Bus Stop Policy and Design Guidelines

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Prepared by:

BANGOR AREA COMPREHENSIVE TRANSPORTATION SYSTEM
BACTS

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Acknowledgements

This document was prepared by BACTS and developed in cooperation and with the assistance of a Work Group made up of Community Connector staff, municipal staff from the partner municipalities, and MaineDOT staff.

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Executive Summary

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 Policy and Design Guidelines include policy, design, and accessibility guidelines, which will be 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 (UZA). It should be noted that each 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 detailed 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.

Key Stakeholders

There are many different stakeholders in ensuring that bus stops are well connected, accommodate the needs of passengers safely and comfortably, and are efficient and cost-effective to operations.

- **The Transit Agency** – The Community Connector is owned and operated by the City of Bangor. It is the only small urban fixed route public transit provider in the greater Bangor urbanized area.

- **Municipal Governments** – Each municipal government which the Community Connector service operates within has jurisdiction over their own streets and sidewalks in the service area. These municipal governments include Bangor, Brewer, Hampden, Veazie, Orono, and Old Town.

- **Developers** – Developers provide new construction and growth in the greater Bangor urbanized area. Development may be either residential or commercial. Though both are concerned with access, the specific nature of those concerns may vary between residential and commercial development.

- **Employers** – Employees and retail customers are potential bus riders. Employers benefit when employees and customers can travel to their location easily and efficiently.

- **Advocacy and Neighborhood Groups** – Neighborhood residents are potential consumers of the bus service, and potential supporters of transit whether they use this service or not.

Bus stops and the related infrastructure and/or amenities may be constructed or owned by one entity and used or connected to facilities or property owned by another entity. Due to potential jurisdictional challenges, it is important for entities to coordinate and work closely with each other, especially during the design and construction (or alteration) of these transportation facilities.

The initial plan for system-wide designation of fixed bus stops will be developed by BACTS in consultation and collaboration with Community Connector staff, Municipal Planning, Engineering, and Public Works staff. A work group will be developed to also include representatives of the business community, educational institutions, social service organizations, and local transit riders and advocates. Once the location of each designated stop has been identified and approved for each route, an inventory listing of the bus stops, required infrastructure, and amenities will be developed. Once the designated stop plan, bus stop inventory listing, and facilities improvement/amenities needs plan are complete, they will be provided to the City of Bangor Community Connector for the next phase of implementation and ongoing upkeep and maintenance.

It is the desire of the Bus Stop Policy and Design Guidelines Work Group to present this draft document to local municipal councils and the public for review and comment with the intent to move forward with the project to complete the initial system-wide designating of bus stops. The Work Group feels strongly that in order to finalize the Policies of how bus stops will be managed and maintained, it is necessary to understand the total number and scope of bus stops and facility requirements in the system. Therefore, while there is agreement on, and it is the intent of the Work Group to follow the design guidelines within this document to complete the initial system-wide designation of bus stops, it is the intent of the Work Group that this document be finalized and presented for final approval only after the second phase of this project, as noted above, is completed.

Quick Reference Summary

The following is a summary of the information presented in this document. This can serve as a quick reference when considering bus-related street improvements; however, it is important to note that bus stop placement does not always fit a one-size fits all formula. Each location is unique and may require individual review and slight variations due to jurisdictional and physical context and limitations.

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.

Table A - Bus Stop Location

Location Relative to Intersection	
Far Side	If no complicating factors, 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 - Bus Stop Spacing

Number of Stops per Mile		
High Density Environment	Target: 4	Maximum: 6
Moderate Density Environment	Target: 3	Maximum: 5
Low Density Environment	Target: 2	Maximum: 4

Table C - Bus Stop Zone Length

In-Lane 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
Pull Out (Bus Bay) Bus Stop	
Far Side	90 feet
Far Side (after right turn)	140 feet
Near Side	100 feet
Mid Block	120 feet

Table D - Curbside Design

Sidewalk	• Clear width of 5-feet • Maximum cross slope of 1:50 (2%) • Maximum ½" vertical changes or opening in surface or gratings
Curb Ramps at Crosswalks	• At marked crossings minimum of 48" clear from ramp bottom to the marking • Minimum of 36" long and at least the width of the curb ramp located at top of the ramp. • Transition to adjacent surfaces of walks, gutters, and streets at same level • Maximum running slope of 1:12 (8.3%) • Maximum flared sides 1:10 (10%) • Maximum cross slope 1:50 (2%) • Maximum counter slope 1:20 (5%) • Turning space 4 feet by 4 feet with maximum 2% slope in any direction • Clear space 4 feet by 4 feet located at bottom of ramp outside active travel lanes • Detectable Warnings required at traffic controlled intersections and mid block crossings
Curb Ramp Detectable Warnings	• Width full depth of curb or minimum of 24" from back of curb • Contrast visually with adjoining surfaces • Consist of raised truncated domes with base diameter from .09" to 1.4" and top diameter 50% to 65% of base diameter and height of .2" • Center to center dome spacing between 1.6" and 2.4" • Base dome spacing of at least .65"
ADA Landing Pad	• Can be connected to the backside of the sidewalk or located between the curb and sidewalk • 8-feet perpendicular to curb/roadway • 5-feet parallel to curb/roadway • Maximum slope of 1:48 (2.1%) perpendicular to roadway • Same roadway slope parallel to the roadway
Pavement Markings	• Stop delineation should designate the entire bus zone to ensure that the area doesn't get blocked by other vehicles • Yellow or white paint
Bus Stop Signage	• Uniform design issued by Community Connector • Bottom of sign minimum of 80" from ground and top no higher than 120" from ground • Front of sign placed at 90° angle perpendicular to curb
Bus Stop Posts	• Installed 18" from edge of roadway • Bus shelters designed to accommodate bus stop signs can be used in lieu of a bus stop post.
Bus Shelters	• Should be oriented so they are placed facing the travel lane and near-side of the landing pad. • Should provide seating on the inside and be transparent on sides for greater visibility • Should be shatterproof and marked with reflectors • Panels should be resistant to fading and clouding • Must have minimum 30" by 48" clear floor space entirely within the perimeter of the shelter • One side of the clear floor space must adjoin accessible route • If clear floor space is confined on any of the three sides, a minimum of 36" front approach or length greater than 60" parallel approach is required • Minimum distance of 2' should be maintained between the back face of the curb and roof or panels of shelter • Minimum 7.5' clearance between underside of roof and sidewalk

Passenger Seating	• Should be fabricated of durable material resistant to vandalism and weather conditions • Clear ground or floor space shall be provided and be positioned at the end of the seat and parallel to the short axis of the bench • Benches shall be a minimum of 42” long and 20” deep with a maximum of 24” deep • Benches shall provide back support or be affixed to a wall • Back support shall be a minimum of 42” long and extend from a maximum point 2“ above the seat surface to a minimum point 18” above the seat surface • At a maximum , back support shall be 2½” from the rear edge of the seat measured horizontally • At a minimum, the top of the bench seat shall be 17”, and at a maximum 19”, above the finish floor or ground • The surface shall be slip resistant and not accumulate water
Lighting	• Transit stops without sheltered lighting should be located within 30 feet of an overhead light source • Alternative to hard-wired lighting may include a solar-powered bus stop pole
Trash Receptacles	• Should be secured to the ground to prevent accidental tipping or unauthorized movement
Bicycle Parking	• A bicycle frame should be supported by the rack in two places for resisting theft • If multiple racks are installed, they must be placed at least 3 feet apart to allow for convenient access • Bicycle racks typically require a 10’ by 10’ footprint, including space for bicycles

Table E - Typical 40’ Bus Specifications

Full Length	41’
Wheelbase	23’ 9”
Front Door to Bumper	2’
Rear Door to Bumper	16’ 6’
Centerline Door to Door	19’ 10”
Front Door Width	3’ 4”’
Rear Door Width	2’ 11”
Height	9’ 9”’
Kneeling Capacity	3”

Table F - Typical 40’ Bus Turning Movement Dimensions

Turning Radius	43’
Approach Angle	9°
Departure Angle	10°

Part 1 - Policies Relating to the Management and Maintenance of Bus Stops

Introduction and Purpose

The purpose of this document is to provide guidance to the stakeholders of the fixed route bus system in the Greater Bangor region to ensure consistency in the design, placement, and location of bus stops; as well as to ensure bus stops are managed and maintained properly and uniformly throughout the system. In order to ensure bus stops are properly managed and maintained, processes and agreements must be implemented and coordinated among jurisdictions so that there is a mutual understanding and acceptance of each entity's roles and responsibilities.

Section 1 - Coordination With Other Jurisdictions and Stakeholders

Municipal Partners

Bus stops and the related infrastructure and/or amenities may be constructed or owned by one entity and used or connected to facilities or property owned by another entity. Due to potential jurisdictional challenges, it is important for entities to coordinate and work closely with each other, especially during the design and construction (or alteration) of these transportation facilities.

The goal of these coordination efforts is to make sure that all partners involved are working together to make the facility feasible and understand each other's roles and responsibilities. These types of projects can provide an opportunity to address accessibility issues and stress the importance of coordinated planning in these types of projects.

Land Development/Site Plan Review

Coordinating bus stop improvements should be addressed as part of any design review process for institutions and developers. Municipalities and other entities with oversight over development in the Greater Bangor urbanized area should incorporate consideration of transit needs and impacts into the site development and/or design review process as a required step. If there are bus stops in the area, or might reasonably be in the future, then institutions and developers should coordinate with Community Connector as applicable. 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 it results in efficiencies during construction. In other situations, it may make more sense for developers to pay into a fund to be used for bus stop improvements along the corridor or in the area.

