

Bus Stop Design and Management Guidelines

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Prepared by:



Bus Stop Design and Management Guidelines

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Introduction

The Community Connector is the urban fixed route transit provider in the greater Bangor urbanized area. The Community Connector is owned and operated by the City of Bangor and currently serves six municipalities – Bangor, Brewer, Hampden, Veazie, Old Town, Orono, and the University of Maine. All of these entities contribute financially to the operation of the bus system and have a vested interest in ensuring an efficient and sustainable regional transit system.

The Bus Stop Design and Management Guidelines will be used as the framework for developing a consistent, system-wide designated bus stop plan to transition from a flag-stop system to designated stop system for the fixed-route bus service in the greater Bangor urbanized area. Each stop location is unique and each stop's jurisdictional and physical context may require individual review which may meet some of the guidelines as outlined, but not others based on those limitations.

The design guidelines are intended to guide local comprehensive plans, land development ordinances, site or subdivision plans, and transportation plans. This document provides guidelines in which to build desirable facilities and amenities wherever possible to provide them. These guidelines will lead to:

- a more consistent, accessible, and better-connected network of bus stops;
- clear and uniform guidance on the design and placement of bus stops and stop-related infrastructure and amenities; and
- a process to clearly identify responsibility and coordination for maintaining and/or managing bus stops.

Part 1 - System Management and Maintenance

The purpose of this section is to provide guidance to the stakeholders of the Community Connector fixed route bus system to promote maintenance and management uniformity. The contents, herein, are not intended to be prescriptive or all encompassing. Formal agreements may be drafted among the jurisdictions, as necessary, to outline specific roles and expectations.

Section 1 - Roles, Responsibilities, and Jurisdictional Coordination

As the transit agency, and recipient of Federal Transit Administration (FTA) funding, the City of Bangor Community Connector is responsible for identifying and satisfying all FTA requirements. One of these requirements is developing and implementing a bus stop maintenance program. Therefore, it is extremely important to coordinate and secure the necessary maintenance agreements with municipalities, private entities, and/or third-party service providers to ensure all parties understand their responsibilities under those agreements.

When bus stops are located on private property, to the extent possible, Community Connector should coordinate a formal or informal agreement with the property owner as well as an understanding of the roles and responsibilities for the management and maintenance of the bus stop and bus stop infrastructure at that location.

Local Comprehensive Plans

Local comprehensive plans should address the need to ensure systems are planned and developed to serve growth in an orderly and efficient manner. The transit system is a critical component of the larger regional community that benefits from maximizing opportunities and efficiencies by planning appropriate development, rather than having to make costly infrastructure improvements after development. Shaping future land use plans and policies that encourage a more transit and pedestrian-supportive development pattern will enhance the potential for future transit service operation and investment efficiencies.

Municipalities can plan for efficient land use and development patterns to support transit by planning for density of population and activity as well as other transit-supportive development plans and policies. These considerations include, but are not limited to:

- Developing a walkable street network that maximizes pedestrian and bicycle access and includes facilities for all users.
- Designing for a pedestrian-friendly environment where streets foster an inviting experience on the way to transit.
- Planning for a mixed-use development pattern at transit centers and bus stops and in corridors that complement overall corridor development and accommodate freight movement.
- Focusing density in linear corridors and considering the relationship to adjacent communities and existing transit service.
- Managing parking supply and providing for other options such as shared rides and bicycle facilities.
- Creating and preserving a mix of housing affordability.
- Incorporating civic and public or semi-public spaces.
- Protecting and restoring important natural resources in the transit center area.
- Addressing barriers to private investment by using financing mechanisms for public infrastructure, site preparation, affordable housing, and other areas that require gap funding.

Land Development

Municipalities and other entities with oversight over development in the Greater Bangor urbanized area should consider transit needs and impacts alongside new development and construction. Significant alterations to the roadway or surrounding land use warrants a re-evaluation of the current bus stop placement. If current routes or stops are impacted, Community Connector should be involved early on to provide guidance on any service changes, stop placement alterations, and potential impacts to agreements.

When a new development plan is submitted to a Municipality, the Municipality should coordinate with the Community Connector to ensure that any desired bus stop improvements are incorporated as part of the Municipality's standard site development and/or design review and approval process. The Municipality and Community Connector will cooperatively perform a bus stop site review.

In some cases, it may be appropriate for the developer to complete the bus stop improvements according to the approved guidelines while building their own property in the vicinity, especially if this results in efficiencies during construction.

Construction and Installation

Responsibilities for construction and installation of bus stop infrastructure and amenities should be clearly defined in agreements. Possible parties who may complete the work include,

Community Connector's third party contractor, the Municipality, and a developer/contractor hired by a Municipality. The party completing work is expected to obtain any necessary approvals or permits from the Municipality, Community Connector, MaineDOT, etc.

Public Notice / Public Outreach

Public outreach and notice of changes affecting bus stops will be posted to the public in accordance with the Community Connector's Title VI plan.

Bus Stop Inventory / Database

A full inventory of bus stops, with location, amenities, and asset ownership has been created as part of the Bus Stop Designation Project, completed in 2022. Community Connector will update this inventory as needed and will notify the affected Municipality of any temporary or permanent changes within their jurisdiction.

Capital Planning and Budgeting

As part of the annual Community Connector budget process, Community Connector will allocate funds to maintain and improve the system, as needed. These annual expenses may include items such as: sign or amenity replacements due to vandalism, theft, or deteriorating conditions; the purchase of signs for stop additions; the purchase of amenities as outlined in the design guidelines criteria; or infrastructure improvements to meet and enhance rider safety, comfort, or Americans with Disabilities (ADA) requirements. The projected costs and budgeted items will be communicated to the Municipal partners and financed through the regular formula.

Section 2 - Bus Stop Maintenance Components

Federal and State regulations require that bus facilities be maintained in good working order and remain accessible. Maintenance responsibility for a bus stop can be that of a Municipality, a private entity that has agreed to host the bus stop, an individual or organization which has adopted the maintenance of the stop through an Adopt-a-Stop Program, or a third-party contractor. Community Connector may execute agreements with each Municipality in which bus stops are located, and private entities as needed, to outline maintenance responsibilities. If the designated responsible party does not undertake repairs, replacement, and/or maintenance per the agreement, Community Connector may thereafter cause the repairs and/or maintenance to be performed and may bill the responsible party for the costs. Passengers, pedestrians, and bus operators shall be instructed to pass reports of issues at bus stops to the Community Connector Administrative Office at (207) 992-4670 or community.connector@bangor.gov.

Maintenance of bus stops shall include, but may not be limited to, the following:

Cleanliness - All locations with fixed bus stop amenities will maintain appropriate standards of cleanliness to ensure comfort and safety, this may include: the removal of litter and other debris; regular cleaning of benches, shelter frames and windows, and floor space to remove dirt, grease, grime, and other foreign substances.

Signs, Posting, and Graffiti Removal - All unauthorized signs or other postings and graffiti will be removed as needed. The only signage and advertising allowed is that which is posted by Community Connector staff and authorized municipal officials to provide system information for passengers and the public.

Repairs and Replacements - When necessary, if any items that need to be repaired or

replaced are identified, notice will be provided by the entity responsible for inspection to all parties.

Grass Cutting and Trimming - The immediate area around the designated locations may be checked for control of grass and weeds. The immediate area shall be defined as six (6) feet from the bench or concrete slab. Those areas needing service will have the grass cut and weeds trimmed on an as needed basis from April 15th through October 15th of each year.

Repainting Pavement Markings - Pavement markings most commonly are yellow painted curbs or yellow or white painted "Bus Stop" on the pavement in front of the bus stop zone. Pavement markings shall be inspected and repainted, as needed, and may be addressed through agreements.

