MASSPORT BOSTON LOGAN AIRPORT

Pedestrian Design Toolbox

JANUARY 2025

massport

TOOLE DESIGN

saam architecture

Contents

Information contained in this document is for planning purposes and should not be used for final design of any project. All results, recommendations, concept drawings and commentary contained herein are based on limited data and information and on existing conditions that are subject to change.

Further analysis and engineering design are necessary prior to implementing any of the recommendations contained herein.

Abbreviations

PROWAG: Public Right of Way Accessibility Guidelines

ADA: Americans with Disabilities Act

MUTCD: Manual on Uniform Traffic Control Devices

RRFB: Rectangular Rapid Flashing Beacons

Design Principles

1. Pedestrian safety is prioritized, acknowledging the need to prevent vehicular traffic queuing back into the major roadway.
2. Design guidance considers the large percentage of users, both walking and driving, who are distracted and generally unfamiliar with the surroundings.
3. Designs should be "forgiving" (acknowledging that people make mistakes, and those mistakes shouldn't be fatal).
4. Pavement markings are more effective for communication than signs alone.
5. Geometric and physical designs are more effective than signs in altering user behavior.
6. Consistency and standardization in design leads to predictability in user behavior.
7. Urban design principles and user experience are important elements of design.
8. Up-to-date design standards, best practices, and out-of-the-box thinking are incorporated.

Toolbox Safety Objectives

Treatment	Reduces Speed	Improves Crossing Safety	Increases Visibility	Reduces Conflicts	Improves Wayfinding
Crosswalk Design					
Raised Crosswalks	●	●	●		
High Visibility Crosswalk Markings		●	●		●
Wide Curb Ramps		●	●		●
Rectangular Rapid Flashing Beacons		●	●	●	●
Yield "Sharks Teeth" Markings	●	●			
Overhead Sign			●		●
Pedestrian Channelization		●	●	●	●
Enhanced Lighting at Crosswalks	●	●	●	●	●
Curb Extensions	●	●	●	●	
Crossing Islands	●	●	●		
In-Roadway Yield Signs	●	●	●		
Roadway Considerations					
Fewer Lanes	●	●	●	●	
Narrow Lanes	●	●	●	●	
Restricted Lane Markings		●	●	●	●
Hardened Center Line Separation	●	●	●	●	●
Speed Humps	●	●			
"Slow XX MPH" Markings		●	●	●	●
Transition: Roadway to Terminal					
Narrow Lanes	●	●	●		●
Traverse Rumble Strips	●	●			
Speed Limit Sign	●	●	●		
Speed Feedback Sign	●	●		●	
Traffic/Crossing Control					
Traffic Signal and Stop Sign	●	●		●	

SECTION 1

Crosswalk Design

Standard Crossing Treatment

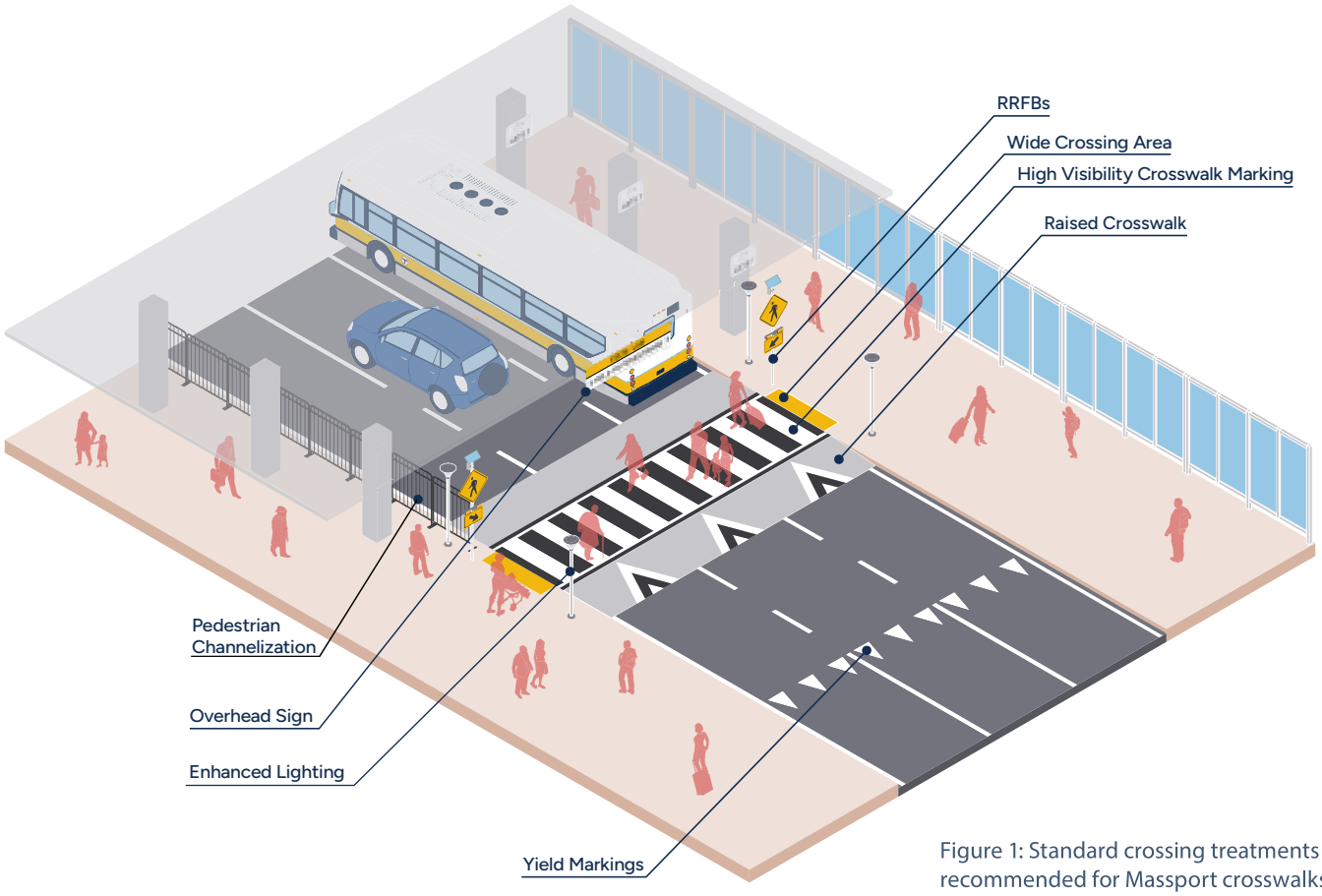


Figure 1: Standard crossing treatments recommended for Massport crosswalks.