When a new development plan is submitted to a Municipality, the Municipality should coordinate with the Community Connector to ensure that any required bus stop improvements are incorporated as part of the site development and/or design review and approval process. The Municipality and Community Connector will cooperatively perform a bus stop site review. Proposed new bus stops and associated infrastructure improvements required and implemented as a result of a development plan reviewed through the municipal subdivision and site plan review process will not require review and concurrence by the BACTS Transit Committee. Page 19 includes a flowchart describing the new development bus stop review process.

Appendix 1 provides sample language which can be incorporated into local land use code to ensure that new development adequately makes accommodation for impacts to existing and planned transit service.

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.

A transportation network that facilitates fast and efficient movement of vehicles from origin to destination point is essential for growing the economy and supporting mobility to connect the region to the rest of the world. However, transportation networks in urbanized areas require a more multifunctional design to accommodate a greater range of activities and users. A strong public transit system is an essential part of an economically vibrant, livable, sustainable, and equitable region.

Municipalities can plan for efficient land use and development patterns to support transit by planning for density of population and activity; designing for a pedestrian-friendly environment; encouraging mixed-use land use patterns; developing an interconnected street network that maximizes pedestrian and bicycle access and simple route design; supporting the development of housing affordability to population likely to use transit; support travel options that encourage or compliment using transit; and plan for linear growth in nodes along corridors.

The intensity of land use drives the cost-effectiveness of transit investments, particularly the ongoing cost to operate service. Regional transit investments need strong partnership with local governments to support success. Municipalities will need to set the vision for land use around transit routes and guide development and local infrastructure to implement the vision through corridor planning. This vision and commitment should be expressed in comprehensive plans and supported by strategies and investments. This includes considering regional corridors and their relationship to neighboring communities including the potential for extensions of existing bus service.

Density and activity are important factors, but there are other components that should be considered in designing 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 accommodates 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.

Example of Types of Uses to Encourage and Discourage in Transit-Supportive Areas

Recommendation to Develop Transit-Supportive Areas		
	Uses	Development Forms
Include or Encourage	• Multifamily/small lot residential units that support mix of housing affordability • Office space • Hotels • Cultural and public institutions • Healthcare facilities and clinics • Retail, services, and restaurants • Post-secondary education	• Maximize building frontage on the street • Varied human-scale building design • Landscaping, pedestrian lighting, sidewalks
Restrict or Discourage (as Standalone)	• Surface parking lots (excluding park and ride lots) • Distribution warehouses • Personal storage facilities • Outdoor storage facilities • Salvage yards • Motor vehicle sales • Motor vehicle fueling, servicing and repair, car washes	• Off-street parking located between the building and the sidewalk • Drive-thru lanes located between the building and the sidewalk • Opaque surfaces of any kinds constituting more than 60% of any building surface facing a street at eye level.

Non-Profit and Private Sector

Large institutions, such as hospitals and colleges, often have expansion needs. Improving bus stops as part of a strategy to reduce the impact expansions have on the transportation network is often appropriate since these institutions are often the destination for many transit users. Private entities also benefit from having bus stops located at their property. In many cases, these institutions adopt the bus stops surrounding their campus and take over responsibility for maintenance as well.

Section 2 - 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, Community Connector should obtain a formal agreement with the property owner for the use of the property, as well as an agreement outlining the financial and physical roles and responsibilities for the management and maintenance of the bus stop and bus stop infrastructure of each entity (i.e., Community Connector, Municipality, or other private entity).

Bus Stop and Shelter Design and Site Planning

Before construction and installation can occur, site plans must be prepared and approved by the municipality where the bus stop/shelter will be located in order to ensure the quality of the stop/shelter

placement and installation, as well as make sure that all aspects of the site and shelter meet or exceed current Americans with Disabilities Act (ADA) requirements (for more information see Appendix 2).

Municipal staff will be able to identify and address any issues that may impact shelter placement (e.g., underground utility lines, property lines and ownership, public right of way issues, snow removal/street maintenance considerations, ADA upgrades required on each end of the sidewalk leading to the site, etc.).

Municipal staff will provide Community Connector with a plan showing how each site will be constructed and where each shelter and other bus stop amenities will be placed.

Procurement

Having uniform and consistent bus stop infrastructure and amenities is essential for customer service and brand recognition. Community Connector, in coordination and communication with municipal partners, will be responsible for the procurement process for bus stop infrastructure and amenities purchased with Federal Transit Administration (FTA) funding. Community Connector will work with municipal partners to seek agreement, to the maximum extent possible, on consistent Bus Stop Sign, Sign Post, Bench, and Bus Shelter general appearance, dimensions, and desired features through the BACTS Transit Committee on or before December 31st, 2021 and develop any required product specifications and/or RFPs based on those agreed upon features.

All Community Connector bus stops, whether funded by a private entity or publicly funded, shall not deviate from the Community Connector standards. Once general design and appearance standards and specifications are agreed upon, the Community Connector bus stop element standards will be incorporated, either directly or by reference, into these guidelines for the following:

- Bus Stop Signage
- Sign Post
- Bus Shelter
- Bus Stop Seating

Property/Land Use

Project and/or site approval may be required for proposed bus stops. The municipality shall obtain and submit any required project or site approvals to the Community Connector Bus Superintendent. The Community Connector shall keep a record of all approvals secured for all bus stops in their service area.

Property use permission and/or a formal agreement may need to be secured where bus stops and/or shelters will be installed on private property. These efforts should be coordinated with the appropriate Municipal Planning, Engineering, Public Works staff, and/or Elected Officials when reaching out to landowners to secure land use approval. Community Connector shall maintain agreements with landowners to use the private property as a public bus stop. This may take the form of a formal easement, lease, land purchase, or other appropriate mechanism.

Construction and Installation

Construction and installation may require municipal or MaineDOT project approval or permitting. The municipality shall obtain and submit any required project approvals or permits to the Community Connector Bus Superintendent. Community Connector will keep records of all approvals and permits obtained for bus stops in their service area.

Responsibilities for construction and installation of bus stop infrastructure and amenities should be clearly defined in agreements.

Maintenance

FTA requires that shelters purchased with federal funds be maintained in good working order and ADA rules require that bus stops are accessible, maintained, and clear of obstructions, including snow. It is essential to eliminate any ambiguity in roles and responsibility of maintaining these facilities. Roles and responsibilities in regards to bus stop maintenance should be clearly outlined in agreements.

Implementation of Adopt-A-Stop Program, where individuals and organizations are provided recognition and incentives can also provide assistance in maintaining bus stops. Volunteers should not be relied upon as a primary source of regular and comprehensive maintenance, but can enhance the maintenance program and can instill a sense of community pride for the transit system. Implementing such a program requires the transit agency to develop and oversee a program.

Table 1 shows, in general, the entity which would be responsible for purchase, construction, replacement, and maintenance of bus stop areas, unless otherwise indicated by formal agreement. It is the intent of the municipal partners to fund the cost of implementing and maintaining bus stop infrastructure to the greatest extent possible with available federal transit funding prior to assessing local municipal funding.

Table 1- Bus Stop Facility Management and Maintenance Roles and Responsibilities

	Fund Purchase of Materials/ Amenities	Labor Construction/ Installation	Labor Regular Maintenance
Pavement Markings	Municipality	Municipality	Municipality
Sidewalk Improvements	Municipality	Municipality	Municipality
Snow Removal / Ice Control	NA	NA	Municipality
Grass / Weed Control	NA	NA	Municipality
Litter Removal	NA	NA	Municipality
Lighting	FTA Funding	Municipality	Municipality
Bus Stop Sign and Post	FTA Funding	Municipality	Municipality
Landing Pad	FTA Funding	Municipality	Municipality
Bus Shelter	FTA Funding	Municipality	Municipality
Shelter Pad	FTA Funding	Municipality	Municipality
Seating	FTA Funding	Municipality	Municipality
Bicycle Parking	FTA Funding	Municipality	Municipality
Trash Receptacle	FTA Funding	Municipality	Municipality
Information Kiosk	FTA Funding	Municipality	Municipality

**** Note: there is no guarantee that Federal Funding will be available***

Public Notice/Public Outreach

Public outreach and notice of changes affecting bus stops needs to be targeted in areas of the impacted routes. This requires coordination with both the Community Connector and affected municipality(ies).

Bus Stop Inventory/Database

A full inventory of bus stops, with location, infrastructure, amenities, existing conditions, asset ownership, and maintenance responsibilities should be developed and maintained. This may involve a site visit to each stop and is labor-intensive, but is the only way to collect critical information for budgeting, planning, and establishing priorities. As part of the initial designation of bus stops project this database/bus stop inventory will be developed. The Community Connector will be responsible for maintaining and updating the inventory of all bus stops, as well as any maintenance agreements and providing the inventory to each respective municipality any time there is a change or update to any of the bus stops within the Municipality.

Grant Applications

As the direct recipient of FTA funding, Community Connector will apply for annual apportioned formula funding, as well as competitive discretionary funding. The Community Connector has been very successful in obtaining competitive discretionary funding in the last several years. Community Connector was awarded $396,800 in federal funding to add passenger shelters and bus boarding areas in federal fiscal year 2020.

The municipal partners have expressed the desire to continue to apply for and take advantage of all available federal funding resources to finance system improvements.

Capital Planning and Budgeting

On or before March 15th of each year, in coordination and in communication with all municipal partners, BACTS, MaineDOT, and Community Connector shall develop a six-year capital improvement plan. This shall include, but is not limited to, all bus stop infrastructure and amenity requirements. A draft capital improvement plan shall be presented to the partners at BACTS Transit Committee to be reviewed collectively and investment priorities mutually agreed upon prior to completion.