Snow and Ice Removal - The immediate bus stop waiting and loading area and the pedestrian route to access the designated bus stops location should be clear of snow and ice as soon as possible or within 72 hours of a storm.

Section 3 - Adopt-a-Stop Program

Stop adoption programs are geared toward engaging the community in assisting in keeping bus stops maintained and aesthetically inviting for passengers and the surrounding community. Private companies, civic groups, public agencies, schools, churches, charitable organizations, and individuals volunteer for these community service projects.

The sponsoring participant would sign an agreement which details the roles and responsibilities of adopting a bus stop. In exchange, Community Connector would agree to display a decal or some other type of promotion of the sponsoring participant at the bus stop site. Other types of incentives may also be offered, including offering the sponsoring participant a free bus pass.

Section 4 - Requests to Add, Relocate, or Eliminate Bus Stops

The four primary motivations to request the addition, relocation, or elimination a bus stop include:

- New Development or Construction
- Temporary Road Construction
- Business Closure
- Ridership

The four primary entities to request the addition, relocation, or elimination of a bus stop include a proposal from a:

- Transit Provider
- Municipality
- Private Entity
- Public Individual

In each situation the first step should include a discussion with Community Connector staff. This will initiate a site review which will inform any decisions and prompt applicable next steps.

Bus Stop Design and Management Guidelines

Regardless of the motivation or proposer, Community Connector will be a key party in the discussion and ultimate decision. The process for which a decision is reached and whether additional parties must be involved will be unique for each situation. A few key considerations include:

Stop Additions

- Is the location on, or in close proximity to, a preexisting route?
- What change or condition has occurred to warrant an additional stop in this location?
- Does the location meet the Bus Stop Placement guidelines outlined in Part 2, Section 1 of this document?

Stop Relocation

- What change or condition has occurred to warrant a stop relocation in this location?
- Is the Relocation temporary or permanent?
- Does the stop have any amenities that must be relocated as well?
- How does the relocation impact the Bus Stop Placement guidelines outlined in Part 2, Section 1?
- Who is impacted by this change and how can they be accommodated?

Stop Elimination

- What change or condition has occurred to warrant a stop removal in this location?
- How does the stop elimination impact the Bus Stop Placement guidelines outlined in Part 2, Section 1?
- Who is impacted by this change and how can they be accommodated?

When feasible, all stop alteration requests will be reviewed each Spring and/or Fall. In all circumstances any required public notice will be provided prior to any changes being made in accordance to Title VI.

Part 2 - Bus Stop Design Guidelines

The spacing, location, design, and operation of bus stops significantly influence the transit system performance and customer satisfaction. The following guidelines have been developed based on a review of industry standards and best practices, other transit agency design guidelines, and federal and state accessibility requirements.

This document is intended to provide municipalities, local developers, and other partners a consistent set of guidelines to facilitate the proper siting, design, installation, and maintenance of either existing or proposed bus stops throughout the greater Bangor urbanized area. However, these recommendations are not intended to be prescriptive and inflexible, some existing non-compliant facilities may be grandfathered in and future locations may require slight variation due to jurisdictional and physical context and limitations. Individual review and adjustments will be made at the discretion of Community Connector and Municipal staff.

Additionally, Community Connector is subject to many regulations not necessarily outlined in this document and is ultimately responsible for maintaining a safe and equitable system. Should any requirements become relevant that are not outlined in here or in individual municipal agreements, Community Connector will communicate changes and assume responsibility for the implementation of such requirements, unless otherwise agreed upon.

All new and altered transportation facilities are subject to the most recent U.S. Department of Transportation (USDOT) accessibility standards and, as such, the standards and requirements should be consulted prior to construction. Any standards noted are current as of December 2020.

There are four interrelated elements that comprise a bus stop. This document includes guidelines on these four elements:

Bus Stop Placement – A bus stop’s placement relative to the nearest intersection, to other stops, and to the development it serves.

In Street Design – The space allocated for the bus to curb passenger loading and to exit and enter the flow of traffic.

Curbside Design – The space reserved for passengers to wait for and board the bus, as well as the connectivity between the space and nearby development

Passenger Amenities – Includes elements, such as shelters, lighting, and seating.

Section 1 - Bus Stop Placement

General Design Principles

There are several factors to help determine where bus stops should be located. In addition to ensuring bus stops are designed in a manner which meets accessibility requirements, passenger and pedestrian safety, as well as passenger comfort are also a key consideration in the siting and design of bus stops.

Bus Stops Should be Located in Convenient and Comfortable Locations - Bus stops should be located in places that are convenient to where people are traveling to and from, including concentrations of residences, jobs, and major destinations such as

social services or shopping destinations.

Bus Stops Should be Located in Visible Locations - The location should be well lit and provide adequate space for waiting passengers to sit or stand away from other pedestrian flow and street traffic. The bus operators should be able to clearly see whether there are waiting passengers.

Bus Stops Should be Easily Identifiable - Bus stops should be located in easily identifiable places, so they can be found without difficulty. Stops should be identified so that they are a recognizable component of the transit infrastructure. Passengers should feel familiar with the elements present at each transit stop, even if the exact amenities differ from stop to stop.

Bus Stops Should Provide Information on Available Services - All transit customers need basic information about the service. Higher volume stops should have schedule and route information at the stop as well as how to contact the Community Connector office. Maps, signs, and graphic elements should be standard across the system to improve familiarity and provide consistency.

Bus Stops Should Have Good Pedestrian and Bicycle Access - Bus stops should be located at sites that provide safe, ADA-accessible, pedestrian access to the surrounding area. This should include well-defined and contiguous pathways to and from the stop, as well as crosswalks. This is currently a challenge in parts of the greater Bangor area. As pedestrian and bicycle infrastructure develops, the responsible agencies should encourage pedestrian pathways when possible, especially pathways to/from high volume bus stops.

Bus Stops Should be Well Integrated with their Surroundings - To the extent possible, bus stops should be integrated with their surroundings. When new developments are constructed, the stops should be designed as part of the overall project, rather than placed as an afterthought. Similarly, when roads and/or sidewalks are reconstructed, bus stops should be developed as part of the overall design.

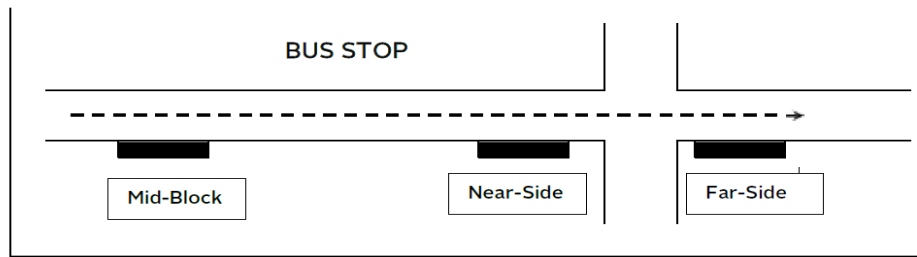
Bus Stops Should Provide Amenities to Make the Wait Comfortable- Providing amenities, such as benches, lighting, bike facilities, trash cans, etc. at stops make waiting for the bus more comfortable. For a number of reasons, particularly cost, it is not practical to provide all amenities at all stops. Typically, more extensive amenities are provided at the busiest locations.

Stop Placement Relative to Intersection

A stop's placement in relation to an intersection directly impacts the convenience and accessibility of the transit system as well as the safe and efficient flow of traffic. Figure 1 illustrates the three placement options.

Bus Stop Design and Management Guidelines

Figure 1 - Stop Placement Illustration



Many conditions impact the placement of stops, see Table A for a brief overview of placement preference based on road conditions.

Table A - Stop Placement Recommended Use

Stop Placement Recommended Use	
Far Side	If no complicating factors exist, far-side stops are preferable.
Near Side	Should be used when traffic and/or pedestrian conditions and movements are better than the far side.
Mid Block	Should only be used under special circumstances, when large destinations justify high volume access or when the distance between adjacent intersections exceeds stop spacing recommendations.