Figure 1 outlines a variety of crossing treatments that are recommended as ideal, standard treatments for crosswalks at Massport terminals. Note that this image illustrates the ideal conditions for crosswalk design when it is constructed from blank slate.

These standard treatments include:

- Raised Crosswalks
- High Visibility Crosswalks Markings
- Wide curb ramps/crossing area
- Rectangular Rapid Flashing Beacon (RRFB)
- Yield Markings
- Overhead Sign
- Pedestrian Channelization
- Enhanced Lighting

The sections below provide more context on these standard treatments and information on other treatments. While these standard treatments are recommended, sometimes other treatments may be suitable depending on the context of the airport and feasibility of implementing the standard treatments.

TREATMENT 1.1

Raised Crosswalks

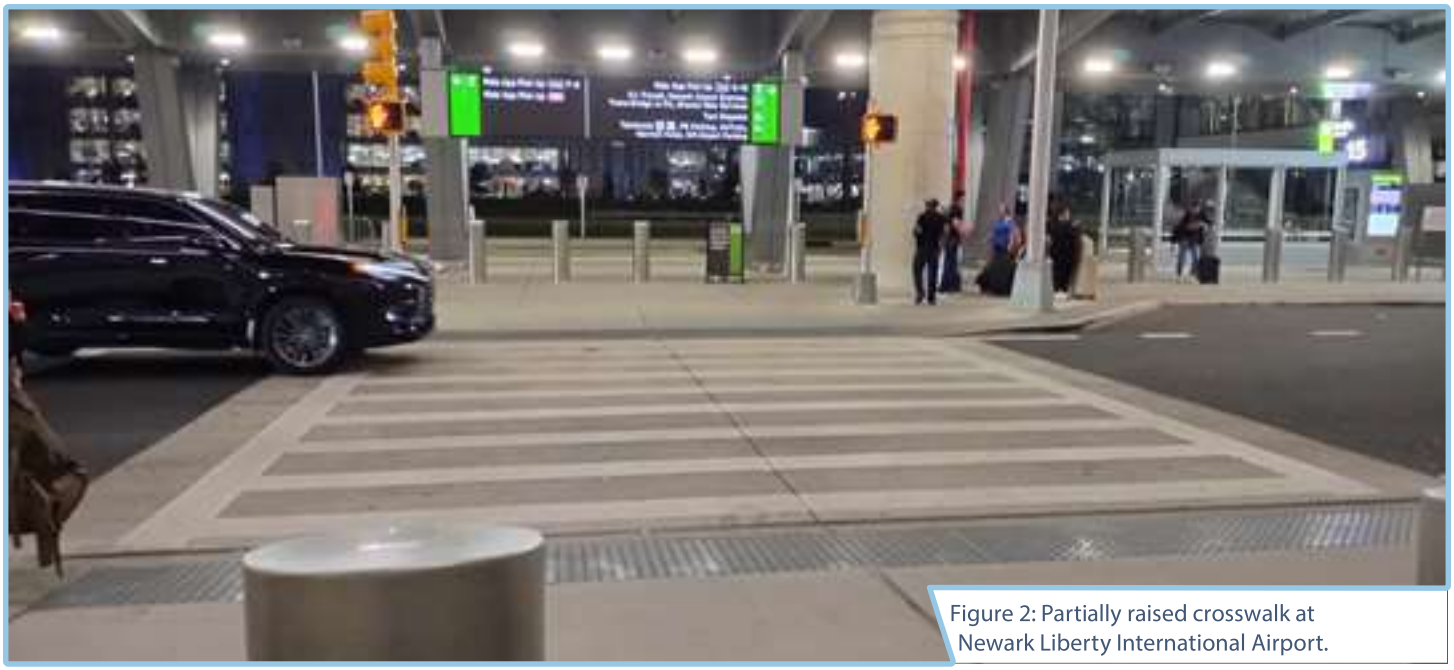


Figure 2: Partially raised crosswalk at Newark Liberty International Airport.

Description

Raised crosswalks maintain pedestrians at the same level as the sidewalks on both sides, requiring motor vehicles to slope up to "sidewalk level" and then back down.

Purpose

Improves visibility between pedestrians and drivers, encourages yielding to pedestrians, reduces vehicle speeds, and eliminates the need for pedestrian curb ramps (detectable warning panels are still required).

Design Directive

Raised crosswalks are a standard requirement for all crossings at Massport terminals.

Design Guidance

Raised crosswalks should be constructed in concrete and match the height of adjacent curb. Transition slopes should be between 8 and 10%.

Pavement markings (Figure 3B-27 Option A) and signage (W11-2) for raised crosswalks should be installed according to MUTCD 11th Ed. A black-colored infill may be added between the chevron markings on the sloped portion of the raised crossing.

Considerations

Raised crossings should be well marked for drivers and for winter maintenance. There should be no more than a ¼" lip to accommodate plow blades. If raising a crossing will impact existing drainage patterns, additional stormwater design will be needed.

Exceptions

Raised crosswalks will not be feasible in locations with overhead height clearances of 13' or less. If a full height raised crossing cannot be implemented, Americans with Disabilities Act (ADA) compliant ramps will be necessary to ramp down to a partial height crossing or ramp down fully to the roadway surface. When raised crosswalks are not feasible, consider other treatments such as Curb Extensions (1.9) or Crossing Islands (1.10).