Prioritizing Investments

While some bus stop improvements may occur as a result of roadway or development projects, some funding will be required to complete bus stop enhancements. For these projects, a plan to evaluate and prioritize investments is needed. Given the estimated costs and the fact that it will take time for all sites to be improved, there are two primary needs for prioritization - bus stops which need basic elements (such as bus stop signs and posts) and/or required ADA or accessibility improvements, and those stops which are to be enhanced with additional comfort amenities (such as bus shelters).

Cost Estimates

Implementing bus stop improvements is often more expensive than expected. In particular, the accessibility requirements to have the sidewalk at least eight feet wide at the landing area by the front door of the bus, and the requirement to keep the cross slope under two percent, means that some significant concrete sidewalk repair may be needed at a number of stops. Cost estimates are included in Appendix 5, and will be provided whenever new facilities are proposed.

Section 3 - Bus Stop Maintenance Policy

As with the planning, design, and construction of upgrades, ongoing physical maintenance may also involve multiple entities for bus stops. Since the land at a bus stop is typically owned by a municipality, and the various bus stop elements can be owned by different parties, it can be a challenge for the public, or even transit agency staff, to track how to report problems. Once again, good communication and

coordination among agencies can alleviate most issues. The bus stop environment may involve multiple ownerships, there should be mechanisms in place to pass along reports of problems from one agency to another as appropriate. Community Connector will execute Agreements with each Municipality and private entity in which bus stops are located. Maintenance responsibility for a bus stop can be that of the 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. Maintenance of bus stops shall include, but may not be limited to, the following:

Physical Inspection - At least twice per fiscal year, Community Connector, or their agent, will perform an inspection to check on the condition of the location, infrastructure, and amenities, and to note any uncompleted maintenance activities required to be performed at each bus stop. A written report noting any graffiti, required repairs, and/or replacements will be provided to the municipality and private entity (if applicable) requesting action on the noted items within 45 days.

Litter Pickup - All locations with fixed bus stop amenities will have the litter and other debris picked up and removed at least monthly. Trash cans located at bus stop locations will be emptied on a weekly basis. Stops with more frequent activity will be serviced on an as needed basis.

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. Signs, postings, and graffiti shall be removed as needed.

Washing of Bus Shelters, Benches, and Area - All shelters and benches not part of a Shelter Advertising program shall be thoroughly cleaned at a minimum of twice per year (in the spring and in the fall), or on an as needed basis. Cleaning shall mean that all benches, windows, frames and other physical parts of the shelter and the shelter floor shall be cleaned from all dirt, grease, grime and other foreign substances to assure that each location is aesthetically pleasing and free from dirt and litter.

Repairs and Replacements - During physical inspection, if any items that need to be repaired or replaced are identified, a written notice will be provided by the entity responsible for inspection to all parties. Items will be repaired or replaced based upon the terms made at the time of Agreement for that bus stop location. During the course of ordinary business, issues requiring attention that are reported by individuals or bus operators shall be communicated by Community Connector to the Municipality, private entity (if applicable), and third-party contractor, if applicable. Action requested and time and materials required to complete the repair or replacement to the bus stop infrastructure and/or amenity shall be negotiated by the parties at the time of notice.

Grass Cutting and Trimming - The immediate area around the designated locations will 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. The paint can wear and fade and may need to be repainted occasionally. The pavement markings should be inspected every spring to determine if they require repainting. Pavement markings shall be inspected and repainted, as necessary, as part of the municipal pavement marking maintenance program.

Snow and Ice Removal - The immediate area around the designated bus stop location and the pedestrian route to access the bus stops and shelters shall be clear of snow and ice. Whenever any ice forms upon a sidewalk or pedestrian route, ice shall be removed and/or covered with sand or other ice melting substances in such a manner as to allow safe and easy travel on the pedestrian way and at

the bus stop or shelter. Snow banks at the bus stop, shelter, or that form on the street in front of bus stops shall be removed, and included as part of the municipal storm maintenance level of service plan.

Failure to Perform Duty - If the responsible party does not undertake repairs, replacement, and/or maintenance per the Agreement, the Community Connector may thereafter cause the repairs and/or maintenance to be performed and bill the responsible party for the costs as detailed in such Agreement.

Reporting of Issues at Bus Stops - 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. Community Connector staff will notify the appropriate contacts responsible for repairing, replacing, or cleaning the item in question as indicated on the Bus Stop Inventory and by Agreement.

Section 4 - 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 and the Municipality 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 include offering the sponsoring participant a free bus pass.

In order to ensure that bus stops are adequately and consistently maintained, these agreements should be developed between the sponsoring participant, the Community Connector, and the Municipality in which the bus stop is located. If the sponsoring participant fails to meet their obligations in maintaining the bus stop, the Municipality would have to assume responsibility for the bus stop maintenance.

In order to implement an Adopt a Stop program, the Community Connector will need to develop and oversee the program.

Section 5 - Procedure for Reviewing Requests for Adding or Eliminating Bus Stops

There are three primary venues in which requests to add, relocate, or eliminate a bus stop may be received:

- New Development or Construction
- Proposal by Transit Provider or Municipality
- Proposal by Private Entity

Construction projects that significantly alter the roadway or surrounding land uses may require a re-evaluation of the placement of bus stops. Likewise, the placement of new bus stops due to development or construction will necessitate early involvement from Community Connector staff to identify appropriate bus stop locations. A number of factors, discussed in this document, contribute to the final decisions regarding bus stop placement.

The design of bus stops and surrounding areas is very important to the safety and convenience of passengers as well as for adherence to the requirements of the ADA. Bus stop design and amenities are detailed in Section 2, and there are several factors that influence the type of bus stop to be designed and what amenities will be included at each location.

Developers should work with Community Connector staff and the municipality to design site plans that accommodate bus stop landing pads, passenger shelters, and other amenities where merited. While certain communities and neighborhoods may want to install custom bus shelters in some locations, it is essential to install standard shelters for uniformity, recognition, ADA accessibility, and maintenance reasons.

Requests to remove or relocate bus stops are usually initiated because of a safety concern caused by a change in traffic conditions; there has been a change in service; or a property owners request.

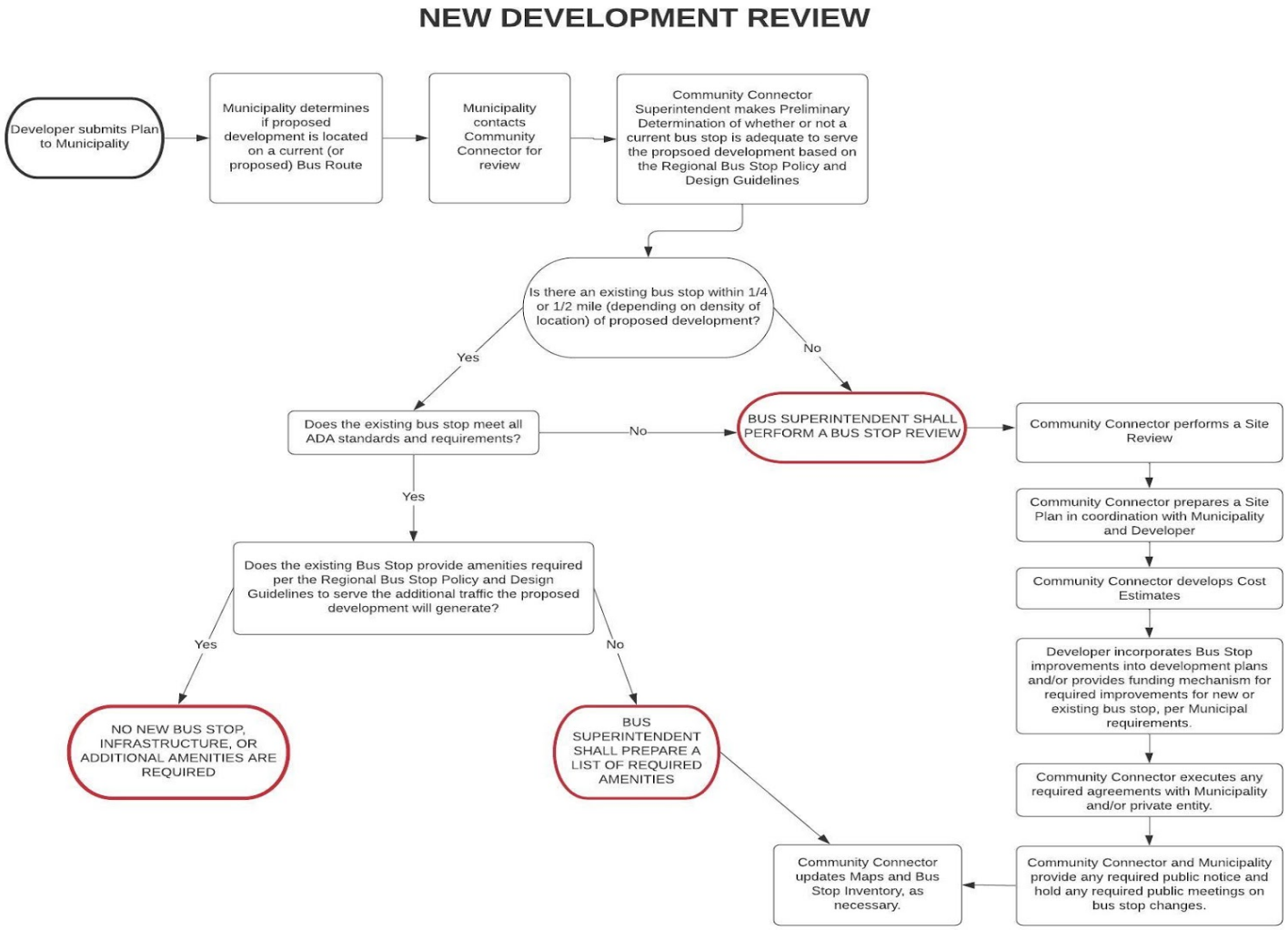
Procedures for Requesting Installation or Removal of a Bus Stop

New Developments

While it is not required, coordinating bus stop improvements should be addressed as part of any site development and/or design review process for institutions and developers to mitigate any unexpected conflicts and/or disappointments after construction. A way to make this process more formalized is to incorporate bus stop design standards as part of the municipal land use code. An example of such language is included as Appendix 1.