Table B shows the advantages and disadvantages of each stop placement type, as well as when each type of stop is recommended.

Table B - Advantages and Disadvantages of Stop Placement Types and Recommended Conditions

	Advantages	Disadvantages	When Recommended
N E A R S I D E	<ul style="list-style-type: none"> Minimizes interference when traffic is heavy on far-side of intersection Allows bus boarding closest to cross walk Avoids double stopping for both traffic signal and customer movements Allows passengers to board while the bus is stopped at a red light 	<ul style="list-style-type: none"> Encourages pedestrians to cross in front of the bus which creates sight-line conflicts and slows the bus departure Increases conflicts with right-turning vehicles passing and turning in front of the bus Obscures sight-line for vehicles exiting the side street to the right of the bus 	<ul style="list-style-type: none"> Traffic is heavier on the far-side of the intersection Existing pedestrian conditions and movements are better than on the far-side Bus route continues straight through the intersection or the stop is set back a reasonable distance to enable right turn When a curb extension prevents vehicles from turning right directly in front of a bus

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F A R S I D E	<ul style="list-style-type: none"> Minimizes conflicts with turning vehicles Encourages pedestrians to cross behind the bus Creates shorter deceleration distances for buses and minimizes area needed for curbside bus zone Buses can take advantage of the gaps in traffic flow created at signalized intersections behind the stop 	<ul style="list-style-type: none"> May result in traffic queued into intersection when a bus is stopped in travel lane Can result in the bus stopping twice at a red light and then a the far-side stop, which interferes with traffic and risks rear end collisions 	<ul style="list-style-type: none"> Traffic is heavier on the near-side of an intersection At heavy right turns on major approach or heavy left and through movements from side street When pedestrian conditions are better than the near-side At complex intersections with multiphase signals or dual turn lanes; this removes buses from the area of complicated traffic movements
M I D B L O C K	<ul style="list-style-type: none"> Passenger waiting areas may experience less pedestrian congestion Minimizes sight line obstructions for vehicles and pedestrians Conflicts with intersection traffic minimized 	<ul style="list-style-type: none"> Requires greatest amount of curb space for no-parking restrictions Encourages unsafe pedestrian crossing unless a crosswalk is provided Increases walking distance to intersection crossing 	<ul style="list-style-type: none"> Traffic or street/sidewalk conditions at the intersection are not conducive to a near or far-side stop Trip generators are located mid-block and/or adjacent intersections are too far apart

Driveways

Optimally, it is best not to have the bus blocking a driveway while stopped for boarding and alighting. If absolutely necessary due to other constraints, a bus may block a small residential driveway only.

Bus Stop Spacing

Bus stop spacing refers to the distance between bus stops along a route. Efficient bus stop spacing balances the goal of minimizing travel time for the bus and walking distance for the passenger. In addition to system efficiency, stop spacing has a major impact on equity.

Community Connector is required to ensure that no social or economic groups are discriminated against through reduced access to pick up and drop off locations. In some situations, Community Connector may need to prioritize equitable access over other spacing guidelines.

Table C illustrates stop spacing recommendations, per industry standard. Very few sections of route will follow this spacing exactly due to numerous complicating factors. These figures are not intended to be prescribed rigidly.

Table C - Bus Stop Spacing Guidelines

Environment	Spacing Range	Target Number of Stops per Mile	Maximum Number of Stops per Mile
High Density	880 - 1,320 feet	4	6
Moderate Density	1,056 - 1,760 feet	3	5
Low Density	1,320 - 2,640 feet	2	4

Factors for Determining Bus Stop Locations

Due to the number of factors involved, each new or relocated stop must be examined on a case-by-case basis. General guidelines for stop spacing and placement are as follows:

Land Use Types, Population Density/Trip Generators - Stops should be located near areas of high population density or activity (areas of transit trip generators). This typically means shorter spacing between stops in core areas of cities and increased spacing as the environment becomes less dense and more spread out. Placing bus stops near activity centers, such as shopping areas, social services, civic buildings, schools, medical services, or multi-unit residential complexes attracts ridership by enhancing the convenience of transit service. In areas where there are several of these types of locations near each other, bus stop placement may depend more on stop spacing and other factors.

Roadway - The functional class designation of a bus stop's roadway indicates the general characteristics of a roadway including its intended purpose and typical roadway speed which can impact both design and operation of bus service and stops. For example, wider streets may allow for curb extensions (also called bulb-outs) at bus stops, which create more space for amenities and reduce the pedestrian crossing distance. However, wider streets also typically have higher speeds, which increase the sight distance needed and make it harder for pedestrians to cross the roadway. Adjacent roadway speed and width should be considered when siting and designing a bus stop.

Pedestrian Safety and Accessibility - Stops should be located in areas that protect passengers from passing traffic and are convenient and safe for pedestrian travel. Proximity to crosswalks and curb ramps should be a consideration in determining stop location.

Connectivity - Most people are traveling to and from the bus stop as a pedestrian or using a wheeled mobility device. The conditions of the sidewalk and connections with the surrounding area are important. See Appendix 1 for ADA guidance for stop connectivity to safe and accessible pedestrian paths.

Route Interconnectivity - Stops should be strategically placed at transfer points where routes overlap in order to enhance coordination in the network and with other modes and providers. When nearby routes don't overlap, stop spacing should be adjusted to take into consideration the shortest path between nearby routes and services.

Service Efficiency - Whenever possible, bus stop locations should be paired, so that people board and alight on opposite sides of the same street in the same vicinity when making a round trip. This allows the transit service to be more intuitive and maximizes convenience for the greatest number of users.

Environmental Considerations - For safety reasons, bus stops should be located so that bus operators are able to see passengers at the stop as they approach and passengers waiting at the bus stop can see bus operators. Bus stops should not be located just after the rise of a hill or bend of a road. When possible, bus stops should be located in areas with existing streetlights or other ambient lighting. Passenger security (real and perceived) can positively or negatively affect customer perceptions of the bus stop. Landscaping, walls, and solid structures can provide hiding spaces and restrict sight lines for passengers and should be carefully considered when placing and designing a bus stop.

Demographics - Community demographics are taken into account when deciding where to operate service and the appropriate level of bus service. The FTA requires that concentrations of Title VI populations, including low-income individuals and minorities, are considered when prioritizing the provision of amenities at bus stops.

Spacing - In many cases, there are certain existing or planned locations for bus stops which stand out as being particularly important. This can be due to existing use, activity centers, transfer opportunities, or other conditions. Once these critical locations are settled, the remaining stops can be planned for optimal spacing.

Section 2 - In Street Design

Bus Zones

The primary area that is devoted to bus movements is referred to as the bus zone. This area allows the vehicle to pull over to the curb for the purpose of passenger boarding and alighting. Typical bus zones can be categorized in two ways with respect to the roadway: in-line or off-line.

In-line bus zones are designed as part of the street and participate in the general pattern of traffic with the boarding and alighting of passengers happening at the roadway edge. Off-line stops are designated “Bus Only” locations, such as those at a transportation center, shopping center, or park and ride facility with boarding and alighting of passengers taking place at a designated area. Although off-line bus zones may have more space available and permit provision of more amenities than in-line bus zones, route deviations into off-line facilities add to a route’s travel time and can affect service efficiency.

Table D outlines the area that the bus may utilize to stop depending on the stop type and its relation to the intersection.

