10.0 Recommended Transit Guidelines

10.1 Introduction

The bus stop is the first point of contact between the customer and the bus service. The location, design, and functionality of bus stops significantly influence transit system performance and customer satisfaction. The following sections include guidelines for designing bus stop improvements along the Route 1 corridor in Saco and Scarborough, including bus stop spacing, placement, and configuration, ADA requirements, pedestrian safety and connectivity, signs and other streetscape elements, such as rider amenities. The guidelines provided in this section are based on a variety of sources including the 2010 American Disabilities Act (ADA) Standards for Accessible Design, the National Association of City Transportation Officials (NACTO) Transit Street Design Guide, the American Association of State Highway and Transportation Officials (AASHTO) Guide for Geometric Design of Transit Facilities on Highways and Streets, the Federal Highway Administration (FHWA) Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts Report, and New England transit providers in Rhode Island and Massachusetts. Graphics are primarily sourced from the Rhode Island Bus Stop Design Guide.

The figure on the following page demonstrates the various steps involved in creating the ideal bus stop. The majority of these elements can be applied to stops along Route 1. If each of the components of the bus stop design cannot be incorporated, it may mean that an alternate location for the stop may need to be identified.
1. Distance to Last and Next Stop
   - Major/Sensitive Transit Generator(s)

2. Placement at the Intersection – far-side, near-side, mid-block or off-street
   - Configuration & Traffic and Parking Impacts – curbside, curb extension or pull-out
   - Site Condition Assessment
   - Bus Stop Audit

3. ADA Accessibility
   - Signs
   - Striping

4. Rider Amenities – shelters, benches etc.
   - Streetscape
   - Bicycle Accommodations
   - Bus Priority Measures

If all components cannot be provided a new location may be required.
10.2 Bus Stop Spacing

Appropriate spacing of bus stops helps maintain service flow and reliability. Determining stop spacing involves striking a balance between locating stops close enough so that riders have a short, convenient walk, while minimizing the number of times the bus has to stop to provide the most efficient service. While the dwell time (the time a bus spends at a scheduled stop without moving) to board and alight passengers generally remains constant regardless of the number of stops, the deceleration time entering stops and accelerating time exiting stops can be reduced with fewer stops. Optimal stop spacing is more or less equidistant and maximizes efficiency of the service. For suburban and central business district environments, such as Route 1, there should be an average of 4-5 stops per mile, such that the average distance between stops is around 1,000 to 1,300 feet, where transit trip generating land uses are located.

Location of stops in pairs makes the service easier and more predictable to use, and stops are easier to maintain. Stop pairs serving routes in opposing directions should ideally be situated across the street from each other, but in a staggered position, so riders can easily locate the stop for their return trip.

10.3 Bus Stop Placement

There are 3 general placement options for bus stops along a roadway, as depicted in the image above:

1. Near-side: located before an intersection crossing.
2. Far-side: located after an intersection crossing.
3. Mid-block: located in between two intersections.

Some key advantages to far-side stops are:

- Crosswalks are located behind the stop, encouraging pedestrians to cross more safely behind, and not in front of a bus.
- Passengers are encouraged to leave by the rear door, since it is closer to the street corner, and as a result loading and unloading time is reduced.
- At signalized intersections, bus drivers can utilize opportunities in the signal phasing and gaps in traffic flow to reenter the travel lane.

Minimizes sight-distance problems on approaches to intersection, including visibility of traffic control devices. The stopped bus does not obscure sight distance to the left for vehicles entering or crossing from the side street.

However, far-side stops in a travel lane have the potential to cause vehicles to obstruct the intersection if general traffic is held up behind a stopped bus.

Near-side stops can be useful in the following scenarios:

- At stop-controlled intersections to reduce the number of times the bus needs to stop.
- If there is a large trip generator on that side of the intersection.
- If a shared stop is desired to facilitate through and right turning bus movements.

However, right turning vehicles and through moving buses have the potential to be in conflict with each other at near-side stops. Further, buses have the potential to be stopped twice: once serving the stop, and again for the traffic signal.

Mid-block stops are located somewhere along a block, usually between two intersections or large commercial access driveways. Mid-block stops are generally discouraged unless accompanied by a safe pedestrian mid-block crossing.