The procedure for reviewing new development located on an existing (or proposed) bus route which is included as part of a development plan reviewed through the municipal subdivision and site plan review process is as follows:

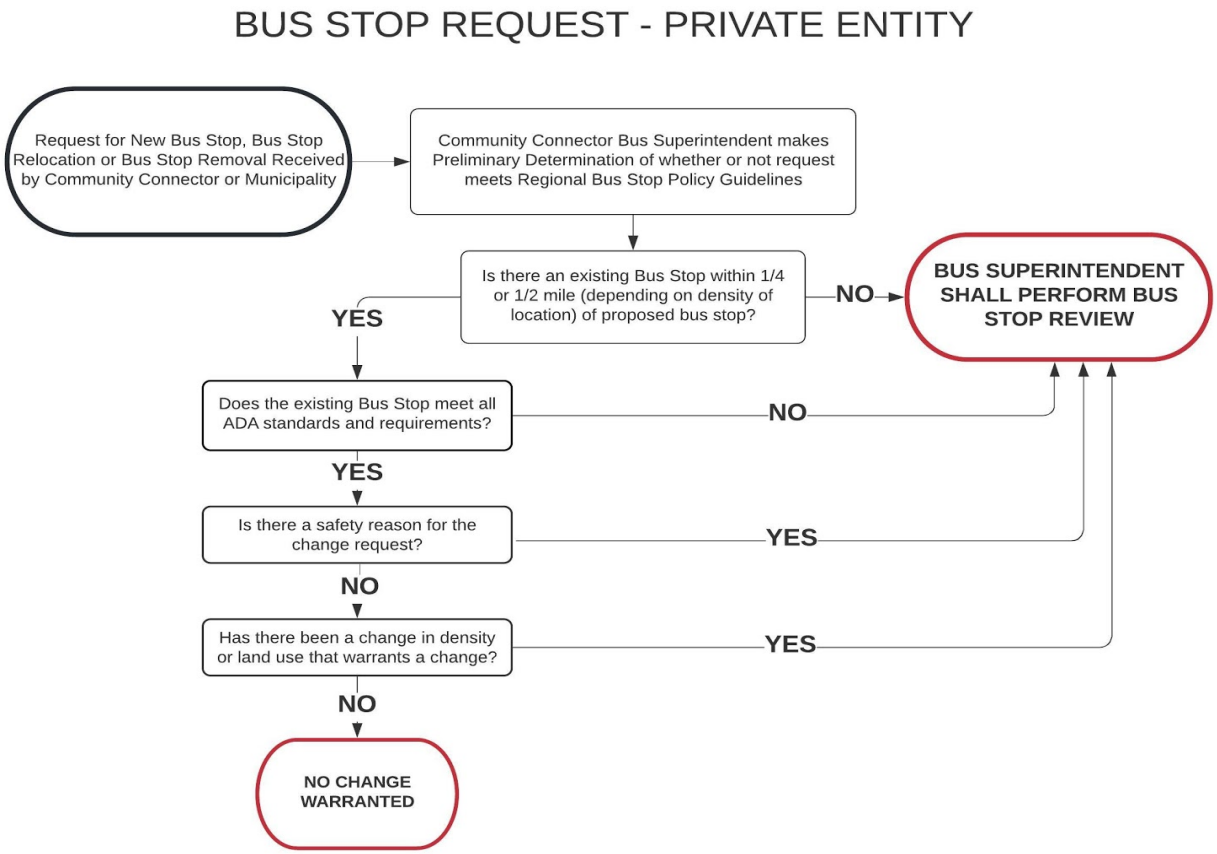
Flowchart 1 - New Development Review



Private Entity Request

When a private party or entity approaches Community Connector or a Municipality with a request to add, relocate or eliminate a bus stop, the Community Connector Bus Superintendent will make a preliminary determination of whether or not the request meets the Regional Bus Stop Policy and Guidelines to warrant a review. The procedure for reviewing the request is as follows:

Flowchart 2 - Private Entity Bus Stop Request



Bus Stop Review Procedure
(Not part of a development plan reviewed through the municipal subdivision and site plan review process)

New Bus Stop Request:

1. The Community Connector Bus Superintendent and the Municipal Engineer and/or Public Works Director will conduct an on-site review of the proposed bus stop location to consider traffic patterns, street design, traffic safety issues, and properties that may be affected by the stop location.
2. Following the site review, the Community Connector Bus Superintendent will document the findings from the site review and present the proposed site plan and improvements with cost estimates to the BACTS Transit Committee for review and concurrence.
3. If approved and required, improvements will be programmed into appropriate annual work plan(s) and program(s).
4. If required, Community Connector will execute Agreements with Private Entities.
5. If approved, Community Connector will execute and/or update bus stop inventory and Agreements with Municipality.
6. If proposed is found to not meet requirements, Community Connector will notify the requesting party of denial.

Removal of Stop Request:

1. The Community Connector Bus Superintendent and the Municipal Engineer and/or Public Works Director will conduct an on-site review of the proposed bus stop location to consider traffic patterns, street design, traffic safety issues, and properties that may be affected by the stop location.
2. Following the site review, the Community Connector Bus Superintendent will document the findings from the site review and present the findings to BACTS Transit Committee for concurrence.
3. If approved, the Community Connector will update Agreements with the Municipality.
4. If denied, the Community Connector will notify the requesting party of the denial.

In all circumstances any required public notice will be provided prior to any changes being made.

Part 2 - Bus Stop Design Guidelines

Introduction and Purpose

The spacing, location, design, and operation of bus stops significantly influence the transit system performance and customer satisfaction. The key component to establishing quality service that balances convenience and speed is the number and location of bus stops.

This document has 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. These guidelines shall be applied to any future routes, proposed bus stop plan, design, and/or improvements.

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

1. **Stop location** – A bus stop's placement relative to the nearest intersection, to other stops, and to the development it serves.
2. **In-street Design** – The space allocated for the bus to curb passenger loading and to exit and enter the flow of traffic.
3. **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
4. **Passenger Amenities** – Includes elements, such as shelters, lighting, and seating.

Section 1 - Bus Stop Location

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 or 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 somewhat 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 will need to encourage pedestrian pathways, 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.

Location Relative to Intersection

Bus stop placement directly impacts the convenience and accessibility of the transit system. Determining the proper location of bus stops involves choosing between near-side, far-side and mid-block stops. While many other factors should be considered when choosing a bus stop location, including adjacent land use, space availability, and pedestrian access, the location of the stop relative to the intersection is an important consideration. If all other factors were similar, far-side stops would be preferable since they encourage pedestrians to cross behind the bus and not in front. However, there are almost always complicating factors.

- **Near-side** bus stops are located before an intersection, allowing passengers to load and unload while the vehicle is stopped at a red light or stop sign. Near-side bus stops can minimize interference when traffic is heavy on the far-side of an intersection. At stop-controlled locations, near-side stops eliminate “double stopping,” as passengers can board the bus during the stop. Additionally, at near-side stops, gaps in traffic flow are created for buses re-entering traffic at the intersection and passengers access the bus closest to the crosswalk.

  The stop configuration generates conflicts with right turning vehicles. Delays associated with loading and unloading passengers may lead to unsafe driving practices, where right turning vehicles drive around the bus to make a right turn in front of the bus. Buses serving near-side stops may restrict sight distances for crossing pedestrians and vehicles.

- **Far-side** bus stops are located after an intersection, allowing the bus to travel through the intersection before stopping to load and unload passengers. When the bus pulls away from the stop to reenter traffic at an intersection controlled by a traffic signal, the signal generates gaps in traffic allowing buses to re-enter the traffic lane. Far-side stops also require shorter deceleration distances and encourage pedestrians to cross behind the bus. Far-side bus stops take up the least amount of curbside space. Far-side stops provide additional right turn capacity at the intersection by eliminating bus blockage in the curb lane on the approach to the intersection. For these reasons, far-side stops are a preferable stop location, if traffic signal and geometry conditions are favorable.

  During peak travel periods, when traffic is heavy and bus queuing is possible, intersections may be blocked by buses waiting to access a far-side bus stop. Queued buses may restrict sight

distances for crossing pedestrians and vehicles. Stopping far-side after stopping for a red light may interfere with bus operations as well as general traffic flow.

- **Mid-block** bus stops are located between intersections. Mid-block stops minimize sight distance problems for vehicles and pedestrians. Passenger waiting areas located mid-block often experience less pedestrian congestion. However, mid-block stops require both deceleration and acceleration areas, requiring additional distances for no parking restrictions or increased turnout construction costs. Mid-block stops also increase walking distances for pedestrians crossing at intersections, or result in pedestrians illegally crossing the street mid-block.

  Mid-block stops should generally be used under special circumstances, such as where large destinations justify high-volume access or when the distance between adjacent intersections exceeds stop spacing recommendations.