TREATMENT 1.2

High Visibility Crosswalk Markings

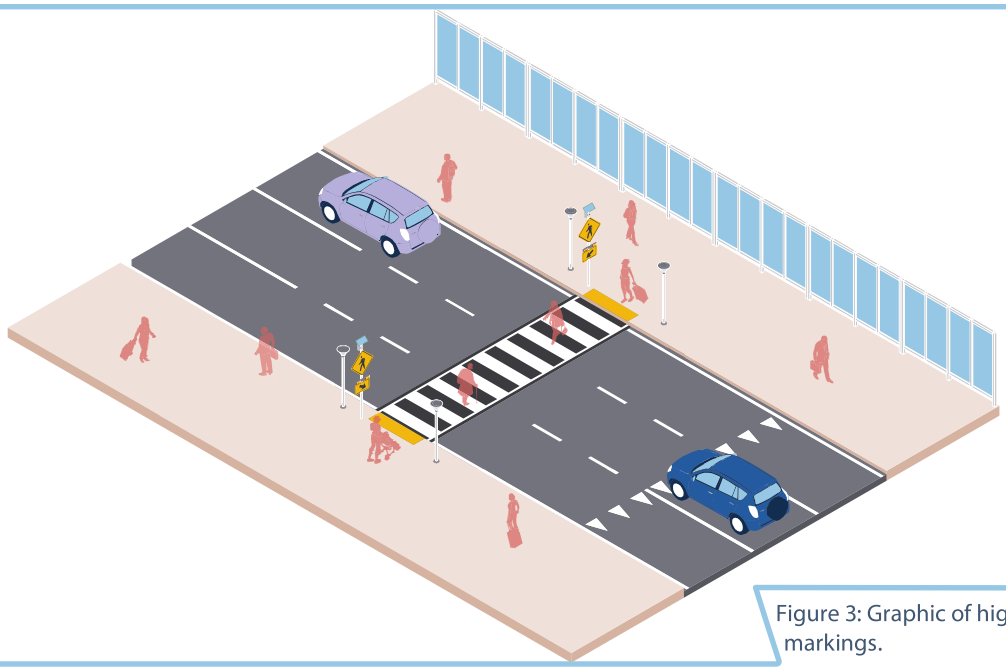


Figure 3: Graphic of high visibility crosswalk markings.

Description

Crosswalk markings that are highly visible, hold up to heavy traffic loading, and provide consistent awareness to drivers of the presence of pedestrians.

Purpose

To enhance the visibility and durability of marked crossings in all conditions. High-visibility crosswalk aim to increase awareness of pedestrians by using highly visible markings.

Design Directive

High visibility crosswalk markings are a standard requirement for all pedestrian crossings at Massport terminals. The ladder style crosswalk should always be used with Massport specifications: 12-inch crosswalk bars spaced 4-feet apart center-to-center, bordered by two 12-inch longitudinal lines.

Design Guidance

Crosswalks should be no less than 10 feet wide and should be equal to or wider than landing areas at either end. Markings should be white, retroreflective and of a durable and highly visible material. If applied on concrete or other light-colored surface material, a contrasting black border infill shall be applied between the crosswalk bars as well as 4-inch black border on the outer edge of the longitudinal crosswalk lines. To preserve high contrast, crosswalks should not be infilled with additional colors. If epoxy or methyl methacrylate (MMA), ensure the surface is clean and dry and the product is installed per the manufacturer's specifications. Epoxy is recommended. Crosswalk markings should be placed to avoid standard vehicle wheel paths.

Considerations

Crosswalks should be cleaned and repaired regularly to ensure visibility is maintained.

TREATMENT 1.3

Wide Curb Ramps

Figure 4: Raised crosswalk with detectable warning panel as wide as the crosswalk.

Description

Wider than standard curb ramps at typical crosswalks or wide crossing areas at raised crosswalks.

Purpose

Most crosswalks at airport terminals have high pedestrian volumes and must accommodate groups of people, those hauling luggage, strollers, etc. A wider curb ramp/crossing area is intended to provide safe access to and from the crossings for the wide variety of users at the airport.

Design Directive

All terminal crosswalks should be paired with curb ramps at least as wide as the crosswalk and no less than 8 feet wide, which is double the minimum Americans with Disabilities Act (ADA) required curb ramp width of 4 feet.

TREATMENT 1.4

Rectangular Rapid Flashing Beacons (RRFB)

Figure 5: RRFB with pedestrian crossing and arrow sign.

Description

A Rectangular Rapid Flashing Beacon (RRFB) is a Manual on Uniform Traffic Control Devices (MUTCD) 2023 approved pedestrian-activated flashing light system accompanying a standard pedestrian warning sign.

Purpose

RRFBs are intended to increase pedestrian conspicuity and driver awareness at unsignalized or mid-block crossings. This treatment is considered current best practice for pedestrian crossings.

Design Directive

RRFBs are standard for all Massport crosswalks within the terminal unless a design exception is granted. MUTCD-approved fluorescent yellow-green signage is standard.

Design Guidance

RRFBs should be solar powered where feasible and hard-wired where solar is not viable. RRFBs must be installed on the left and right side of the crossing and double-sided if on a 2-way roadway. MUTCD W11-2 and W16-7P signs should be installed with the pedestrian symbol and arrow oriented towards the crosswalk to emphasize that drivers should anticipate the direction pedestrian may be crossing from.

RRFBs may be push button and/or motion activated but must always include the push button to communicate audible information that the "flashing light are on." If the standard RRFB sign and light assembly cannot fit due to height restrictions, coordinate with Capital Programs on an alternate configuration.

TREATMENT 1.5

Yield “Sharks Teeth” Markings

Figure 6: Yield markings ahead of a crosswalk.

Figure 7: “Yield here to pedestrians” sign next to yield markings.

Description

Yield markings consist of a row of solid white isosceles triangles extending across all approach lanes and pointing against the flow of traffic.

Purpose

Yield markings indicate to motorists where they should yield when approaching a crosswalk.

Design Directive

Yield markings should be a standard treatment at all crosswalks.

Design Guidance

The Manual On Uniform Traffic Control Devices (MUTCD) provides guidance on a range of sizes and separation for these markings. The following should be used: base 2 feet wide, height of 3 feet, and spacing approximately 4 feet apart on center (3 per lane). They should be placed 20 feet away from the crosswalk.

Considerations

Yield lines be supplemented with “Yield here to pedestrians” sign (MUTCD R1-5).

Note

For typical urban roadway configurations, MUTCD R1-5 Advanced Yield Sign are placed in advance of uncontrolled crosswalks. For crosswalks at Massport terminals, these treatments are not recommended because of curbside sign clutter and the frequency that they would be blocked by curbside buses and other motor vehicles.

