from Federal Street onto North Street – ineffective, watched multiple cars and trucks turn around median to proceed south onto North Street. Median built to prevent cut-throughs into Federal Street neighborhood	Re-evaluate effectiveness of median blocking traffic from continuing into Federal Street neighborhood; clarify legal turning movements at and around the median	Mid-term	City of Salem, Mass Dept of Transportation
“Don’t Block the Box” pavement markings seem to be ineffective in allowing traffic to exit Federal St on a GREEN signal while northbound traffic on North St is stopped; doesn’t fully address issue of Bridge Street ramp and Federal Street being offset	Clarify the meaning of “Don’t Block the Box” pavement markings through signage or modification of markings	Short-term	City of Salem
Pedestrian signal is exclusive; may not be necessary on east side of North Street when crossing Federal Street – long wait to stop one-way traffic from courthouse	Evaluate the pedestrian phase of traffic signal – currently exclusive, but some movements may allow concurrent phases that could increase pedestrian compliance	Short-term	City of Salem
Vegetation at northeast corner of Federal Street is worn due to foot traffic	Northeast corner of Federal street should be redesigned to reflect pedestrian desire lines; trim vegetation	Short-term	City of Salem

North Street/Lynde Street intersection

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Wide curb radii and long crossing distance at Lynde Street	Tighten curb radii and consider curb extensions to reduce travel distance across Lynde Street	Long-term	City of Salem

North Street/Essex Street/Summer Street intersection

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Slip lane for motorists turning right from Essex Street onto Summer Street – crosswalk present, but no yield to pedestrian signs or crosswalk signs; unprotected crossing	Consider installing additional warning signs if deemed appropriate	Short-term	City of Salem
Pedestrian phase may not allow adequate time to cross Essex/ Summer Street intersection	Review signal timing to ensure it meets guidelines	Short-term	City of Salem

Summer Street/Chestnut Street/ Norman Street intersection

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
No pedestrian signals at the intersection - no option for a protected crossing	Evaluate the current intersection control and update for improved safety, efficiency and expectations of all users	Short-term	City of Salem
	Consider installing curb extensions on both northern and southern corners of Norman Street – make pedestrians more visible without changing traffic patterns – would require tightening of curb radii and narrowing travel lane	Long-term	City of Salem
Parking on east side of Summer Street south of Norman Street limit pedestrian visibility; light conditions and overhanging trees make it difficult to see people in the crosswalk	Removing parking spaces proximate to crosswalk on eastern side of Summer Street	Short-term	City of Salem
Minimum pavement markings on all four crosswalks through the intersection	Upgrade pavement markings to at least ladder or continental crosswalk; consider treating crosswalks like those in retail district – red stamped pavement or brick	Short-term	City of Salem
Limited number of pedestrian crossing signs	Install additional pedestrian crossing signs or yield to pedestrian warnings; add only if does not clutter intersection with signage – may not conform to goals of National Historic District	Short-term	City of Salem

New Derby/Washington Street intersection

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Size of intersection and signal timing causes long wait times for exclusive pedestrian phase; pedestrian crossing time seems short; unclear if phase is designed as a two-phased crossing. If two-phased, pedestrians are not using the intersection that respects phased crossing.	Evaluate pedestrian signal timing to see if concurrent phasing is possible on some legs of intersection; consider automatic pedestrian phase. Determine if pedestrian crossing time is adequate and meets code for two-phased or single phased crossing. Pedestrians want to cross the entire intersection in one phase.	Mid-term	City of Salem
Curb ramps, but no detectable warning strips	Install detectable warning strips where required	Mid-term	City of Salem

Appendix B. Participant List

NAME	ORGANIZATION
Stacey Beuttell	WalkBoston
Nina Cohen	Advocate
Jude Griffin	Safe Routes to School
Kasia Hart	WalkBoston
Dorothea Hass	WalkBoston
Kristian Hoysradt	Mayor's Office
Matthew Lambert	Mass in Motion
John Pelletier	Mass in Motion
Robert Preczewski	Police
Lisa Schletzbaum	MassDOT Safety
Misrak Sultan	MassDOT D4
Jim Treadwell	NIAC

Appendix C. Terminology

Below are images and definitions of the terms used to describe the walking environment in this report.

Crosswalk and stop line

Crosswalks can be painted in a variety of ways, some of which are more effective in warning drivers of pedestrians. Crosswalks are usually accompanied with stop lines. These lines act as the legally mandated stopping point for vehicles, and discourage drivers from stopping in the middle of the crosswalk.



Crosswalk patterns
Source: USFHA



Crosswalk and stop line
Source: http://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_scdproj/sys_impact_rpt/images/fig16.jpg

Curb ramp and detectable warning strip

Curb ramps provide access from the sidewalk to the street for people using wheel chairs and strollers. They are most commonly found at intersections. While curb ramps have improved access for wheelchair-bound people, they are problematic for visually impaired people who use the curb as an indication of the side of the street. Detectable warning strips, a distinctive surface pattern of domes detectable by cane or underfoot, are now used to alert people with vision impairments of their approach to streets and hazardous drop-offs.