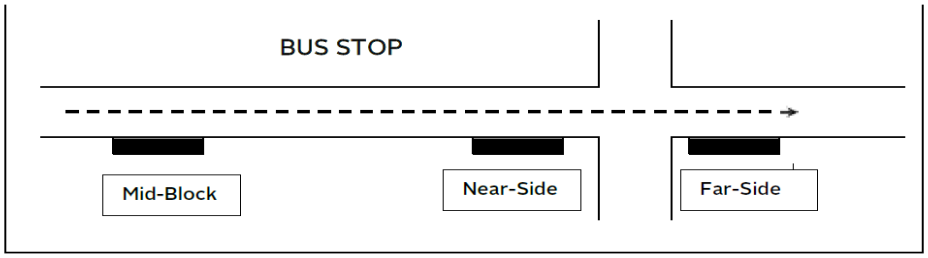


Table 1 shows the advantages and disadvantages of each stop placement, as well as where each type of stop is recommended.

Table 1 - Location Relative to Intersection

	Advantages	Disadvantages	Where Recommended
NEAR SIDE	• Minimizes interference when traffic is heavy on far-side of intersection • Allows bus boarding closest to cross walk. Pedestrians waiting to cross do so while the bus is stopped and not moving into the stop • Width of the intersection is available for the bus to pull away from curb and merge with traffic • Avoids double stopping for both traffic signal and customer movements • Allows passengers to board while the bus is stopped at a red light	• Increases sight-line problems for crossing pedestrians • Increases conflicts with right-turning vehicles passing and turning in front of the bus • May result in stopped buses obscuring curbside traffic control devices and crossing pedestrians • May block the through lane during peak periods with queuing buses • May cause sight lines to be obscured for vehicles exiting the side street to the right of the bus	• 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 • Where the accumulation of buses at a far-side stop spill over into the intersection
FAR SIDE	• Minimizes conflicts with turning vehicles • Provides additional right turn capacity by making curb lane available for traffic • 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	• May result in traffic queued into intersection when a bus is stopped in travel lane • May obscure/increase sight distance at the far-side crosswalk and for side streets • Pedestrian stepping off the curb as the bus approaches the bus stop • Vehicles occupying right turn only lanes and deciding to proceed straight instead of turning and cutting off bus approaching far-side stop • 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	• 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
MID BLOCK	• Passenger waiting areas may experience less pedestrian congestion • Minimizes sight line obstructions for vehicles and pedestrians • Conflicts with intersection traffic minimized	• 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	• 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

Bus Stop Spacing

Bus stop spacing refers to the distance between bus stops along a route. It is a powerful service planning tool that has a major impact on transit vehicle and system performance. Efficient bus stop spacing balances the goal of minimizing travel time for the bus and walking distance for the passenger. When stops are uniformly placed, passengers can more easily understand the layout of the system and rely less on maps and guides.

Stop spacing for local services of more than five per mile (less than approximately 1,000 feet apart) can be useful only when most passengers are going short distances (such as services in retail and entertainment areas where substitutes for walking are a primary reason for the service) or where design and street conditions render the delay caused by stops less relevant. Stops spaced closer together slow down the ride for everyone and leave fewer resources to spend on each stop. As a generalization for local service in urbanized areas, bus stops should be spaced every ¼ mile, with some denser areas requiring closer spacing to meet operational needs, and less dense areas stops to be spaced every half-mile. Assuming the average speed to be three (3) miles per hour, it will take ten (10) minutes for a person to walk or move between stops that are a half-mile (2,640 feet) apart.

As shown in Table 2, the target number of stops per mile in higher density environments (areas with a high number of activity generators and large population centers) is 4, moderate density environments (areas with some activity generators and moderate levels of population density) is 3, and low density environments (areas with little or no activity generators and lower population density) is 2.

Table 2 - 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

Steps in 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. Existing conditions such as roadway type and width, bus service characteristics, and land use affect the way that bus stops should be spaced and designed to ensure comfort, short travel times, and overall network efficiency. Additional considerations that impact the safety, convenience, and accessibility of a stop, such as placement relative to street intersections must also be considered.

However, 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 will depend more on stop spacing and other factors. However, for major trip generators the stop should be located as close as possible to the entrance of the destination.

- **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. It 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 will 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.

    a. Bus stops should be accessed by a sidewalk in good condition between the bus stop and the closest intersection. A safe, nearby street crossing with curb cuts for wheeled mobility devices, is required. For areas where it is likely that a higher volume of people will visit multiple destinations in a single trip, priority should be given to making sure that there is an accessible path throughout the area. For bus stops which serve mostly a single destination, the focus can be on a path between that destination and the bus stop.

    b. Bicycling and transit can complement each other. The reach of transit service can be extended by providing connections for passengers to combine these two modes of transportation in a single trip. Particularly in outlying areas, passengers may be more likely to access the bus stop by bicycle. Good bicycle infrastructure increases bicycle usage by making riders feel safer and more comfortable. Wherever possible, stops should be placed close to bicycle infrastructure, especially where a stop can facilitate connections to areas without bus service. Some stops may warrant bicycle parking.

- **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.

- **Additional 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 at 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

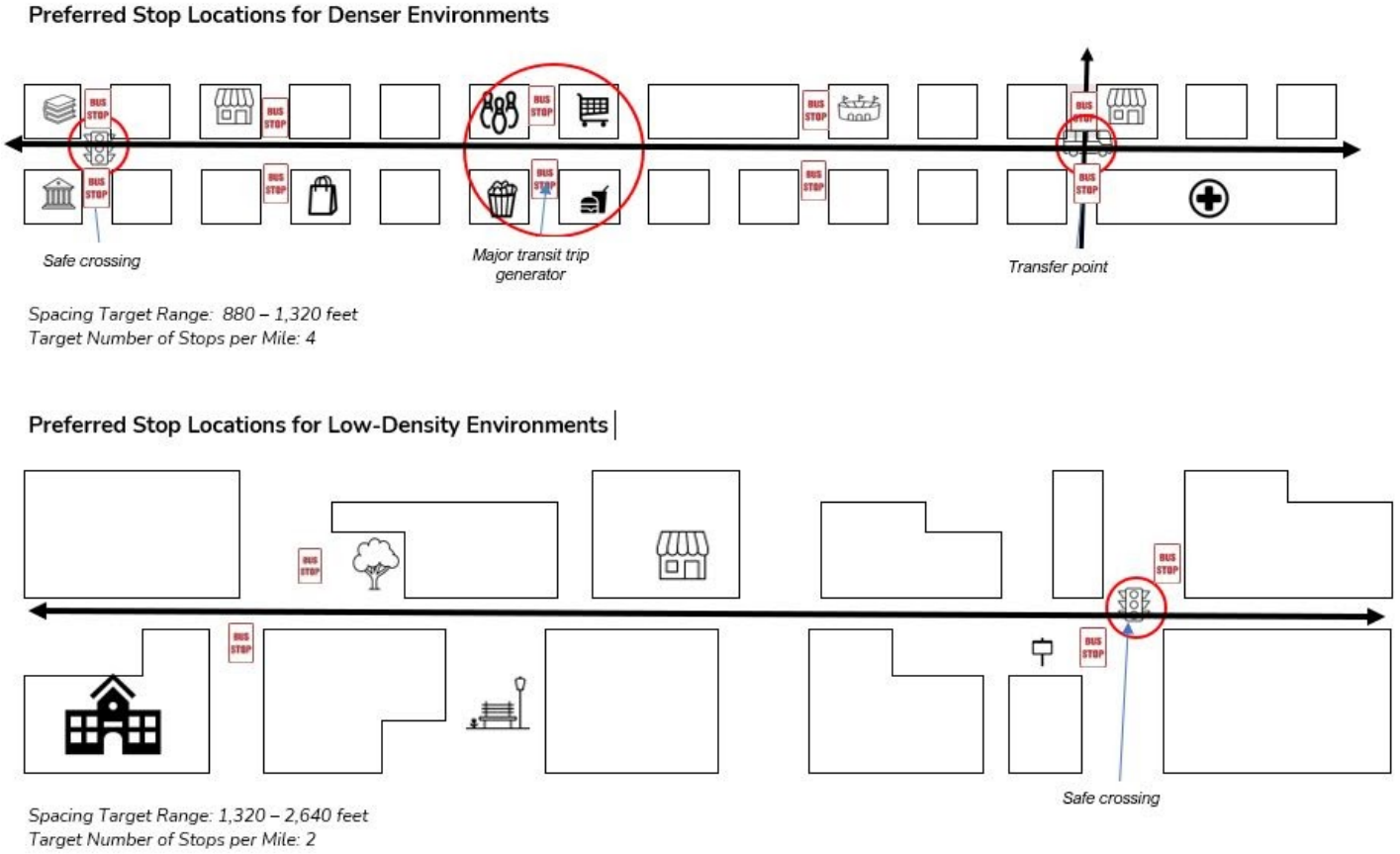
Title VI populations, including low-income individuals and minorities, are considered when prioritizing the provision of amenities at bus stops.

- **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.

  This distance is a reasonable balance of the conflicting goals. However, finding suitable sites for bus stops may necessitate altering the spacing significantly. In addition, there may be reasons for bus stops to be closer together, such as major transfer points and/or activity centers. And there may be places where bus stops should be further apart, particularly if there would be no boardings or alightings due to adjacent land uses. Initially plan stops at major transit generators, safe crossing locations, and transfer points. Then plan stops at locations that are spaced appropriately between the initial stops.

Figure 1 illustrates preferred stop locations.

Figure 1 - Preferred Stop Location



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.

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 activity.

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, curbside bus stops will generally fall within the parking lane and will necessitate the removal of 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 also impact stop length.

Bus stops may need to be adjusted based on site specific conditions; however, typical dimensions for in-line bus zones are shown in Figure 2 below, and the desired minimum bus stop zone length is shown in Table 3.