TREATMENT 1.6

Overhead Signage

Figure 8: Example of an R1-9 overhead "Yield to Pedestrian" sign.

Description

These signs are placed overhead above the crosswalk.

Purpose

Overhead signage takes advantage of overhead structures for sign installation. They provide additional high visibility communication to drivers about the presence of crosswalks.

Design Directive

Overhead signs should be used when overhead structures permit their placement.

Design Guidance

These are R1-9 signs placed overhead on the approach to the crosswalk encouraging motorists to yield to pedestrians at the crosswalk. They are better suited for terminal areas where there are larger motor vehicles such as buses or trucks where drivers will be able to see the overhead sign more clearly. They also provide an additional vantage point for motorists that are further away to see the sign and notice that there is a crosswalk coming up.

These signs should be applied with other treatments that increase pedestrian visibility (see Figure 1). Overhead signs should not have a height clearance of less than 13' (See 1.1 above for details). Lighting design should illuminate signage to improve visibility.

TREATMENT 1.7

Pedestrian Channelization

Figure 9: Pedestrian channelization fencing to direct pedestrians to cross at the crosswalk at Dubai Airport (Source: Google Maps).

Description

Pedestrian channelization are fences or railings that physically control where pedestrians can cross.

Purpose

Reduces pedestrians crossing at undesignated locations.

Design Directive

Pedestrian channelization devices are recommended in locations where there is no curbside activity adjacent to the crosswalk. It is also recommended in cases where pedestrians need to be directed through a singular point at the crosswalk to other destinations (such as parking garage, terminal entrances, etc.) in a safe manner.

Design Guidance

Channelization devices must be compliant with the requirements of Public Right of Way Accessibility Guidelines (PROWAG) for pedestrian detectability. Devices should be placed in a manner and be made of materials that are highly visible, cane-detectable, maintain required clear space, and are not easily by-passed.

TREATMENT 1.8

Enhanced Lighting at Crosswalk

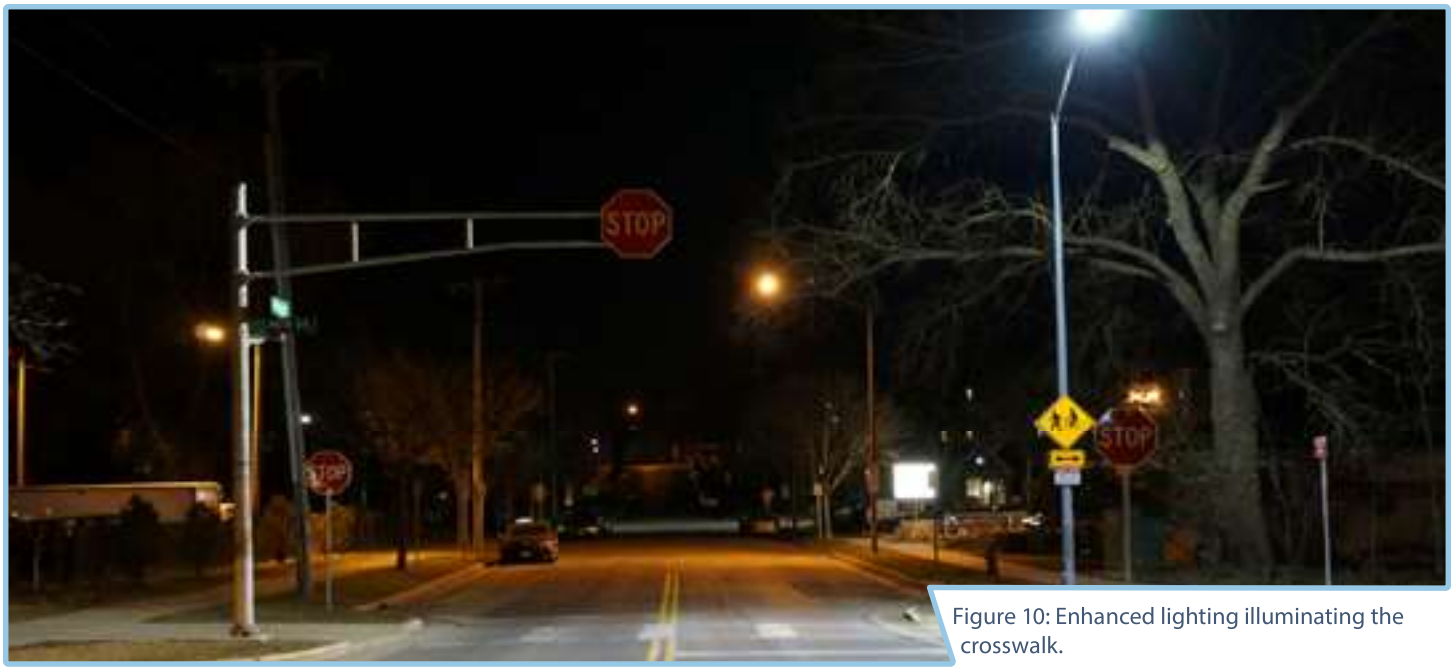


Figure 10: Enhanced lighting illuminating the crosswalk.

Description

Additional lighting specifically focusing on a crosswalk

Purpose

The goal of enhanced lighting should be to illuminate crosswalks and pedestrians with positive contrast to make it easier for a driver to visually identify the pedestrian. This involves carefully placing the luminaires in forward locations to avoid a silhouette effect of the pedestrian.

Design Guidance

Luminaires for crosswalk lighting should be placed at least 10 feet from the crosswalk to provide the recommended 20 vertical lux at the crosswalk. A lighting designer should confirm that chosen light fixtures can provide this level of light. Lighting designers should do a light study to determine the target number based on the actual location and exposure levels based on time of day. On airport roadways where there is traffic traveling in both directions and/or multiple lanes of one-way travel, two luminaires are required, located on either side of the road and placed prior to the crosswalk from the motorists' perspective.

Lighting elements must be combined with additional countermeasures in this toolbox; ideally paired with at least one other treatment from each Section to improve pedestrian safety. For example, combining enhanced lighting with a raised crosswalk (1.1 & 1.2), narrowed lanes (2.2) and transverse rumble strips (3.2) works to improve pedestrian visibility, limit their exposure to on-coming traffic and reduce the speed of traffic overall.