10.4 Bus Stop Configuration

While the stop placement generally determines how buses approach stops and engage with traffic operations, the physical configuration of stops impact how riders interact with the transit system, and how it integrates with the streetscape and surrounding environment. There are essentially two different types of bus stop configurations that should be considered on Route 1:

1. Curbside in a travel lane or shoulder
2. In a pull out

Curbside bus stops are located adjacent to the roadway’s existing curb line and entail the bus stopping in the travel lane or shoulder, as illustrated in the images below. Buses stopping in a travel lane, including a bike lane, or shoulder, eliminate the need for the bus to merge in and out of traffic, which improves service reliability and travel time. However, it may cause the bus to temporarily block other vehicles.

Bus stops in right turn lanes are generally discouraged to prevent conflicts with vehicles that may utilize the adjacent travel lane and cut in front of a bus, a movement that is not always visible to bus drivers. It is more appropriate to have a near-side bus stop in a travel lane if right turns are prohibited, such as at an intersection where the cross street to the right is a 1-way approaching the intersection.

An alternative to curbside stops that can further enhance the rider/pedestrian/bicycling environment or provide more priority for transit operations is a pull out (also referred to as bus bays, turn outs, or cut outs), which is illustrated in the figure below. A bus pull out allows buses to stop without impeding traffic flow by pulling into a bus stop ±1, on the side of the roadway, indented into the sidewalk, and out of the main travel lane. They are most appropriate along higher speed suburban/rural roadways, or where there are extended dwell times, such as at a layover location or at commercial establishments such as a grocery store or mall when boardings can be slower with passengers carrying packages. Passenger safety is improved by providing more distance between the boarding and alighting area and moving traffic.

Although there are clear benefits of buses pulling out of the travel lane, pull outs can also delay bus service, as buses may have to wait for a gap in traffic in order to re-enter the travel lane. Delay for buses re-entering traffic may
occur on roadways where traffic exceeds 1,000 vehicles per hour per lane. Pull outs also reduce the sidewalk space at a stop, which can have a negative impact on the passenger waiting area and incorporation of amenities at stops. They are typically constructed when there is a wide right-of-way available, or the abutting property owner provides an easement for the construction of the sidewalk and/or pull out.

When constructing a bus stop adjacent to a sidewalk level bike lane or shared or multi-use path, the bike lane/path should be diverted behind the bus stop, to minimize conflicts between bus riders, and bicycle riders, to create a bus island (also referred to as a floating bus stop or bus stop bypass). See image below for an illustration of this configuration.

Transit riders are pedestrians before and after they ride the bus. Pedestrian connectivity at, within, and beyond a bus stop is an essential component of providing bus service. Basic pedestrian elements of a bus stop include:

- A clear and level bus stop boarding and alighting area (the landing area, also referred to as a landing pad) at the accessible door(s) of the bus
- A clear z1 at any additional bus doors, and
- A clear path of travel to the sidewalk and bus stop amenities.

Landing areas and clear z1s should be laid out to accommodate the bus fleet servicing the stops being planned or evaluated.

Audits of existing bus stop conditions and features should be undertaken to identify major deficiencies and barriers to accessing bus stops. The audit process will also help identify the type of bus stop improvements needed at each stop, prioritize or target areas with major and minor deficiencies, and help communities be ready to engage in the design process as roadway projects are initiated.

A landing area consists of a continuous, unobstructed z1 contiguous to the curb and to the street. The minimum dimensions allow deployment of the bus access ramp and allow customers using mobility devices to board or alight the bus. The ADA requires that a minimum width of 5 feet along the curb, and a minimum depth of 8 feet perpendicular to the curb, be provided at the landing area, to the extent feasible and within the control of the transit provider. In areas where there is vegetation, including grass strips and esplanades, 10 feet along the curb is preferred. The landing area should be a firm, stable surface, with a maximum 2% cross slope. Parallel to the roadway, the landing area should match the roadway running slope to the maximum extent practicable.

The landing area should be concrete, ideally, although asphalt is routinely used on less travelled walkways. Brick sidewalks or brick patterns integrated with concrete sidewalks are not desired due to leveling and maintenance concerns. The landing area cannot encompass uneven or rough surfaces, such as a grass strip or tree pit, or contain dirt or gravel, or be located in a driveway. No amenities including sign posts, shelters and benches, can be installed within the landing area.

Low curbs, or areas without curbs, pose accessibility challenges for the elderly, persons with mobility impairments, and passengers with strollers. At the landing area, the vertical step between the sidewalk and the bus (or bus ramp) must not exceed 5/8 inch, with a maximum horizontal gap of 3 inches. To minimize the vertical gap and for near-
level boarding, the ramp must not rise more than 3 inches or exceed 1:8 slope\(^2\).