Curb ramp and detectable warning strip in Woburn, MA

Curb extension/curb bulb-out

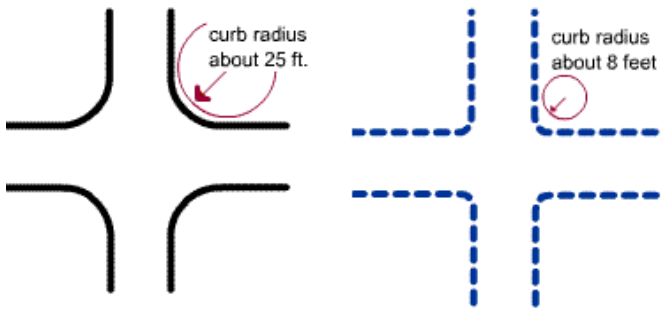
A sidewalk extension into the street (into the parking lane) shortens crossing distance, increases visibility for walkers and encourages eye contact between drivers and walkers.



Curb extensions are often associated with mid-block crossings

Curb radius

A longer curb radius (on the left in figure below) allows vehicles to turn more quickly and creates longer crossing distance for pedestrians. A shorter curb radius (on the right in the figure below) slows turning speeds and provides pedestrians shorter crossing distances.



There are two excellent examples of the shortening of curb radii in Woburn, MA. The first (A) is a low-cost solution using a gravel-filled zone between the original curb line and the newly established road edge. The second is a higher-cost solution using grass and trees and extending the sidewalks to the new curb. Both work to slow traffic.

Edge line

An edge line is a solid white line painted along the roadside curb that defines the driving lane and narrows the driver's perspective. Edge lines are most often used in suburban and rural locations, but may be appropriate in some urban conditions.



Edge lines delineate the vehicular driving zone on wide roadways.



(A) Gravel-filled curb extension



(B) Grass, trees and extended sidewalk in curb extension

In-street pedestrian crossing sign

In-street pedestrian crossing signs are used at the road centerline within crosswalks to increase driver awareness of pedestrians in the area. These signs are a relatively low-cost, highly effective tool in slowing traffic by the narrowing travel lanes. They are popular with road maintenance departments since they can be easily moved for snow removal.



Leading Pedestrian Interval (LPI)

A leading pedestrian interval gives pedestrians an advance walk signal before motorists get a green signal, giving the pedestrian several seconds to start walking in the crosswalk before a concurrent signal is provided to vehicles. This makes pedestrians more visible to motorists and motorists more likely to yield to them. Typical LPI settings provide 3 to 6 seconds of advance walk time.



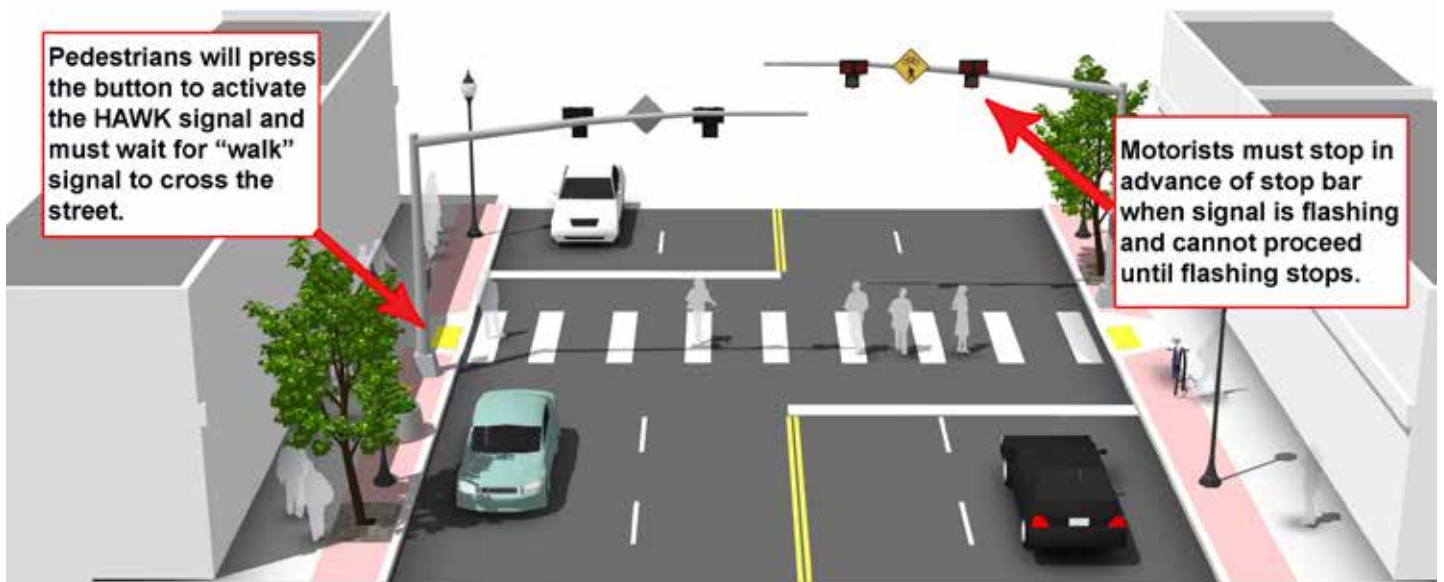
Source: http://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_scdproj/sys_impact_rpt/images/fig34.jpg