TREATMENT 1.9 A

Curb Extensions (Permanent)

Figure 11: A curb extension at a crosswalk.

Description

Curb extensions extend the sidewalk into the travel way at the location of a crosswalk on one or both sides.

Purpose

Shortens the distance pedestrians need to cross, improves sight lines between motorists and pedestrians, prevents parking in the crosswalk, and narrows the roadway which can reduce motorist speeds.

Design Directive

Curb extensions are a recommended treatment for at-grade crosswalks where there is pick-up/drop-off, parking or other activity along the curb. This treatment can bookend the curbside uses at the crosswalk to improve sight lines between all road users. It may also be applied in conditions where there is excess space in the roadway to give back more space to pedestrians and narrow travel lanes. Curb extensions are strongly recommended in parts of the airport where a raised crosswalk may not be feasible due to presence of overhead structures and height constraints (e.g. Logan Airport Terminal B).

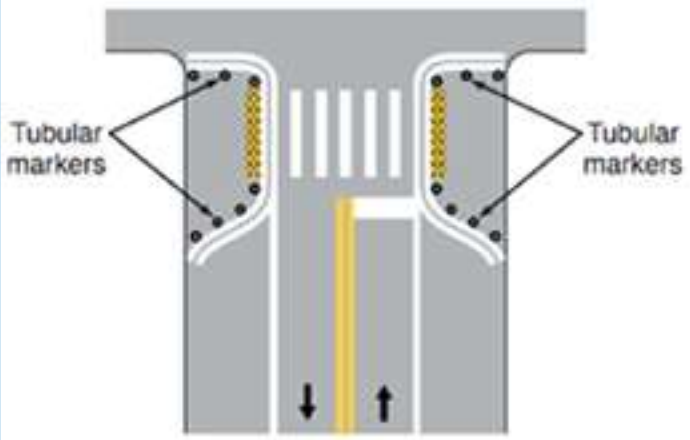
Design Guidance

Curb extensions should extend at least 20 feet away from crosswalks in order to ensure adequate visibility between pedestrians and parked vehicles. In bus loading areas, consider lengthening the curb extension beyond 20 feet to maintain sight lines around larger vehicles. The width of the curb extension may vary depending on the width of the existing pick-up/drop-off or parking lane along the curb. If building a curb extension will change existing drainage patterns, additional stormwater design will be needed.

A "no stopping" sign should bookend the curb extensions to indicate that motorists are not allowed to stop/park between the curb extension and the crosswalk. White vertical tubular markers (such as flexposts) should be placed to help reinforce no parking or stopping and to bring attention to pedestrian activity.

TREATMENT 1.9B

Curb Extensions (Quick Build)



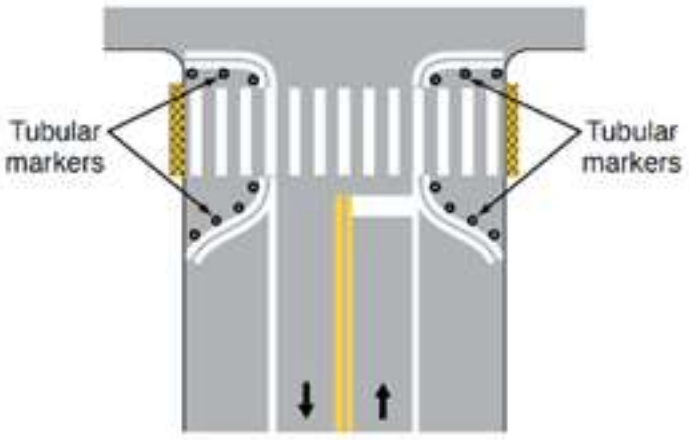


Figure 12: Quick build curb extensions. Left: shows detectable warning panels at the edge of the curb extension. Right: shows detectable warning panels at the curb edge. (Source: MUTCD)

Quick Build Option

Quick-build curb extensions can be installed using paint and vertical objects as a low-cost interim treatment. Vertical objects such as flexible delineators are necessary as paint alone is not sufficient to prevent motorist encroachment. Colored pavement is recommended in the curb extension, which may match the sidewalk color or be high-contrast with the surrounding materials. Manual on Uniform Traffic Control Deviced (MUTCD 11th ed.) presents two options (Figure 3J-6).

The preferred option is (a) placing the detectable warning panels at the interface between pedestrian zone and traffic zone is preferred (see above) which emphasizes the actual crossing distance for pedestrians from the curb ramp and to the edge of the painted curb extension.

(b) It is also permitted to leave the detectable warning panels at the curb edge (see left) and extend the crosswalk markings through the curb extension to the curbline.

Design Guidance

Quick build curb extensions should extend at least 20 feet away from crosswalks. The width of the curb extension may vary depending on the width of the existing pick-up/drop-off or parking lane along the curb or excess space in the roadway.

A "no stopping" sign should bookend the curb extensions to indicate that motorists are not allowed to stop/park between the curb extension and the crosswalk. Vertical elements like flexible delineators are recommended to ensure motorists do not park in the curb extension.

TREATMENT 1.10

Crossing Islands

Figure 13: Crosswalk with pedestrian crossing island.

Description

Pedestrian crossing islands are space for pedestrians between vehicular travel lanes.

Purpose

Pedestrian crossing islands provide space for pedestrians to wait as they cross a multilane road, reduce "multiple threat" crashes (one driver stops but second driver proceeds and hits pedestrian) by providing clear line of sight between drivers and pedestrians, and lower vehicle speeds because of physical narrowing. This is especially critical in environments with intensive drop off/pick up, distracted pedestrians and motorists, and tall motor vehicles like buses which are difficult to see around.

Design Directive

Crossing islands are to be used at all crosswalks where pedestrians are required to cross more than one lane of traffic and where space permits.

Design Guidance

Islands should be at least 4 feet wide. The cut-through must include detectable warnings if an island width is wider than 6 feet. Raised islands are recommended where feasible. Painted islands with vertical barriers may also be implemented as an interim measure or if there is not enough space to build a raised island. Painted islands, while not accessible, can provide some space for pedestrians to wait and provides horizontal deflection to make motorists slow their speeds as they approach.