Figure 2 - Typical Dimensions for In-Line Bus Zones

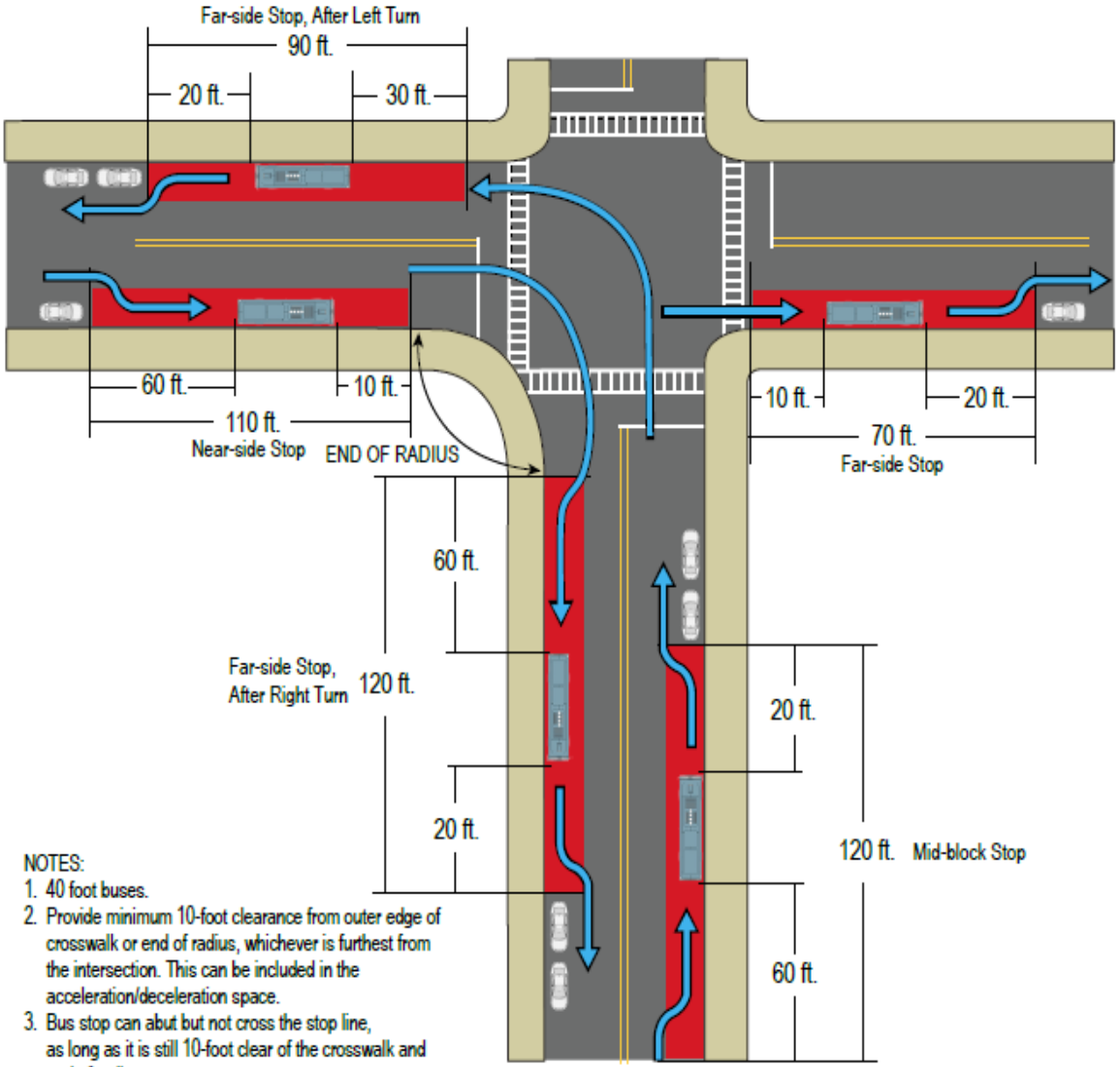


Table 3 - Desired Minimum Bus Stop Zone Length for 40' Bus In Lane Bus Stop

Stop Location	Deceleration Lane (feet)	Stopping Area (feet)	Acceleration Lane (feet)	Total (feet)	Number of Parking Spaces
Far-Side	10	40	20	70	4
Far-Side (after left turn)	30	40	20	90	5
Far-Side (after right turn)	60	40	20	120	6
Near-Side	60	40	10	110	6
Mid-Block	60	40	20	120	6
Curb Extension	n/a	40	n/a	40	2

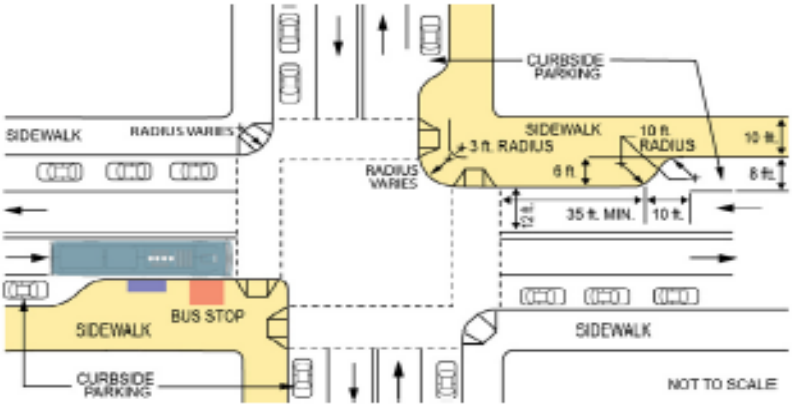
Note: The bus stop must have a 10-foot clearance from the outer edge of the crosswalk or end of radius, whichever is furthest from the intersection.

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.

It is 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.

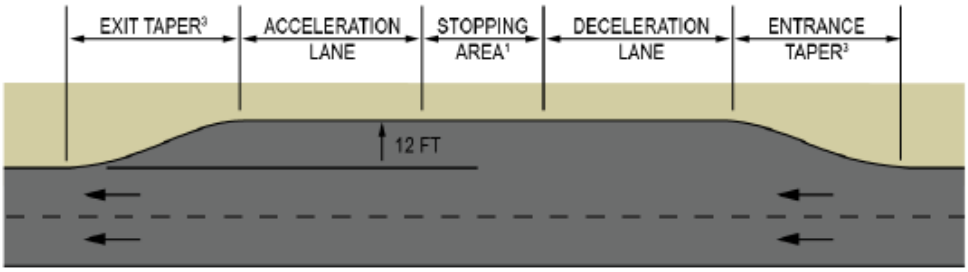
Figure 3 - Curb Extension Illustration



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 it is recommended over in-line curbside bus stops if traffic speeds are greater than 40 mph. It can be effectively incorporated into a site design where high-volume boarding is anticipated.

Figure 4 - 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.

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-lane stops.

Table 4 - Desired Minimum Platform Length for 40' Bus Pull Out (Bus Bay) Bus Stop

Stop Location	Total (Feet)
Far-Side	90
Far-Side (after right turn)	140
Near-Side	100
Mid-Block	120

Source: NACTO Transit Street Design Guide

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.

Table 5 - Advantages and Disadvantages of Curb Extensions (Bus Bulbs) and Pull Outs (Bus Bays)

		Advantages	Disadvantages
CURB EXTENSION	*For Transit Operations*	● Improves safety for passengers while alighting and boarding ● Provides easy access for driver to bus stop ● Eliminates delay for bus returning to travel stream	● Bus is not removed from travel lane while passengers board and alight ● Requires a larger capital investment than curbside bus stop ● More difficult to relocate
	For Traffic Management	● Improves speed for transit as compared to pull out ● Used in combination with parking in the curb lane ● Removes fewer parking spaces for the bus stop than curbside stop or bus pull out	● Impacts other vehicles that may queue behind bus ● Other drives may make unsafe lane changes to avoid stopping behind the bus
	For Pedestrians	● Provides additional sidewalk area for pedestrians and passengers to wait for the bus ● Reduces pedestrian distance to cross the street	
PULLOUT	*For Transit Operations*	● Provides a protected area away from moving traffic for bus stopped for a long dwell time or layover ● Allows buses to drop off and pick up passengers outside travel lanes	● May present problems to bus drivers trying to reenter traffic, especially in high-speed or high-volume traffic ● Requires infrastructure modifications ● More difficult to relocate
	For Traffic Management	● Bus stops out of moving traffic lane ● Minimizes traffic delays due to bus operations	● Creates bus/vehicle conflicts when buses reenter busy travel lane ● May reduce parking space curbside
	For Pedestrians	● Improves safety for passenger boarding and alighting by increasing the distance between passengers and moving traffic	● May reduce sidewalk space and increase pedestrian congestion

Standard 40-Foot Bus Dimensions

A standard transit bus is commonly 40 feet long, and 10 feet high. Guidelines presented have been based on the standard 40-foot bus. Consideration for bus zones should be given to the loading and unloading of bicycles from the front bus rack, which adds an additional six feet to the loading zone vehicle length.

See Appendix 3 for more detailed Bus Specifications.