**Clear Z\(^1\)**

For second or rear door passenger activity, bus stops should also have clear Z\(^1\)s (see image below for illustration). The clear Z\(^1\) is a clear and level landing space located where the second or back doors (not the accessible door) of the bus open onto the sidewalk. The clear Z\(^1\) should be free of driveways, curb ramps and obstructions such as utility poles, hydrants, and other street furniture, including shelters.

The critical path of travel at a bus stop is the connection between the landing area and the sidewalk and bus shelters. The ADA requires that there be an accessible route between these elements, as depicted in the figure above. This means that a continuous, clear, unobstructed, ADA compliant path of travel must be provided. To the extent feasible this accessible path of travel should be provided to other bus stop amenities as well.

The ADA requires that bus stop boarding and alighting areas shall be connected to streets, sidewalks, or pedestrian paths by an accessible route. Sidewalks that provide adequate access will not only be connected to the stop, but will also be connected to a sidewalk network, and so an accessible path of travel may consist of walks and sidewalks, curb ramps and exterior pedestrian ramps, or a combination of these elements. Sidewalks at bus stops should also be free of vegetation that can narrow the path of travel along the sidewalk. The path of travel through the stop should be maximized to the extent feasible, while meeting other bus stop design requirements and guidelines.

Horizontal clearances are particularly important at bus stops where there are a lot of pedestrian movements in a variety of directions. Dimensions of a typical pedestrian path of travel through a stop are depicted in the below figure. Sidewalks at bus stops should also be free of vegetation that can narrow the path of travel along the sidewalk. Vertical clearance should be a minimum of 7 feet (84 inches) above the ground for signs and 80 inches for the shelter.

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\(^2\) NACTO 2016 (FTA 2007)
10.6 Bus Stop Signage and Information

Signs serve as a source of information to customers and bus drivers regarding the location of the bus stop, can function as a reference point for the landing area and are an inexpensive and obvious marketing tool to promote transit use. The bus stop can be the customer’s initial point of access to the system and as such should inform customers that they are at the correct location to catch a specific route in a specific direction. Bus stop customer information may include route information, system and neighborhood maps, wayfinding information, and schedules (real-time or hard copy display, such as the Southern Maine Transit Tracker shown below), and general service information.

Bus stop signs may be considered for framing to coordinate with other street furniture and provide more context sensitivity in historic or beautified neighborhoods and downtown areas as depicted in the image below. Bus stop signs should be retroreflective to increase visibility for bus drivers and customers in the dark.

10.7 Lighting

Passengers feel more comfortable, safe and secure at bus stops when they are well lit. Lighting also helps bus drivers and other drivers see waiting passengers. Bus stops can be adequately lit by surrounding overhead street lighting, back lit signs or as part of a bus shelter structure, or they may require additional lighting. Lighting installed at bus stops should be pedestrian scale with lamps less than 25 feet high (see image below) and be proximate to the passenger waiting area. The potential negative impacts of increased lighting to abutters of bus stops should be considered. This issue can be mitigated by installing dark sky friendly light fixtures that minimize light glare upward into the night sky and are more appropriate for stop-specific lighting. Light sensors could also be considered, thereby limiting the activation of lighting when there is passenger activity at a stop.

10.8 Amenities

Shelters

Shelters at bus stops can help increase the visibility of a stop, be used to incorporate various forms of rider information, protect passengers from weather elements, and provide protected seating, and additional lighting. Benches should be integrated into the shelter design, or the design of the shelter should be able to accommodate the addition of a freestanding bench. All aspects of the shelter design shall meet ADA requirements, including but not limited to access points between panels, clearance and circulation space within the shelter, and seating. Art may be integrated, and the shelter tailored specifically to the stop location or community.
Seating

Benches
Benches may be installed as stand-alone (freestanding) seating at a bus stop or added as a separate element underneath or integrated into a shelter. Freestanding benches are a relatively low-cost bus stop amenity that can provide riders with some level of comfort, especially on bus routes that do not run very frequently, and at bus stops that have lower ridership, where a more substantial investment in a bus shelter may not be viable. Benches are relatively simple to install and more easily accommodated on narrower, constrained sidewalks, and where a shelter might not be feasible.

Stools and Leaning Rails
As a unique alternative to typical freestanding benches, 1, two or more stools may be considered at low ridership stops or where there are narrow sidewalks. Stools may be freestanding or may be attached to the bus stop sign post.

Leaning rails may also be used in place of traditional benches. They are particularly useful at floating bus stops as they help establish a narrow barrier between the bus island and the bike lane behind it, deterring riders from crossing the bike lane in non-designated spots.

Stools and leaning rails both increase rider comfort, while deterring loitering at bus stops.