Considerations

Massport roadways with two or more lanes may not have sufficient space to provide a crossing island.

TREATMENT 1.11

In-Roadway Yield Signs

Figure 14: MUTCD R1-6 In-roadway yield sign in the middle of the painted median.

Description

These are yield signs, placed in the roadway between travel lanes.

Purpose

In-roadway yield signs increase yielding behavior of drivers, slow down drivers by narrowing the roadway, and prevent any lane changes for motor vehicles encroaching onto the crosswalk.

Design Directive

In-roadway yield signs shall be used at all crosswalks at all locations where there are two or more lanes for pedestrians to cross.

Design Guidance

These MUTCD R1-6 signs are placed within the roadway in between travel lanes or in a median to remind motorists to yield to pedestrians at the crosswalk. These can either be permanently mounted in-ground (preferred) or on a movable pedestal (very often are improperly moved to the sidewalk and not returned to their proper location). These signs should be applied with other measures such as raised crosswalks and curb extensions to increase visibility of the sign and crosswalk.

Considerations

Note that the R1-6a "Stop" version is not permitted in Massachusetts. Signs will be most effective in environments that encourage low speed travel.

SECTION 2

Roadway Considerations

TREATMENT 2.1

Fewer Lanes

Figure 15: 4-lane to 3-lane lane reduction in Orlando, FL. (Source: FHWA)

Description

Reducing the number of lanes of a roadway from its existing configuration.

Purpose

Having fewer lanes reduce potential conflict points for pedestrians, shortens pedestrian crossing distance, provides space for crossing islands, and can lower motorist speeds.

Design Directive

Reducing the number of lanes should be considered on multi-lane roadways as long as additional traffic analysis shows that doing so will not result in any queues backing up into the main roadway.

Design Guidance

There are several metrics that outline when a lane reduction may be effective, especially the reduction of lanes from 4 lanes (2 lanes per direction) to 3 lane configurations. Additionally, at intersections, there are metrics used to inform considerations for having fewer lanes including roadway characteristics, vehicular volumes and speed, vehicular Level of Service, queue lengths, and more.

At airport terminals, since the conditions are different than typical roadways and intersections, additional analysis is needed to assess congestion and length of queuing that may develop if the number of lanes are reduced.

Considerations

The number of lanes should not be reduced to the point where traffic congestion backs up into the main roadway; therefore, consideration of the whole roadway network is needed when assessing these design decisions.

TREATMENT 2.2

Narrow Lanes

Figure 16: Road narrowed with striping at shoulders and allocated space for a painted median, Cambridge, MA.

Description

Lane widths should be as narrow as possible.

Purpose

Narrow lane widths reduce vehicle speeds by visually narrowing the roadway. They shorten pedestrian crossing distance and potentially provide enough additional space for a crossing island.

Design Directive

Lanes should be narrowed to 10 feet where only passenger vehicles operate and 11 feet where buses/ heavy vehicles operate at all Massport roadways. Lanes narrowing should be prioritized on approach to crosswalks.

Considerations

Wider curbside drop-off lanes may be used to allow for safer use of the left-side vehicle doors at terminals where there is pick-up and drop-off activity. Any additional space available after meeting 10-foot or 11-foot lane widths should be allocated to the sides as shoulders, with diagonal striping to help visually narrow the roadway.

This shoulder space provides opportunities, in the long term, to be reallocated as sidewalk space or as a curb extension and/or as a crossing island, giving more space to pedestrians.

TREATMENT 2.3

Restricted Lane Markings

Figure 17: BUS ONLY lane markings and red-colored pavement to mark a bus lane in Austin, TX.

Description

Lanes designated for different vehicles and lane types using pavement markings.

Purpose

Lane use markings serve as a visual cue that is located directly in front of drivers. It can improve traffic flow and reduce confusion on where drivers need to go.

Proposed Design Directive

Lane restriction should be applied where there are mode-specific lanes (e.g. "bus only" lanes) and/or where are there direction-specific lanes (e.g. "through only" lanes)

Design Guidance

Lane color and stencil pavement markings should be used to emphasize restricted or designated use lanes in a consistent manner. This can include red-colored pavement for bus only lanes or green-colored pavement for bike lanes as discussed in the 11th Edition of the MUTCD. These markings must also be supplemented with signage (MUTCD R3 Series) to position vehicles to the desired lane.

TREATMENT 2.4

Hardened Lane Separation

Figure 18: Bike lane separation using a combination of precast concrete barriers and flexible delineators in Boston, MA.

Description

Vertical elements separating lanes.

Purpose

Prevents drivers from merging or pulling over to the curb/terminal. Keep drivers out of lanes they are not supposed to be in and reduce speeds as the vertical elements visually narrow the travel lane.

Design Directive

Hardened lane separation should be used whenever there are through-only lanes for passenger vehicles. It should be combined with restricted lane markings to denote use for passenger vehicles on a through-only lane. Since Massport operations are often dynamic and may need to be changed, temporary materials like flex posts are recommended to allow for adjustments or relocations.

Considerations

Consider materials that would be less damaging to the vehicle should it run over the vertical separator. Temporary materials are adjustable if needed to address any concerns about damage.

Design Guidance

Temporary materials may include flexible delineators, precast concrete barriers to provide physical separation between lanes. Barriers and delineators should be anchored to the roadway so that they affixed to the ground. However, both barriers and delineators can be removed or relocated, if needed. Flexible delineators have reflective taping and precast concrete curbing have reflective material on the edges that should match the corresponding lane lines that they supplement (e.g., white or yellow). Other temporary devices typically used in work zones and/or for construction (e.g. orange traffic cones or barrels) are not recommended to be used for hardening the lane. Hardening will be supplemented with signs to position motor vehicles to the desired lane (MUTCD R3-series with modifications).