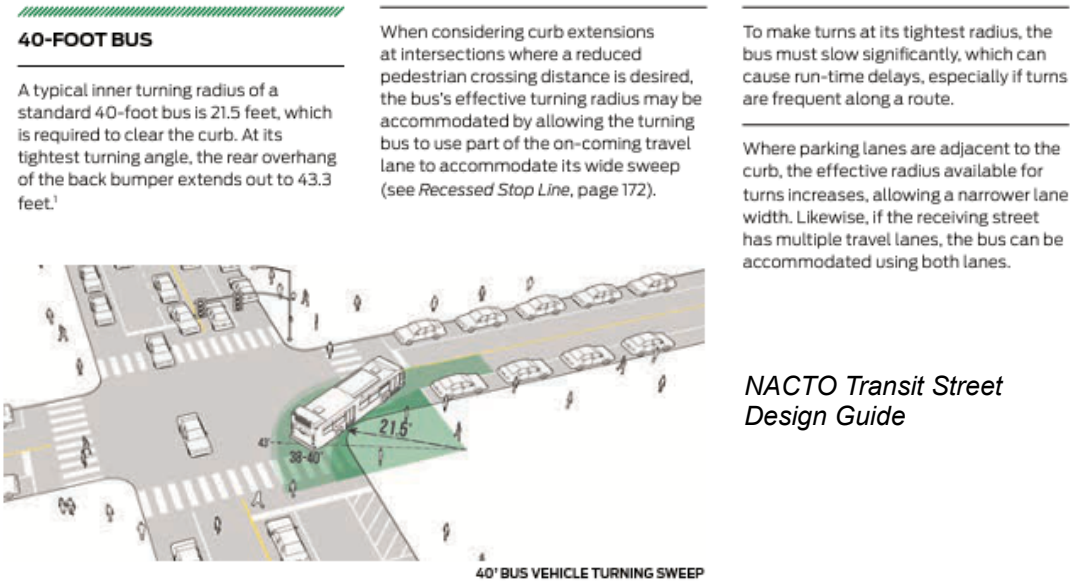
Horizontal and Vertical Clearances

In-street stop designs also require consideration of horizontal and vertical clearances for both passengers and vehicles. Curbside stop areas should be free of horizontal obstructions at least two feet from the curb face and vertical obstructions should be clear from the loading area surface to a height of at least nine (9) feet, preferably 12 feet or more.

Turning Radii

Turning radii are important considerations for stop locations where the bus makes a turn or deviates from a primary corridor. The required turning radius must be accommodated so a bus will not halt in the pedestrian way or impede other traffic flow.

Figure 5 - 40' Bus Turning Radii



NACTO Transit Street Design Guide

Section 3 - Curbside Design

Universal Design

Universal design means that transportation facilities are designed to reduce functional and mobility difficulties for everyone, not just those with disabilities. Bus stops should be designed with these seven principles in mind:

1. **Equitable Use** - The design is useful and marketable to people with diverse abilities.
2. **Flexibility in Use** - The design accommodates a wide range of individual preferences and abilities.
3. **Simple and Intuitive Use** - Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.
4. **Perceptible Information** - The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
5. **Tolerance for Error** - The design minimizes hazards and the adverse consequences of accidental or unintended actions.
6. **Low Physical Effort** - The design can be used efficiently and comfortably and with a minimum of fatigue.
7. **Size and Space for Approach and Use** - Appropriate size and space is provided for regardless of the user's body size, posture, or mobility.

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 furniture
- 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:

1. Accessible path of travel
2. Loading area
3. Waiting area

1. 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.

2. 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 meet 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.

3. 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 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/Passenger Amenities

Signage - Bus stop signs are the most basic element of a bus stop and are vital to the transit customer experience. All bus stops should have a consistently maintained bus stop sign. Bus stop signs should include information that helps riders use available transit services and should present a uniform brand identity. Transit signs should have letter styles, design, and color choices that are unique to the transit system so that passengers can easily identify bus stops.

Bus stop signs should be installed at a standard height, so as to be more recognizable. The bottom of the sign should be at least 80 inches from the ground, so as not to cause a hazard for pedestrians walking nearby and the top of the sign should be no higher than 120 inches from the ground, so that the sign is readable to everyone, including those in wheelchairs. The sign should be placed at a 90-degree angle, perpendicular to the curb line.

All sign posts should be installed approximately 18 inches (12 inches minimum) from the edge of the roadway in order to prevent collisions with vehicles, including bus mirrors. Additionally, bus stop sign posts must not interfere with providing a safe and accessible pedestrian path of travel at the bus stop.

Pavement Markings - Pavement markings play an important role in bus stop delineation and should be provided at every bus stop. Appropriate pavement markings can reduce motorist confusion, allow for safer and more efficient use of the roadway and help facilitate stop accessibility. Properly delineated bus stops are more visible for bus customers and bus operators. Stop delineation designates the area that a bus will need to enter and leave a bus stop and helps to ensure that this area doesn't get blocked by other vehicles. The overall marked area should be sufficient to accommodate all bus-related activities (entering, stopping, and exiting).

In many instances, it 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" should also be painted on the pavement in order to clearly signify that the space is a designated bus stop.

Static Passenger Information – Static information placed at the bus stop that, while changed periodically to reflect service changes, does not reflect real-time operating conditions of the transit service. System maps can assist passengers in determining the best routing for their trip, including identifying transfer location. System maps can also be low-cost advertising and help potential riders understand how they can use the bus service. Some agencies provide maps of the entire network and others display maps of just the route based on the stop location. High ridership stops, especially those which are high transfer locations, should have some form of transit system map.

Variable or Electronic Information - Real-time arrival information provides customers with an increased sense of confidence in using the bus. Real-time passenger information provides information on when a bus will arrive at a given stop. Real-time arrival information decreases the uncertainty related to service delays, and allows riders to spend less time waiting at a stop. Most agencies make arrival information open source and allow software developers to make applications that track buses using a smartphone.

Variable or electronic message boards can also be utilized to enhance security by displaying real time messages for emergencies, detours, or missing persons alerts. Some transit operators have installed digital signage with arrival information directly at bus stops. These boards are useful for riders who do not own a smartphone and can increase the perception of a bus stop as a permanent piece of infrastructure. Real-time signage also increases awareness of available transit service and may contribute to increased ridership. These screens are especially useful for busy stops with multiple routes, as even riders who can access such info on their phones will find it easier to see available options on a larger screen.

Lighting – Adequate lighting is important for passenger comfort and security as well as for visibility of waiting passengers to the bus and other oncoming traffic, particularly at night and during inclement weather. Almost all bus stops are served after dark and should be located where they will be illuminated at night, preferably from an overhead streetlight. If that is not possible, lighting should be installed at the stop, either via mounted lights or within shelters. When possible, efforts should be made to reduce the presence of shadows and dark enclosures in and around the bus stop. There are options for all in one solar powered pole-mounted security lighting and stop signage.

Seating - Providing seating at bus stops significantly enhances the experience of waiting for a bus. Benches are the most typical type of seating, but alternatives such as low walls can also be used. Seating design should not encourage loitering, but should also be comfortable for riders. Seating should be incorporated within shelters when possible.

Providing comfortable seating at or near transit stops dramatically improves the comfort of the passenger experience. Seats should be designed or selected on the basis of comfort relative to expected wait time and boarding demand at a stop.

Bus Shelter – Bus shelters protect transit riders from the elements, provide seating for waiting passengers, and help to identify stop locations. Aside from buses, they are one of the most visible elements of a transit system. As such, attractive and well-designed shelters can help enhance public perceptions of transit and function as advertisements for available services. Bus shelters typically require a 5-foot by 14-foot footprint. In addition to standard shelters, many private shelter suppliers develop more specialized, high-tech shelters. Several companies now design solar-powered shelters, which can include maps, LED lighting, Wi-Fi, advertisements, and bus arrival displays. Bus shelters should provide a clear line of sight to approaching buses. Many shelter designs incorporate glass or plastic walls in order to provide multiple lines of sight. Shelters also present an opportunity to integrate advertising into bus stop design.

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

Trash Receptacles - Trash receptacles provide a convenience for waiting riders and help to reduce the amount of trash left on buses and on the street. Trash receptacles should be within easy reach of the bus stop waiting area, but not block sidewalk traffic or pedestrian access to buses. If the stop has a shelter, the trash receptacles can be integrated with the shelter. In busier areas (and where pickup is scheduled on a regular basis). Trash receptacle design should be consistent with the design of the other bus stop furniture and amenities. Trash receptacles typically require a 2’ by 2’ footprint.

Bicycle Parking - Bicycle racks help provide an additional way for passengers to access bus service. Bike racks can range from basic designs to complex shapes that act as a type of public art. Association of Pedestrian and Bicycle Professionals (APBP) bicycle parking guidelines stress the importance of a bicycle frame being able to be supported by the rack in two places for resisting theft. Additionally, if multiple bicycle racks are installed, they must be placed at least 3 feet apart to allow convenient access. Bicycle racks typically require a 10’ by 10’ footprint, including space for bicycles.

Section 4 - Bus Stop Types and Passenger Amenities

Developing clear and practical guidelines for amenities at bus stops can provide the structure and process needed to improve overall transit system quality. No matter how many riders use a bus stop on a given day, each stop requires certain key design elements to be safe, accessible, and reliable for passengers. As ridership at a given stop increases, additional amenities can be added.

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 exact amenities that are appropriate for and can be supplied at each bus stop may vary due to both **physical and financial constraints**.*

Table 6 - 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 – Is a stop with low boardings (10 or fewer daily), serving one route.

Bench Stop – Is a 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 concentration of transit-dependent populations with headways between trips of more than 30 minutes.

Shelter Stop – Is a 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 connections.

Bus Stop Elements and Amenities

Refer to Appendix 2 for ADA requirements and design specifications for each element and the Reference Summary for the Design Factors for each bus stop element.