Table D - Bus Stop Zone Length

In-Line Bus Stop	
Far Side	70 feet
Far Side (after left turn)	90 feet
Far Side (after right turn)	120 feet
Near Side	110 feet
Mid Block	120 feet
Curb Extension	40 feet
Off-Line Bus Stop	
Far Side	90 feet
Far Side (after right turn)	140 feet
Near Side	100 feet
Mid Block	120 feet

In-Line Curbside Bus Stop

Curbside bus stops are the most common form of bus stop configuration in the region. They are located adjacent to the roadway’s existing curb line and entail the bus stopping in the parking lane, travel lane, or shoulder. Curb-side, or shoulder, bus stops in the travel lane require minimum design and can easily be established or relocated.

Curb-side bus stops should not be located in areas of high traffic volume with posted speed limits of 40 mph or more. Curb-side stops in the travel lane should also be avoided at stops with high passenger volume.

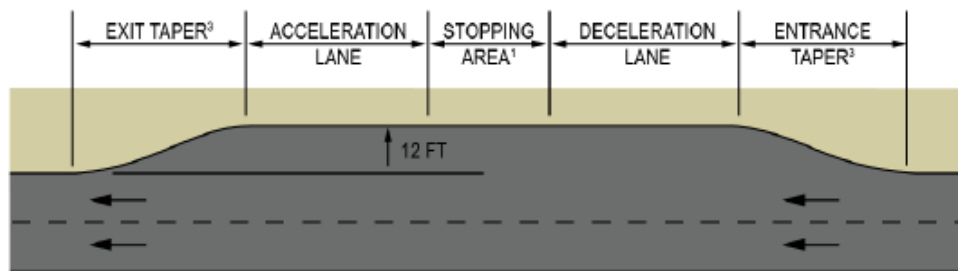
For bus stops in a travel lane or shoulder, the bus stop length is generally irrelevant (except as to mark the pavement indicating the location of the stop) as the full length of the travel lane or shoulder is available for the bus stop zone. Where on-street parking terminates just before the intersection in order to facilitate an additional travel or turn lane, the length of the lane should meet or exceed the equivalent curb space needed for a near-side bus stop. The travel or turn lane may need to be extended, or a no parking area provided, to facilitate access to the stop.

The stop length of a curbside stop in a parking lane is made up of three components: the deceleration zone, the stopping zone, and the acceleration zone. In areas with on-street parking, it may be beneficial for traffic flow to remove parking spaces. A typical 40-foot bus is equivalent to two on-street parking spaces, but additional space is needed to accommodate entry and exit and for deceleration and acceleration between the parked vehicles. Curb extensions for pedestrian crossing before and after bus stops may also impact stop length.

Off-Line Bus Bay/Pull Out

The Bus Bay, or Pull Out, is a location off-line with respect to travel lanes, with a special curbed pull-out for buses. The bus bay allows general traffic to pass around a loading bus and interferes less with right turning vehicles at the intersection. The bus bay or pull out is most effectively used where traffic speeds are greater than 35 mph and is recommended over in-line curbside bus stops if traffic speeds are greater than 40 mph. Bus bay or pull outs can be effectively incorporated into a site design where high-volume boarding is anticipated. Bus zone lengths at pull-out stops include transition or taper space in addition to the platform length, resulting in a need for longer clear curb zones with in-line stops.

Figure 2 - Pull Out Stop Bus Zone Length



NOT TO SCALE

- (1) The bus stopping area should be 50 ft for each 40-ft bus expected to be at the stop at the same time.
- (2) The width of the pull out should be at least 12 ft, excluding gutter width. A pull out 10 ft in width may be acceptable with traffic speeds less than 30 m.p.h.
- (3) Taper lengths are a function of the roadway through speed and the width of the pull out. A taper of 5:1 is the recommended minimum for an entrance taper from an arterial street into a pull out. The recommended taper for re-entry into the traffic stream is not sharper than 3:1.

See Appendix 4 for more information on In-Line and Off-Line stops and other design considerations. The *NACTO Transit Street Design Guide* is also another helpful resource.

Section 3 - Curbside Design

Federal Accessibility Requirements

The Department of Justice (DOJ) standards apply to all facilities covered by the ADA of 1990, *except* transportation facilities, which are subject to the U.S. DOT accessibility standards. Both the DOT and DOJ standards are very similar and are based on the United States Access Board ADA Accessibility Guidelines. DOT's ADA standards apply to facilities used by state and local governments to provide designated public transportation services, including bus stops and apply to both new construction and alterations. Generally, these requirements for bus stops include:

- A boarding/alighting area which has a firm, even surface that is at least five (5) feet wide (parallel to the roadway) and eight (8) feet deep (perpendicular to the roadway)
- Clear zones for rear bus doors (generally 10 feet wide and 4 feet deep)
- Cross slope of less than two (2) percent (perpendicular to roadway)
- Continuous clear width of four (4) feet for path of travel through or around the bus stop
- Accessible path of travel to and from a bus shelter or sign, and around any other amenities or street features
- Sufficient roadway length for all bus doors to be flush with curb, generally meaning that bus stops must be at least 60-120 feet long for a 40-foot bus pulling out of the travel lane to access the stop
- Mechanism for the visually impaired to access information provided (raised lettering, text-to-speech, etc.)

Curbside Passenger Facility Design

Curbside passenger facilities have three primary elements: accessible path of travel, loading area, and waiting area

Accessible Path of Travel - When possible, bus stops should be located along existing sidewalk facilities. When a bus stop is required in an area that does not have a formal sidewalk, a portion of the pedestrian path may be located within the shoulder, unless pedestrian use of the shoulder is prohibited. Regardless of whether the pedestrian connection to a bus stop is made via sidewalk, pedestrian/multi-use trail or the shoulder, U.S. DOT ADA standards require an accessible route to bus stops. At or around the bus stop itself, there needs to be an accessible clear width of at least four (4) feet through or around the bus stop. Curb ramps are an important part of making pedestrian routes accessible by safely transitioning from a roadway to a curbed sidewalk and vice versa and required by U.S. DOT ADA standards. Detectable warnings are required at traffic controlled intersections and mid block crossings.

Loading Area - A level loading area, referred to as a Landing Pad, is required where the front doors of the bus open for boarding and alighting at each bus stop. Locating a clear area at the front of the bus allows easy deployment of the front door ramp (or kneeling feature) for disabled persons. Landing pads and clear zones should not be obstructed by any physical features such as utility poles, sign poles, trees, newspaper machines, etc. The landing pad must be at least eight feet perpendicular to the curb and five feet parallel to the curb. U.S. DOT ADA standards require all new or upgraded bus stops to have a front landing pad constructed that meets the minimum criteria. It should be noted that the landing pad is the top priority in order to comply with ADA mandates and provide universal access. Other bus stop amenities are important for passenger comfort and service but should not displace investment in proper landing pads.

Waiting Area - Waiting is a significant part of every transit trip. Well-designed bus stops enhance the transit experience, decrease perceived wait times for transit services, and can contribute to increased ridership. Conversely, poorly designed bus stops can decrease customer satisfaction, make transit less attractive to potential new customers, and potentially make waiting at stops feel unsafe for riders. A bus stop waiting area should be sized to reflect expected passenger volumes and be wide enough at the curb line to provide a safe place for passengers to wait outside of the loading areas. Paved passenger waiting areas provide a safe, comfortable waiting area and promote access for all transit users, including those who are mobility impaired. The surface must be durable, slip-resistant, and free of obstructions or tripping hazards. Waiting area elements and passenger amenities include: signage, pavement markings, static passenger information, variable or electric information, lighting, seating, bus shelters, trash receptacles, and bicycle parking.

Section 4 - Passenger Amenities

Bus Stop Types

Passenger amenities should be in locations that will create the greatest benefit for customers. Generally, this occurs at stops that have the highest utilization, but other factors may be considered. The selection of the appropriate stop type and amenities should consider both qualitative and quantitative measures, such as:

- Boardings or boarding potential;
- Proximity to activity centers;
- Proximity to concentration of transit-dependent populations;
- Number of routes/modes serving the stop and transfer activity;
- Wait time between headways;
- Physical constraints of available space.