TREATMENT 2.5

Speed Humps

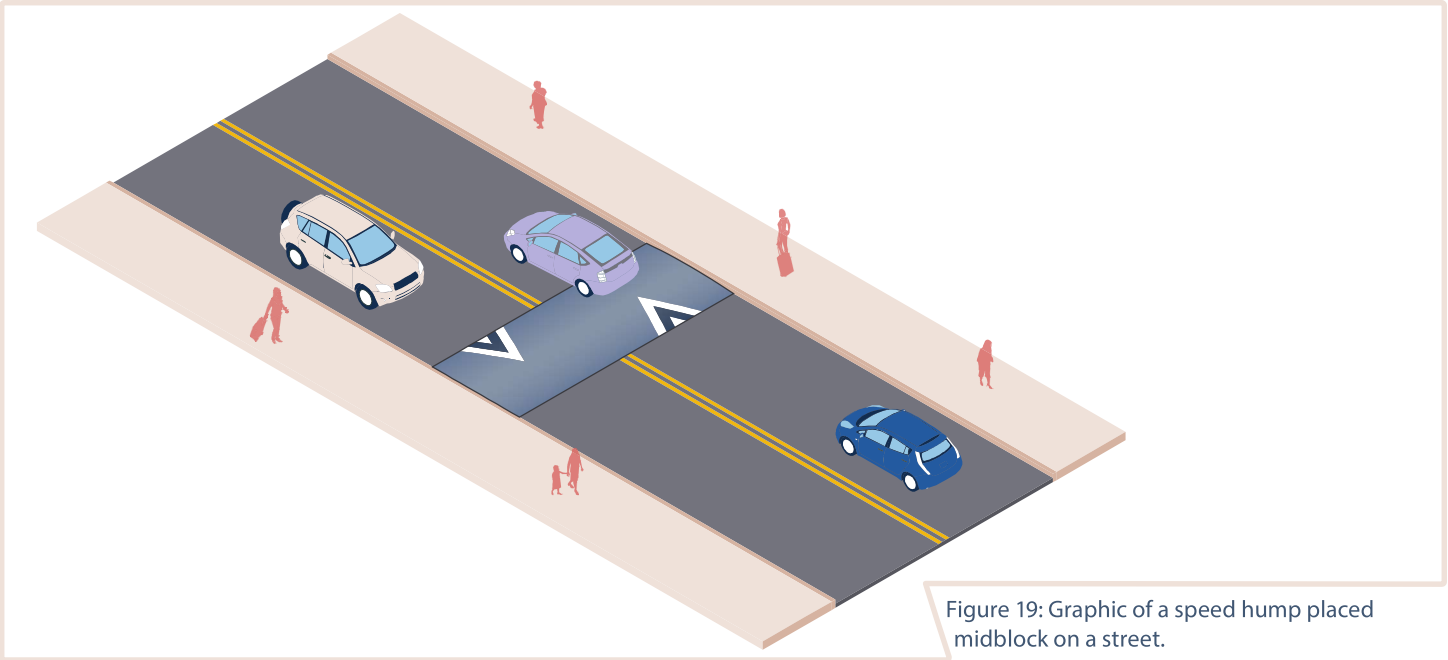


Figure 19: Graphic of a speed hump placed midblock on a street.

Description

Speed humps are gradual mounds of asphalt built into the pavement as vertical deflection to slow motorist speeds.

Purpose

Speed humps in advance of crosswalks reduce vehicle speed. This is particularly important during non-congested times when it is easy for drivers to operate at higher speeds.

Design Directive

If it is feasible to implement a raised crosswalk to reduce speed, it should be prioritized as per Section 1.1. When raised crosswalks are not considered feasible, speed humps should be installed in a series to reduce motorist speeds as they approach the crosswalk.

Considerations

Speed humps should be located to avoid conflict with underground utility access and drainage structures. They should not be placed in front of driveways. Speed humps should not be installed if the design speed for the roadway is more than 30 mph.

Design Guidance

Speed humps should be about 3 inches in height at their center, and 12-18 feet wide. Speed humps shall be installed in a series and generally placed between 150 and 250 feet apart. When midblock crossings are present, a speed hump should be placed no more than 50 feet ahead of the crosswalk. This ensures that motorists do not start speeding as they approach all the crosswalks in the series. Speed humps should be placed 150 feet from an unsignalized intersection, or 250 feet from a signalized intersection. Speed humps should be accompanied with "speed hump" signs (MUTCD W17-1) to provide advance notice to the plow drivers to lift their blades for snow clearance.

Exceptions

Raised crosswalks will not be feasible in locations with overhead height clearances of 13' or less.

TREATMENT 2.6

“SLOW XX MPH” Markings

Figure 20: “SLOW” markings followed by speed limit to convey to motorists to slow to an appropriate speed.

Description

In-lane pavement markings that communicate to motorists to slow to a posted speed or a speed fitting the context of the roadway.

Purpose

Visual queue for motorists to slow down to a design speed fitting the context of roadway at the airport.

Design Directive

“SLOW XX mph” epoxy pavement markings should be considered on all lanes when there is a need to slow motorists down to a set design speed. The desired speed should be determined by Massport internally and may vary by location.

This treatment should be implemented together with speed feedback signs and speed limit signs as transitional elements to emphasize a need for reduction in speed. These markings shall not be applied in the terminal area as they may compete with existing markings used for wayfinding.

SECTION 3

Transition: Roadway to Terminal

TREATMENT 3.1

Narrow Lanes

Figure 21: Road narrowed with striping at shoulders and allocated space for a painted median in Cambridge, MA.

Description

Lane widths should be as narrow as possible.

Purpose

Narrow lane widths reduce vehicle speeds by visually narrowing the roadway and can be an effective geometric treatment for drivers approaching the terminal from the main roadway.

Design Directive

Lane widths of 10 feet where only passenger vehicles operate and 11 feet for where buses/heavy vehicles operate should be standard requirements for all Massport roadways.

TREATMENT 3.2

Transverse Rumble Strips

Figure 22: Transverse rumble strips on approach to terminal at Dane County Regional Airport in Madison, WI (Source Google Maps).

Description

Transverse rumble strips are grooves cut into the pavement that act as a warning device. When driven over, the strips produce sounds and vibrations to warn drivers that they need to slow down.

Purpose

Transverse rumble strips can alert drivers to slow down on the approach to the terminal, indicating a change in environment to slow down.

Design Directive

Transverse rumble strips should be placed on all lanes in a series as motor vehicles approach the terminal. This treatment should be implemented together with speed feedback signs and speed limit signs as transitional elements to emphasize a need for reduction in speed.