Seating Placement
The orientation of seating is an important factor in placement. Having an unobstructed view of an oncoming bus is critical for waiting passengers, so shelters or trees within the line of sight should be avoided. The back of sidewalk generally provides the safest, driest and best view for riders waiting on a bench, but 5-foot clearance also needs to be provided (4-foot wide path of travel should be maintained through the bus stop for ADA access, with an additional 1-foot of space required for knee and toe clearance). They are also less likely to be buried in snow banks, compared to seating position closer to the curb.

Trash and Recycling Receptacles
The addition of trash/recycling receptacles, and or trash/recycling solar compactors is important, particularly at higher ridership stops, at stops within commercial areas and retail centers, and stops with shelters. Trash accumulation can be problematic at shelters as they can catch wind-blown debris, but the addition of trash receptacles alongside shelters should help keep the overall buildup of trash to a minimum. A regular open container trash receptacle is ideal for lower ridership stops. Ideally trash receptacles should be accompanied by recycling receptacles, with a similar but slightly different style. Multicompartment receptacles may also be considered. Trash containers should be sited in shady areas away from seating areas, but in close proximity to boarding/alighting areas. Solar powered trash compactors should be placed with access to sunlight. All trash containers should also be located where they will not inhibit or obstruct accessible boarding/alighting or sidewalk usage. Public works maintenance tends to prefer them to be located next to the curb, although site conditions may require them to be located at the back of sidewalk. The minimum sidewalk width required to accommodate a trash receptacle is 7.5 feet.
10.9 Connectivity

Connectivity to bus stops is a crucial aspect of bus stop design. If passengers cannot physically get to a bus stop, they may choose not to use the service.

Pedestrian Connectivity

Ideally, the sidewalk at a bus stop connects to a surrounding sidewalk network, providing access to riders’ origins and destinations. It is important to place priority on creating sidewalks adjacent to bus stops to provide this basic level of safety and comfort for passengers.

Pairs of stops should ideally be connected via a crosswalk so that riders have safe crossings for both directions of their trip. ADA compliant curb ramps should be on each side of the crossings. Enhanced crossing treatments such as curb extensions, pedestrian refuge islands, raised crosswalks, and hybrid or flashing beacons may be warranted at specific locations, especially where there are high pedestrian volumes, limited sight distance, or high speeds. These treatments reduce the crossing distance and/or increase pedestrian safety for riders.

Bus stops should not be isolated or located on an island, on unpaved areas, or where there is a solid platform or pad, but no connecting sidewalk. Pedestrians are likely to feel stranded and potentially unsafe if a bus stop is located in the middle of moving vehicles, or between two driveways, especially those that are heavily utilized.

10.10 Other Considerations

Sidewalk treatments can be used at bus stops to provide contrast with adjacent surfaces and additional emphasis on the stop, making stops more visible, safer and accessible for riders, especially seniors and persons with disabilities. Treatments may include colored concrete, textured sidewalks, pavers, truncated domes/detectable warning strips, tactile edged curbing, or simply altering the pattern of the sidewalk panels, as shown in the image below.

Raising the sidewalk at the bus stop from the rest of the sidewalk could also be considered to provide a more level boarding/alighting procedure. By reducing the step height, it makes it easier for all riders, but notably seniors or persons with mobility impairments, to step on and off the bus. This treatment has been applied in the Dublin example in the image.
Sidewalk and Edge Treatments

1. Painted or in-mix colored concrete. (Oakland, CA)

2. Brick edge between the sidewalk and the curb distinguishes the bus stop zone. If the sidewalk is brick, altering the pattern can also provide distinction. (Dublin, Ireland)

3. Textured sidewalk with features to designate the boarding area. (Brisbane, Australia)

4. Tactile warning strip. (Puget Sound, WA)

5. Alternative curb design that could be angled at the face of curb and or tactile treatment at top of curb. (Dublin, Ireland)
11.0 General Access Management Recommendations

Highways are principal transportation routes that accommodate many different types of trips, among them longer distance trips between towns and other distant destinations. Because they are the primary corridors for longer distance automobile and truck travel, highways are often designed to move traffic quickly. Nonetheless, many highways (with the exception of Interstate Highways, the Maine Turnpike, and other fully access-controlled routes) also provide access to abutting parcels to various degrees. Therefore, maintaining the efficiency and safety of highways is in part related to existing and proposed land use activity along those highways and how access to such activity is managed.