The below guidelines for amenity selection and qualification are industry standards, however, they are not intended to supersede other factors. The exact amenities that are appropriate for and can be supplied at each bus stop may vary due to both physical and financial constraints. Additionally, Community Connector is bound to certain FTA requirements that ensure equitable amenity siting system wide. See the Community Connector Title VI Plan for more information on requirements and policies.

Table E - Bus Stop Types

Stop Type	Daily Boardings	Proximity to Activity Center	Proximity to Transit Dependent Population	Number of Routes / Modes Serving Stop	Wait Time Between Headways
Basic	< 10	NA	NA	1	NA
Bench	< 10	< .25 mile	< .25 mile	1	>30 min.
Bench	11-20	NA	NA	1	NA
Shelter	> 20	NA	NA	1	NA
Shelter	11-20	< .25 mile	< .25 mile	≥ 2	>30 min.

Basic Stop – Stop with low boardings (10 or fewer daily), serving one route.

Bench Stop – Stop with moderate levels of daily boardings (11-20); a stop with fewer boardings (less than 11) located less than a quarter-mile from an activity center and/or an area with a high

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concentration of transit-dependent populations with headways between trips of more than 30 minutes.

Shelter Stop – Stop with high levels of daily boardings (more than 20); a stop with daily boardings greater than 10 but fewer than 20 where two routes or modes transfer, or are located less than a quarter mile from an activity center and/or an area with a high concentration of transit dependent populations, or where headways are longer than 30 minutes and passengers may be waiting long periods of time for connection.

Bus Stop Elements and Amenities

Refer to Appendix 1 for ADA requirements and design specifications for each element.

Table F briefly describes the purpose of bus stop amenities, which stop type uses it, and general specifications for placement.

Table F - Bus Stop Elements and Usage Factors

Bus Stop Element	Technical Specifications and Usage Factors
Bus Stop Sign All Stop Types	<ul style="list-style-type: none"> ● Signs help customers and bus operators to identify the stop location within the system and also publicizes the services and routes served by the stops. ● Each active bus stop location should be marked with a uniform Community Connector bus stop sign. ● Signage must be compliant with FTA's MUTCD Section 28 guidelines. ● All stops are required to have "no smoking" signs per State law.
Bus Stop Sign Post All Stop Types	<ul style="list-style-type: none"> ● Preferred that all bus stop locations should have their own bus stop posts. Using other types of posts such as utility poles, traffic sign posts, and light poles should be avoided. ● Generally, signs should be installed between 80-120 inches from the ground and 18 inches from the edge of the roadway though other factors may impact placement.
ADA Landing Pad All Stop Types	<ul style="list-style-type: none"> ● ADA landing pads should be installed, to the extent possible, at all bus stop locations. Stops which cannot be rendered accessible obligates the transit provider to offer ADA complementary paratransit for customers who could otherwise use the accessible stop.
Pavement Markings All Stop Types	<ul style="list-style-type: none"> ● Pavement markings delineate bus stops and reduce motorist confusion. ● May be desirable to paint a white box that clearly delineates the footprint of the bus stop on the roadway. The words "BUS" or "BUS STOP" could also be painted on the pavement in order to clearly signify that the space is a designated bus stop.
Lighting All Stop Types	<ul style="list-style-type: none"> ● Adequate lighting at bus stops allows bus drivers and approaching traffic to see waiting passengers. Lighting also provides added security for those waiting at the stop. ● Lighting should be incorporated within 30 feet of a stop whenever possible. Options include nearby streetlights, ambient light from

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	adjacent businesses, lighting installed within a bus shelter, or a stand-alone light pole.
Benches Bench Stop Shelter Stop	<ul style="list-style-type: none"> ● Benches can be freestanding or part of a shelter design. They provide seating for passengers waiting for the bus, particularly at locations where service is less frequent. They may also be prioritized in locations that frequently service elderly or disabled riders. ● Benches require specific site design to fit into the physical space and comply with ADA requirements.
Bus Shelter Shelter Stop	<ul style="list-style-type: none"> ● Shelters provide protection to riders from the elements, increasing both comfort and safety. This amenity type is prioritized at locations where service is less frequent, ridership is high, and/or frequent users include vulnerable populations. ● Bus shelters typically require a 5-foot by 14-foot footprint. ● Shelters require specific site design to fit into the physical space and comply with ADA requirements. Many locations will not have the physical conditions to allow a shelter to be placed, regardless of other supporting factors. ● Shelters also typically require additional maintenance in the form of regular cleaning.
Trash Receptacles <i>Optional</i>	<ul style="list-style-type: none"> ● Trash receptacles can help maintain a stop's cleanliness but must be maintained regularly. ● Trash receptacles are recommended for stops that are served in close proximity to fast food establishments and convenience stores. ● Trash receptacles typically require a 2' by 2' footprint.
Bicycle Parking <i>Optional</i>	<ul style="list-style-type: none"> ● Providing bicycle parking can encourage usage which can expand the service area that is accessible for bus riders. ● Bicycle parking is recommended in areas where bicycle transportation commuting patterns show higher usage. ● Bicycle racks typically require a 10' by 10' footprint.

Appendices

Appendix 1 - ADA Guidelines

All bus stops are required to meet the latest U.S. DOT ADA Standards for Transportation Facilities. The following references to these standards are not intended to be all encompassing, but rather to provide direction to users of these guidelines to the areas of ADA that may be required when implementing bus stop facilities and amenities.

The DOT's ADA standards apply to facilities used by State and Local governments to provide designated public transportation services, including bus stops. They include unique provisions concerning: Location of Accessible Routes; Detectable Warnings on Curb Ramps; and Bus Boarding and Alighting Areas. These standards apply to all new and altered facilities.

<https://www.access-board.gov/ada/#department-of-transportation-ada-standards-for-transportation-facilities-2006>

Accessible Routes

ADA guidelines related to accessible routes are included in Chapter 2 Section 206, *Accessible Routes*; and Chapter 4, *Accessible Routes* of the above mentioned standards. Chapter 2 details where accessible routes are required and Chapter 4 provides details on walking surfaces, doorways and curb ramps to be incorporated.

Section 206.3 contains the unique provisions regarding the location of accessible routes in the provision of public transportation services.

U.S. DOT ADA standards require the following criteria:

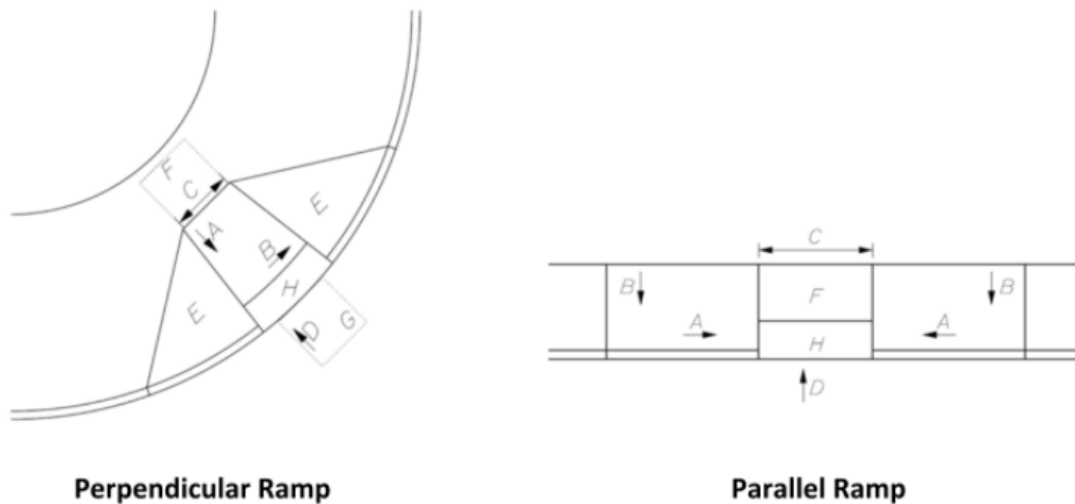
- Accessible route to streets, sidewalks, or pedestrian paths
- DOT standards provide that bus stops located on streets without sidewalks are subject to the same requirements to the maximum extent practicable. In these cases, this means constructing or locating stops with connections via an accessible route to the public right of way; if the only public right of way is the roadway, this means providing connections to the roadway.
- Accessible route located in the same general area as the general public route and is interior where circulation paths are interior (*if separate from general public route*)
- Accessible clear width of 4-foot path of travel through or around the bus stop
- A surface which is stable, firm, and slip resistant
 - At least five 5 feet wide (parallel to the roadway) and 8 feet long (perpendicular to the roadway)
 - Cross slope $\leq 1:48$ (2.1%)
 - Vertical changes $\leq \frac{1}{2}$ "
 - Any opening in surface or gratings $\leq \frac{1}{2}$ "