Considerations

Transverse rumble strips should not be installed within the terminal since they are noisy. They are also not appropriate on sharp horizontal or vertical curves or along a bridge deck.

Design Guidance

Transverse rumble strips are placed perpendicular to the direction of traffic. They may be placed in a series with typical spacing between strips between 50-100 ft.

At the airport, the transverse rumble strips are not meant to provide a visual cue and should and instead, intended to provide vibrations and auditory signal regarding the upcoming change in environment. Milled rumble strips are recommended over raised rumble strips since raised rumble strips make snowplow operations difficult.

TREATMENT 3.3

Speed Limit Sign

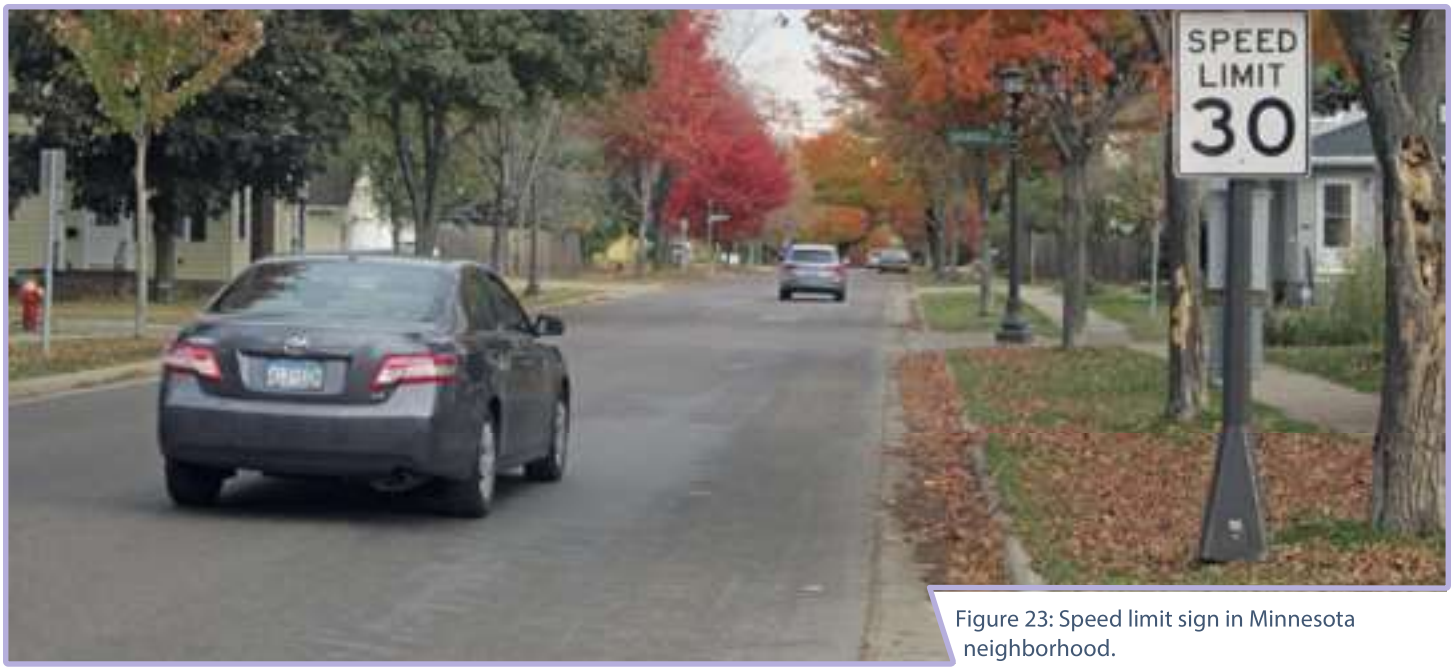


Figure 23: Speed limit sign in Minnesota neighborhood.

Description

Speed limit signs communicate the design speed of a roadway.

Purpose

To communicate the appropriate speed to drivers.

Design Directive

XX MPH speed limit signs should be placed at the entrance to all terminals when a driver exits off the main ring roadway. The desired speed limit should be determined by Massport internally and may vary by location.

Considerations

Speed limit signs have historically been proven far less impactful on operating speed than physical speed control methods. As such, the speed limit sign should be placed with all other measures defined in Section 3.

TREATMENT 3.4

Speed Feedback Sign

Image left blank intentionally.

Description

Speed feedback signs provide real-time speed feedback to drivers.

Purpose

When confronted with their own speed, drivers better comply with posted speed limits. These are paired with speed limit signs. They are particularly useful during non-congested times to draw attention to speeding.

Considerations

These treatments are relatively inexpensive and can help to address localized speed issues. They can run on wired power or solar powered batteries.

Design Guidance

Per the 11th Ed. of the MUTCD Section 2c.13, the signs should be black text on a yellow background.

SECTION 4

Traffic / Crossing Control

TREATMENT 4.1

Traffic Signal and Stop Sign

Figure 24: Traffic signal at a crosswalk at Singapore Changi International Airport (Source: Google Maps).

Description

Traffic signals and stop signs formally control the flow of traffic by requiring that drivers stop completely.

Purpose

Provides a complete stop for drivers instead of a yield condition.

Design Directive

A traffic signal or stop control may be considered if there are benefits for drivers to come to a complete stop instead of just yielding to pedestrians. Additional study would be needed to assess the need.

Design Guidance

A traffic signal at crosswalks with pedestrian signal heads and push button is a traffic control measure typically used in locations where throughput of motor vehicles needs to be prioritized and/or high volume or speed of vehicles create unsafe pedestrian crossing conditions.

A stop sign with a stop bar is a traffic control measure used to indicate that vehicles are always required to stop instead of yielding at crosswalks. Additional study and data collection is necessary and at least one MUTCD warrant for traffic signal and/or stop sign must be met.

A traffic signal may be pedestrian-actuated, pre-timed, or motion-activated. Push buttons must provide audible and vibrotactile feedback, per PROWAG. A stop sign may be installed at locations where it serves as an interim measure to control traffic while arrangements are made for the installation of a traffic signal.

Considerations

Installation of traffic signals or stop signs should not be used as a speed control measure, but rather as a way of communicating right-of-way when other treatments have proved to be ineffective.