The frequency, location and configuration of access points (i.e., driveways or entrance roads) influence many aspects of a highway’s performance and character. Access points, particularly those requiring left turns, can disrupt traffic flow and increase the potential for crashes. In densely developed areas with frequent access points, trips entering or exiting the highway can worsen congestion and increase crashes. In less developed areas where posted speeds are high, occasional turning vehicles can be unexpected and crashes can be more severe. Management of how access is provided can address these safety and congestion issues, and also help communities preserve rural or historic character where appropriate to do so.

While the MaineDOT administers an access management program outside a municipality’s urban compact area, ultimate responsibility and authority for the implementation of land use and access management in Maine lies primarily with the municipalities. This Section includes an introduction to access management and examples of best-practices solutions. Specific access management recommendations were identified for each corridor segment and discussed previously.

Introduction to Access Management

Access Management is a set of techniques used to preserve highway capacity, manage highway congestion and reduce crashes. Examples include:

- Traffic signal spacing;
- Driveway location, spacing, and design;
- Use of service and frontage roads; and
- Land Use policies that control right-of-way access to highways.

Specific benefits of Access Management include:

- Preserve integrity of the roadway system
- Improve safety and highway capacity
- Extend functional life of the roadways
- Preserve public investment in infrastructure
- Preserve private investment in properties
- Provide a more efficient (and predictable) motorist experience
- Improve “thru” times through a corridor
- Improve aesthetics (less pavement, greener)

Restrict the number of driveways per lot

Restrict the number of driveways to one per parcel (or two one-way driveways), with special conditions for additional driveways. Lots with larger frontages, or those with needs for separate right and left-turn entrances, could be permitted more than one driveway, in accordance with driveway spacing standards. (MaineDOT does limit one driveway per lot).

Locate driveways away from intersections

Setting driveways and connections back from intersections reduces the number of conflicts and provides more time and space for vehicles to turn or merge safely across lanes. This spacing between intersections and driveways is known as corner clearance. Adequate corner clearance can also be assured by establishing a larger minimum lot size for corner lots.

Connect parking lots and consolidate driveways.

Internal connections between neighboring properties allow vehicles to circulate between businesses without having to re-enter the major roadway. Joint and cross access requirements can help to assure connections between major developments, as well as between smaller businesses along a corridor. Cross access also needs to be provided for pedestrians. Sidewalks are typically placed far away from buildings on the right-of-way of major roadways or are not provided at all. Pedestrians prefer the shortest distance between two points and will walk if walkways are provided near buildings. Joint and cross access strategies help to relieve demand on major roadways for short trips, thereby helping preserve roadway capacity. They also help to improve customer convenience, emergency access, and access for delivery vehicles.

Provide residential access through neighborhood streets

Residential driveways on major roadways result in dangerous conflicts between high-speed traffic and residents entering and exiting their driveway. As the number of driveways increase, the roadway is gradually transformed into a high-speed version of a local residential street. Subdivisions should always be designed so that lots fronting on major roadways have internal access from a residential street or lane. Minor land division activity can be managed by establishing a restriction on new access points and allowing land to be further subdivided, provided all new lots obtain access via the permitted access point.

Promote a connected street system

As communities grow and land is subdivided for development, it is essential to assure continuation and extension of the existing local street system. Dead end streets, cul-de-sacs, and gated communities force more traffic onto collectors and arterials. Fragmented street systems also impede emergency access and increase the number and length of automobile trips. A connected road network advances the following growth management objectives:

- fewer vehicle miles traveled
- decreased congestion
- alternative routes for short, local trips
- improved accessibility of developed areas
- facilitation of walking, bicycling, and use of transit
- reduced demand on major thoroughfares
- more environmentally sensitive layout of streets and lots
- interconnected neighborhoods foster a sense of community
- safer school bus routes
Topsham, ME Connector Road Example

**Encourage internal access to outparcels**

Shopping center developments often include separate lots or “outparcels” fronting on the major roadway. The outparcels are leased or sold to businesses looking for highly valued corridor locations. Access to these outparcels should be incorporated into the access and circulation system of the principal retail center. This reduces the need for separate driveways on the major road, while maintaining overall accessibility to the site. To accomplish this, establish that development sites under the same ownership or those consolidated for development will be treated as one site for the purposes of access management. Then require a unified traffic circulation and access plan for the overall development site.

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**Coordinate with the MaineDOT**

MaineDOT is responsible for access permits meeting certain conditions along Route 1. The municipalities oversees land use, subdivision, and site design decisions that affect access needs. Therefore, State and local coordination is essential to achieve effective access management. Lack of coordination can undermine the effectiveness of regulatory programs and cause unnecessary frustration for permit applicants. Timely communication is key to an effective review procedure.