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Table G - Minimum Requirements for Pedestrian Facilities

Minimum Requirements for Pedestrian Facilities		
SIDEWALKS		
Cross Slope		Max. 2% (1:50)
Clear Width		5 feet, excluding curb (standard) 4 feet, excluding curb (minimum) 3 feet allowable at a single point <i>Widths less than 5 feet require a 5 foot by 5 foot passing space every 200 feet.</i>
CURB RAMPS		
Running Slope	A	Max. 8.33% (1:12)
Cross Slope	B	Max. 2% (1:50) <i>Ramp cross slope at street crossings without stop or signal control may match roadway profile.</i>
Clear Width	C	Min. 5 feet <i>For existing ramps only, ramp width may remain 4 feet.</i>
Counter Slope	D	Max. 5% (1:20) <i>Adjacent surface must be flush with the ramp.</i>
Flared Sides	E	Max. 10% (1:10)
Turning Space	F	4 feet by 4 feet <i>Maximum slope of 2% in any direction. May include Detectable Warnings.</i>
Clear Space	G	4 feet by 4 feet <i>Located at the bottom of the ramp outside active travel lanes.</i>
Detectable Warnings	H	<i>Required at traffic controlled intersections and mid-block crossings, full ramp width.</i>

Figure 3 - Ramp Components



Detectable Warnings

Section 406.8 includes the specific provisions regarding the requirements for detectable warnings on curb ramps in the provision of public transportation services.

U.S. DOT ADA standards require the following criteria:

- At marked crossings are within the markings
- Diagonal curb ramps at marked crossings have ≥ 48 " clear from ramp bottom to the marking
- Ramp ≥ 36 " long and \geq width of the curb ramp located at top of ramp
- Transition to adjacent surfaces of walks, gutters and streets at same level
- All ramp slopes $\leq 1:12$ (8.3%)
 - Side flares $\leq 1:10$ (10%)
 - Cross slope $\leq 1:48$ (2.1%)
- Counter slope of adjoining gutter road or accessible route surface $\leq 1:20$ (5%)
- Detectable Warnings
 - Width full depth of curb ramp or ≥ 24 " from the back of the curb
 - Contrast visually with adjoining surfaces (either light on dark or dark on light)
 - Consists of raised truncated domes with:
 - Base diameter ≥ 0.9 " to ≤ 1.4 " and top diameter 50% to 65% of base diameter
 - Height of 0.2"
 - Center to center dome spacing ≥ 1.6 " to ≤ 2.4 " and base to base dome spacing ≥ 0.65 ".

Bus Boarding and Alighting Areas

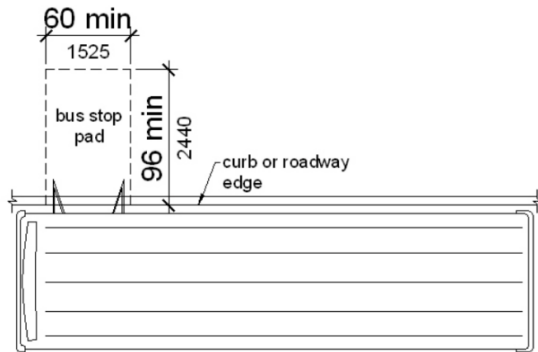
Several sections of the ADA Guidelines in Chapter 3 *Building Blocks* provide important information on designing ADA compliant bus stops (e.g., ground surface, turning space, clear space, reach ranges, etc.)

Section 810 details the guidelines by which all transportation facilities shall comply. Section 810.2 includes the specific provisions regarding the requirements for bus boarding and alighting areas (specifically the Passenger Landing Pad) in the provision of public transportation services.

U.S. DOT ADA standards require all new or upgraded bus stops to have a front landing pad constructed that meets the following criteria:

- Provide a firm, slip-resistant, stable surface
- Have sufficient roadway length for all bus doors to be flush with the curb (at least 60-120 feet long for a 40-foot bus pulling out of the travel lane to access the stop)
- Provide a clear length of 96 inches minimum, measured perpendicular to the curb, and a clear width of 60 inches minimum, measured parallel to the roadway
- The slope of the landing pad parallel to the roadway shall be the same as the roadway, to the maximum extent possible
- The cross slope perpendicular to the roadway cannot exceed 1:48 (2.1%)

Figure 4 - ADA Bus Stop Landing Pad Specifications

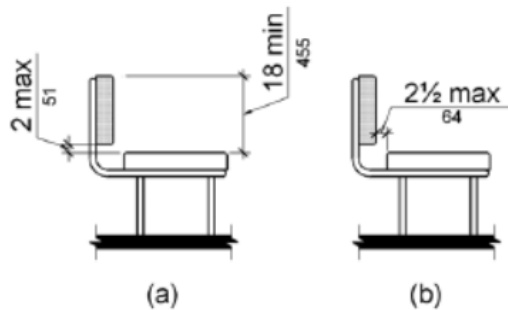


Amenities

Bus Stop Signs - The requirements for bus stop signs for transportation facilities (Section 810.4) references adhering to compliance with standards listed in section 703.5, Signs.

Passenger Seating - Passenger Seating should follow the requirements for clear floor or ground space listed in Section 903.2. Bench size, structure, and support should follow the requirements listed in Section 903.3 through 903.7.

Figure 5 - ADA Bench Back Support Specifications

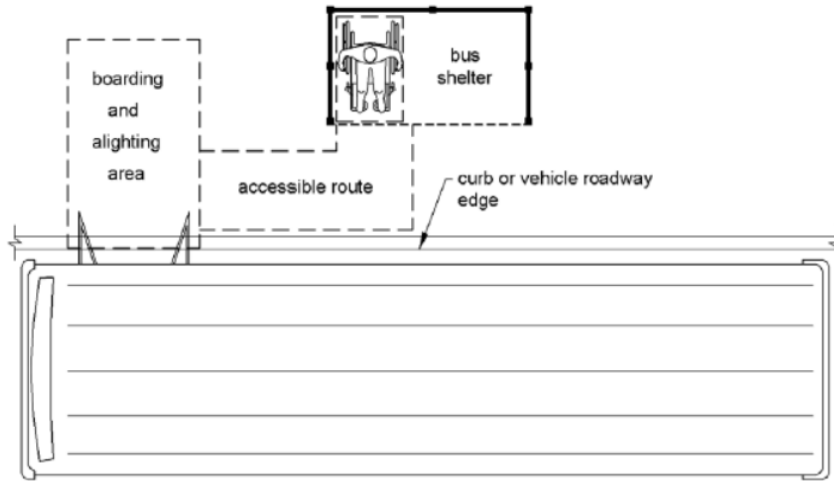


Bus Shelters - Bus shelters (Section 810.3) must provide a minimum ground floor space which complies with Section 305 entirely within the shelter, must be connected by an accessible route complying with Section 402 to a boarding and alighting area complying with Section 810.2.