High-Intensity Activated crossWalk (HAWK)

A HAWK beacon (High-Intensity Activated crossWalk beacon) is a traffic signal used to stop road traffic and allow pedestrians to cross safely. It is officially known as a Pedestrian Hybrid Beacon (PHB). The purpose of a HAWK beacon is to allow protected pedestrian crossings, stopping road traffic only as needed. Where standard traffic signal 'warrants' prevent the installation of standard three-color traffic signals, the HAWK beacon provides an alternative.



Source: <http://www.achdidaho.org/Projects/Images/NewHawkSignal092209%20014.jpg>



Source: <http://bloomington.in.gov/media/media/image/jpeg/13144.jpg>

Pedestrian Refuge Island

Pedestrian refuge islands are protected areas where people may safely pause or wait while crossing a street. Pedestrian refuge islands are particularly helpful as resting areas for seniors, persons with disabilities, children, and others who may be less able to cross the street in one stage. At signalized intersections, they allow slow moving pedestrians to cross in two phases. At unsignalized locations, they simplify the act of finding a gap in traffic to cross since vehicles from only one direction must be reckoned with at a time.

<http://www.sfbetterstreets.org/find-project-types/pedestrian-safety-and-traffic-calming/traffic-calming-overview/medians-and-islands/>



Pedestrian refuge island at a signalized crossing
Source: <http://safety.fhwa.dot.gov/intersection/resources/fhwasao6o16/images/fig95.jpg>

Transit/Walk Audit Assessment Tool



Street Name/Intersection	
Date/Time	
Weather Conditions	
Neighborhood Character	
<input type="radio"/> Land use: residential, commercial, industrial or mixed use?	
<input type="radio"/> Community facilities: schools, parks, libraries?	
<input type="radio"/> Surface parking lots?	
<input type="radio"/> Buildings occupied?	
<input type="radio"/> Building facades – blank walls, engaging storefronts, sidewalk cafes?	
<input type="radio"/> Is there street activity?	
Street Description	
<input type="radio"/> Arterial or local	
<input type="radio"/> Number and estimated width of travel lanes – narrow, adequate, wide?	
<input type="radio"/> Parking – none, one or both sides?	
<input type="radio"/> Sidewalks – none, one or both sides?	
Vehicular Traffic	
<input type="radio"/> Posted speed limit signs	
<input type="radio"/> Estimated vehicle speeds	
<input type="radio"/> Volume	
Sidewalks	
<input type="radio"/> On both sides of the street?	
<input type="radio"/> Wide? Continuous? Smooth surface?	
<input type="radio"/> Curb ramps/detectable warning strips?	
<input type="radio"/> Buffered from traffic with landscape strips (verge)?	
<input type="radio"/> Minimal number of interrupting driveways? Narrow or wide driveways?	
<input type="radio"/> Are newspaper racks, outdoor	

Transit/Walk Audit Assessment Tool



Street furnishings	
<input type="radio"/> Trees?	
<input type="radio"/> Benches?	
<input type="radio"/> Trash receptacles?	
<input type="radio"/> Bicycle accommodations?	
<input type="radio"/> Lighting?	
Crosswalks	
<input type="radio"/> Condition?	
<input type="radio"/> Design: 2 lines, zebra/ladder, stamped, pavers? Raised?	
<input type="radio"/> Marked and signed?	
Traffic signals	
<input type="radio"/> Pedestrian-activated? Countdown signals?	
<input type="radio"/> Timing – enough time to cross? Traffic stops in all directions? Traffic stops only in lanes pedestrian is crossing?	
<input type="radio"/> Right turn on red prohibited?	
Sight lines/Visibility	
<input type="radio"/> Obstacles – vegetation, light poles, parked cars?	
<input type="radio"/> Road design – curves, elevation change?	
Pedestrian Safety Countermeasures	
<input type="radio"/> Curb extensions?	
<input type="radio"/> Pedestrian refuge islands or medians?	
<input type="radio"/> In-street pedestrian signs?	
<input type="radio"/> Speed tables?	
Accessibility	
<input type="radio"/> Curb ramps?	
<input type="radio"/> Detectable warning strips?	
<input type="radio"/> Slopes/cross-slopes?	