Bus Shelters must be connected by an accessible route to bus boarding and alighting area and meet the following U.S. DOT ADA requirements:

- Clear floor space of $\geq 30''$ by $\leq 48''$ entirely within shelter
- One side of the clear floor space adjoins accessible route
- If clear floor space is confined on any of the three sides, width $\geq 36''$ for front approach or length $\leq 60''$ for parallel approach
- Clear floor space, stable, firm and slip resistant, no changes in level $> \frac{1}{4}''$

Figure 6 - ADA Bus Shelter Specifications



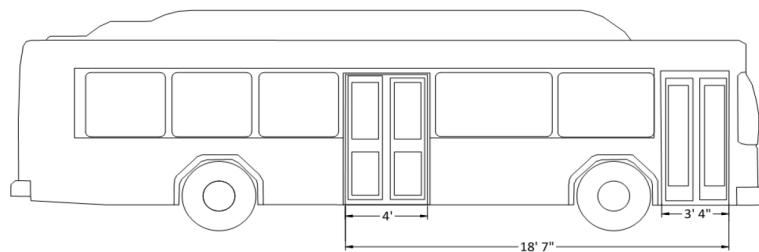
Appendix 2 - Bus Specifications

To design facilities for buses, it is important to know the specifications of the vehicles that will or could be using the facilities. At this time the largest vehicle in the Community Connector fleet is 35-feet.

Table H - Gillig Bus Dimensions

	Gillig 35-Foot	Gillig 40-Foot
Full Length	36.2 Feet	41 Feet
Wheelbase	19.6 Feet	23.7 Feet
Front Door to Bumper	1.9 Feet	2 Feet
Rear Door to Bumper	16.3 Feet	16.5 Feet
Centerline Door to Door	14.9 Feet	19.8 Feet
Front Door Width	3.3 Feet	3.3 Feet
Rear Door Width	4 Feet	2.9 Feet
Height	9.7 Feet	9.7 Feet
Wheelchair Ramp	Front	Front
Bike Rack	Yes	Yes
Turning Radius	36 Feet	43 Feet

Figure 7 - 35-Foot Gillig



Appendix 3 - System Design and Branding Specifications

Figure 8 - Bus Shelter Design Specifications

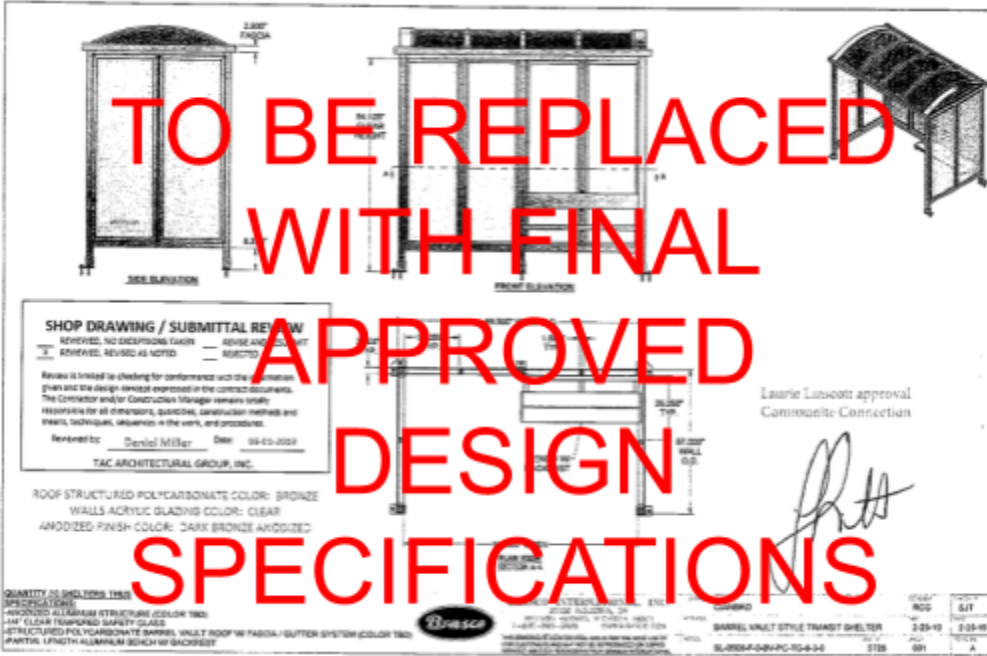
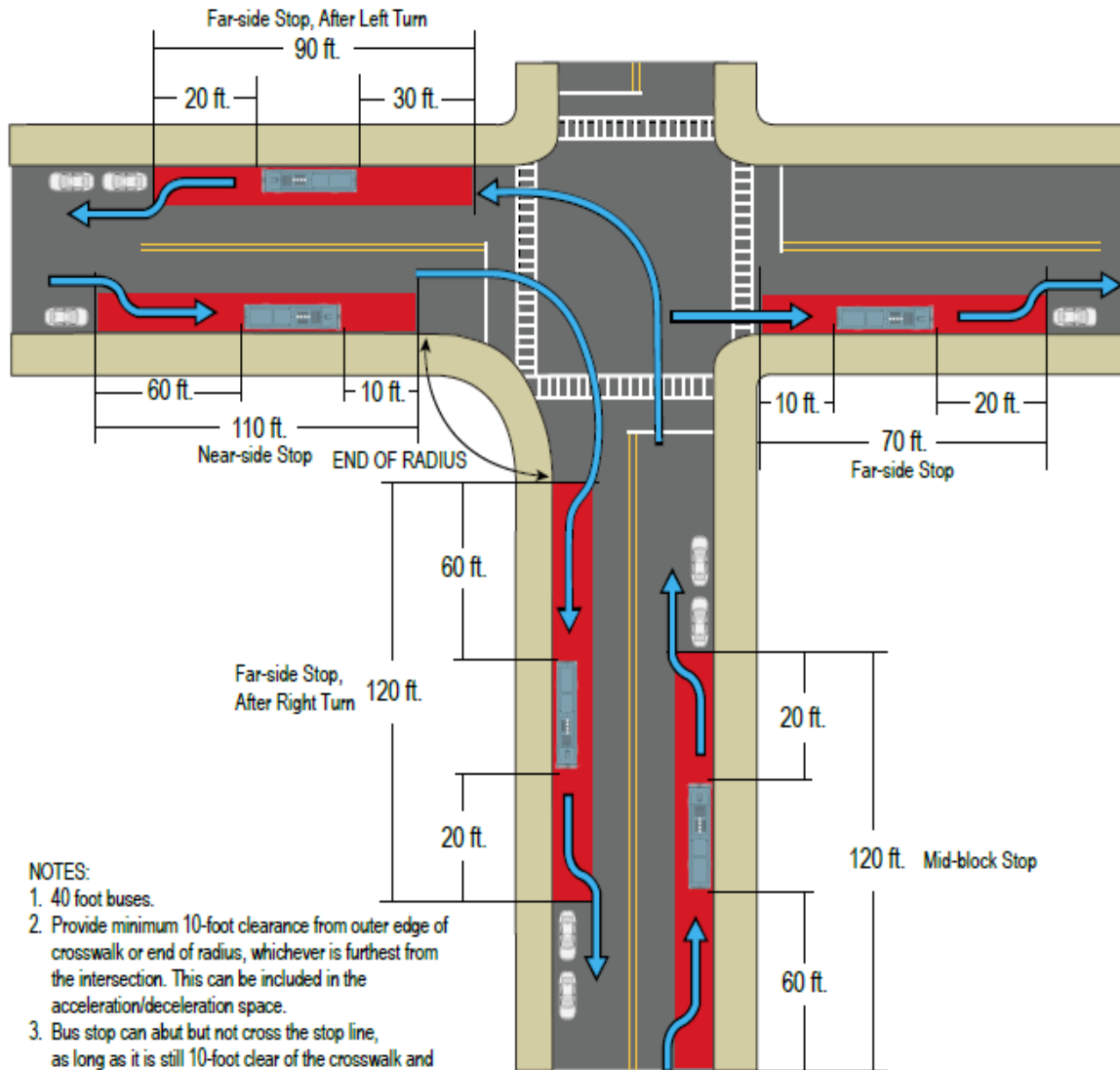


Figure 9 - Bus Stop Sign and Pole Specifications

**FINAL APPROVED
DESIGN
SPECIFICATIONS
WILL BE
INCLUDED**

Appendix 4 - In-Line and Off-Line Stops

Figure 10 - Typical Dimensions for In-Line Bus Zones



- NOTES:
1. 40 foot buses.
 2. Provide minimum 10-foot clearance from outer edge of crosswalk or end of radius, whichever is furthest from the intersection. This can be included in the acceleration/deceleration space.
 3. Bus stop can abut but not cross the stop line, as long as it is still 10-foot clear of the crosswalk and end of radius.

NOT TO SCALE

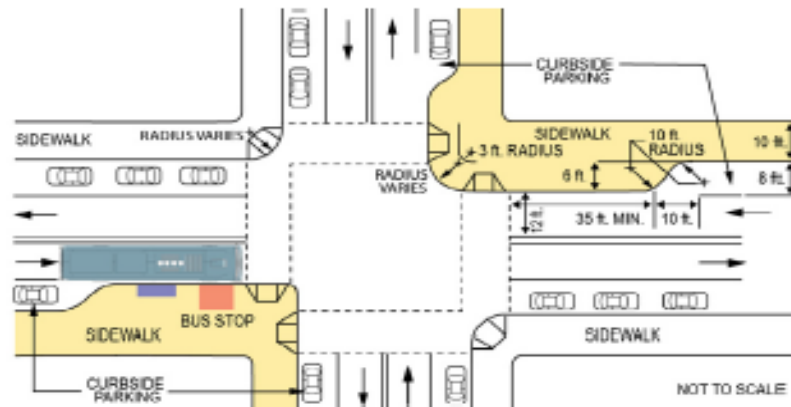
Curb Extension

A curb extension (also known as bus bulb) is a modification to the sidewalk which extends the bus loading area into the roadway. Curb extensions at bus stops help to minimize parking impacts, as less curb space and no acceleration and deceleration zones are needed. Curb extensions are generally 40 feet long, excluding the taper. Just as with in-line bus stops, curb extensions should be designed to ensure that buses stop with a minimum of at least 10 feet clearance of crosswalks.

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Curb extensions are most effectively used when travel speeds are lower than 30 mph, where pedestrian volumes are high, or where the sidewalk is narrow and additional waiting space is required. The curb extension provides a larger waiting area for passengers (to accommodate a bus shelter, for example), with less interference with pedestrians on the sidewalk, and can also serve as a pedestrian amenity by shortening the crossing distance. Curb extensions are most appropriate for near-side stops where there are parking lanes or multiple travel lanes. An illustration of a curb extension is shown in Figure 3.

Figure 11 - Curb Extension Illustration



Note: The bus stop must have a 10-foot clearance from the outer edge of the crosswalk or end of radius, whichever is furthest from the intersection.

Appendix 5 - References and Resources

The following industry publications, reports, or guidance documents were reviewed and/or referenced in developing this document.

Transit Cooperative Research Program (TCRP) Report 19 *Guidelines for the Location and Design of Bus Stops* Transportation Research Board, National Academy Press Washington DC 1996

Transit Cooperative Research Program (TCRP) Synthesis 117 *Better On-Street Bus Stops A Synthesis of Practice* Transportation Research Board, National Academy Press Washington DC 2015

U.S. Department of Transportation ADA Standards for Transportation Facilities
<https://www.access-board.gov/guidelines-and-standards/transportation/facilities/ada-standards-for-transportation-facilities>

FTA Circular 4702.1B Title VI Requirements and Guidelines for Federal Transit Administration Recipients October 1, 2012
https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Title_VI_FINAL.pdf

National Association of City Transportation Officials (NACTO) Transit Street Design Guide © Copyright 2016

National Aging and Disability Transportation Center (NADTC) *Toolkit for the Assessment of Bus Stop Accessibility and Safety* Easter Seals Project ACTION 2014

Health and Places Initiative (HAPI) *Mobility, Universal Design, Health, and Place A Research Brief Version 1.0* September 2014 Harvard Graduate School of Design

Transit Cooperative Research Program (TCRP) Synthesis 129 *Managing Extreme Weather at Bus Stops* Transportation Research Board, National Academy Press Washington DC 2017

APTA SUDS-UD-RP-005-12 Design of On-Street Transit Stops and Access from Surrounding Areas March 2012, Washington DC

Maine Department of Transportation Minimum Requirements for Pedestrian Facilities May 21, 2019 <https://www.maine.gov/mdot/civilrights/ada/>
Gillig Corporation Low Floor Diesel Powered 40-Foot 12 year/500,000 mile STURAA Test PTI-BT-R0410. The Pennsylvania Transportation Institute Bus Testing and Research Center, Duncansville PA December 2004

Guidelines for Planning, Designing, and Operating Bus-Related Street Improvements - Research Report 2-18-89-1225. Fitzpatrick, Kay, Urbanki, Thomas, Stoke, Robert. Texas Transportation Institute. College Station, TX August 1990

Manual on Uniform Traffic Control Devices (MUTCD) 2009 Edition with Revision Numbers 1 and 2 incorporated, dated May 2012 https://mutcd.fhwa.dot.gov/pdfs/2009r1r2/pdf_index.htm

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From Sorry to Superb: Everything You Need to Know about Great Bus Stops. Transit Center. October 2018 New York, NY

Best Practices in Transit Service Planning Project #BD549-38 Prepared for the Florida Department of Transportation Research Center by the Center for Urban Transportation Research University of South Florida. March 2009

Department of Transportation ADA Standards for Transportation Facilities (2006)
<https://www.access-board.gov/ada/#department-of-transportation-ada-standards-for-transportation-facilities-2006>

Other Transit Agency Design Guidelines Reviewed

The following is a list of peer Agency Bus Stop design and guidance documents which were reviewed and/or referenced in developing this document:

- MBTA Bus Stop Design Guidelines
- Rhode Island Bus Stop Design Guide McMahon April 2017
- Port Authority of Allegheny County Bus Stop and Street Design Guidelines July 18, 2019
- Tri Met Bus Stops Guidelines July 2010
- GO GoldCoast Transit Bus Stop Guidelines June 3, 2015
- OmniTrans Transit Design Guidelines
- WeGo Public Transit Design Guidelines February 2019
- Transfort Bus Stop Design Standards and Guidelines July 2015
- SEPTA Bus Stop Design Guidelines October 2012
- Multi-Modal Circulation Handbook for Chester County, PA 2016
- Memphis MPO Bus Stop Design Accessibility Guidelines April 2017
- Metro Transit Shelter Guidelines January 2018
- GPCOG PACTS Transit Stop Access Project Phase IIA December 2019
- GPCOG PACTS Regional Bus Sign and Shelter Study Report and Implementation Guide October 2013
- Sullivan County Transportation Short Range Transit Operations Plan Bus Stop ADA Guidelines
- Monterey-Salinas Transit Designing for Transit A Guide for Supporting Public Transit Through Complete Streets 2020 Edition
- Mankato Transit Development Plan June 2018
- WMATA Guidelines for the Design and Placement of Transit Stops December 2009