Table 7 - Bus Stop Elements and Usage Factors

Bus Stop Element	Description	Usage Factors
Bus Stop Sign All Stop Types	Bus stop signs help customers and bus operators identify the designated location of the bus stop. The bus stop sign also publicizes the services and routes that are served by the stop.	Each active bus stop location should be marked with a uniform Community Connector bus stop sign.
Bus Stop Sign Post All Stop Types	Bus stop posts provide a way to securely mount passenger information such as the bus stop sign.	It is 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.
ADA Landing Pad All Stop Types	An ADA landing pad provides greater access to transit services for wheelchair users, the elderly, and other encumbered riders such as parents with strollers.	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	Pavement markings play an important role in bus stop delineation and should be provided at every bus stop. Appropriate pavement markings can reduce motorist confusion, allow for safer and more efficient use of the roadway and help facilitate stop accessibility.	It 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” should also be painted on the pavement in order to clearly signify that the space is a designated bus stop.
Lighting All Stop Types	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.	Bus stop locations that are served when it is dark should have adequate lighting. Lighting can be provided by a nearby streetlight, ambient light from the adjacent businesses, lighting installed within a bus shelter, or a stand-alone light pole.

Benches Bench Stop Shelter Stop	Benches can be freestanding or part of a shelter design. It provides seating for passengers waiting for the bus particularly at locations where service is less frequent.	Benches are recommended at bus stop locations that have between 11-20 daily boardings; or have fewer than 11 daily boardings but are in close proximity to transit-dependent population concentrations and/or major activity centers and are transfer points between routes or modes that may have wait times of longer than 30 minutes between connections.
Bus Shelter Shelter Stop	Passenger shelters help to shield riders waiting for the bus from the weather.	Passenger shelters are recommended for all bus stops with more than 20 or more daily boardings; Bus stops that have more than 10 but less than 20 daily boardings, but are in close proximity to senior communities, colleges/universities, hospitals, or other major activity centers; are transfer points between routes or modes and may have wait times of longer than 30 minutes between connections.
Trash Receptacles *Optional*	Trash receptacles can help to control litter and maintain a stop's cleanliness. It is important to properly maintain the receptacles and the trash collection.	Trash receptacles should be provided at bus stops that are served in close proximity to fast food establishments and convenience stores.
Route Maps *Optional*	Provide helpful customer information onto one concise layout. Maps and customer information can be provided in static or electronic/variable formats. Should be provided in formats accessible to those with visual impairments.	Route maps should be provided at stops with moderate to high levels of boarding activity. System maps should be provided at high boarding stops and stops where there are more than one route or modes serving the stop.
Bicycle Parking *Optional*	Help provide an additional way for passengers to access bus service	Bicycle parking should be provided at bus stops that have high numbers of passengers using the bike racks on the bus and in areas where bicycle transportation commuting patterns show higher usage.

Table 8 - Criteria to Add Amenities to Bus Stops

PRIMARY	Daily Boardings	The number of boardings is a primary indicator of the use of a bus stop. Bus amenities are of greater importance at stops where there are many passengers waiting to board the bus. The number of boardings at a stop is the most influential factor in determining the placement of a bus stop amenity.
	Condition of Existing Amenity	If the condition of an amenity is such that it poses a danger to the surrounding community it should be repaired or removed immediately and be given priority to be replaced, so long as it still meets the initial criteria for its placement.
	Transfer Location	Transfer points require passengers to switch between routes or modes. This frequently requires passengers to wait at a stop. When possible efforts should be made to provide a comfortable area at stops where it is common for passengers to wait. The number of transfers at a stop is an influential factor.
	Equitable Distribution	In order to comply with Title VI requirements, there should be an equitable distribution of passenger amenities between areas.
	Maintenance Agreement	Responsibility for maintenance of the amenity needs to be established in advance of installation by way of Memorandum of Understanding or Agreement.
SECONDARY	Availability of Right of Way	The associated costs of land acquisition and construction should be evaluated and weighted against the benefits generated from adding a particular amenity to a stop. In some cases it may not be practical to add an amenity to a location if the site is so physically constrained that it becomes cost prohibitive.
	Special Needs Location	Occasionally there is a need for amenities at a specific location to accommodate concentrations of populations who are vulnerable and/or require additional assistance.
	Existing Amenities	If there are existing amenities, such as a bench, and it meets the primary criteria that the stop should be considered for an upgrade. Otherwise, the location should be removed from the list for bus stop enhancements.
	Financial Constraints	Implementing bus stop improvements is often more expensive than expected. In some cases, it may not be financially feasible to add an amenity to a location.

Section 5 - Coordination with Other Uses

Driveways

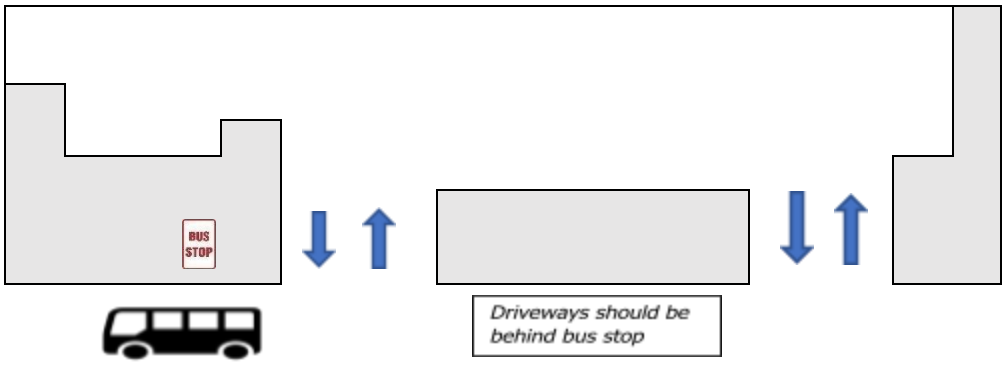
Optimally, It is best not to have the bus blocking a driveway while stopped for boarding and alighting. If absolutely necessary due to other constraints, a bus could block a small residential driveway, since there will only be occasional conflicts, but this will not work for busy commercial driveways.

Stops need to make the best use of available space and avoid sight distance issues. Buses stopped at intersections may block visibility for both pedestrians attempting to cross the street and vehicles attempting to enter the roadway. Placement of stops should balance the need to be near the intersection for passenger access and the need to maintain safe visibility. Placement near driveways should be avoided when possible, but poor access along corridors may make the occurrence unavoidable. When presented with an instance that involves intersections and driveways, it is preferable to block driveways than intersections.

Bus stops are preferably not placed near a driveway; however, if placement near a driveway is unavoidable, the guidelines below should be followed:

- Locate bus stops to allow adequate visibility for vehicles leaving the property to minimize vehicle/bus conflicts. This is best accomplished by placing bus stops where driveways are behind the stopped bus.
- Attempt to keep at least one exit and entrance open to vehicles accessing the property while a bus is loading or unloading passengers.
- When there are two driveways to a parcel on the same street, the upstream driveway would preferably be blocked in order to force vehicles to turn behind the bus to access the driveway.
- It is preferable to fully block rather than partially block a driveway to prevent vehicles from attempting to circumvent the bus in a situation with a reduced sight distance.
- Ensure that passengers have a safe area to wait when loading must occur in or adjacent to a driveway.

Figure 6 - Driveway Diagram



Park and Ride Facilities

Park and ride lots are off-street intermodal transportation facilities that allow users to transfer from automobile travel to public transit. Providing park and ride facilities in areas with low population and employment density makes transit ridership more feasible in these areas by concentrating demand to a single site.

Park and ride facilities typically include either permanent single-use parking lots or shared-use parking lots, where transit riders are able to park their automobile while using transit. Design of park-and-ride facilities should be done on a case-by-case basis, considering the following factors:

- Capacity or site size
- Visibility
- Available transit service
- Access for vehicles, bicycles, and pedestrians
- Multiple street connections
- Pedestrian access routes

While each Park and Ride facility is unique, most Park and Rides should receive, at minimum, amenity treatments comparable to high volume bus stops. Consideration should be given to allowing for a vehicle pickup/drop-off area, parking for shared vehicles, and space for private shuttles.

Appendix 1 - Land Use Code Sample Language

Bus Stop Design Standards

Purpose - To ensure that new development adequately accommodates existing and planned transit service by integrating facilities designed and located appropriately for transit into the development plan.

General Standard - All development located on an existing or planned transit route shall install a transit stop and other associated facilities on an easement dedicated to Community Connector and the **[City/Town]** or within public right-of way as prescribed by the Regional Bus Stop Policy and Design Guidelines in effect at the time of installation, unless the **[MUNICIPALITY City/Town Council]** and Community Connector mutually agree that adequate transit facilities consistent with the Regional Bus Stop Policy and Design Guidelines exist to serve the needs of the development. All development located on existing transit routes will accommodate the transit facilities by providing the same at time of construction. All development located on planned routes will accommodate said facilities by including the same in the development plan **[and/or]** escrowing funds in order to enable **[the City/Town]**, or its agents, to construct the transit facilities at the time transit service is provided to the development. All facilities installed shall, upon acceptance by the **[City/Town]**, become the property of **[Community Connector/City/Town]** and shall be maintained by the **[City/Town]**, or its agent.

Location of Existing and Planned Transit Routes - For the purposes of application of this standard, the location of existing transit routes shall be defined by the Community Connector route map in effect at the time the application is approved. The location of planned transit routes shall be mutually approved by the City of Bangor Community Connector, The BACTS Transit Committee, and the **City/Town Council** of the municipality in which the route is planned.

Appendix 2 - ADA Guidelines

All bus stops are required to meet the latest U.S. Department of Transportation (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.* 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 ≤ 1:48 (2.1%)
  - Vertical changes ≤ ½"
  - Any opening in surface or gratings ≤ ½"

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 ≥ 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 ≤ 1:12 (8.3%)
    - Side flares ≤ 1:10 (10%)
    - Cross slope ≤ 1:48 (2.1%)
- Counter slope of adjoining gutter road or accessible route surface ≤ 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 in 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%)

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.

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 ≥ 30” by ≤ 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 ≥ 36” for front approach or length ≤ 60” for parallel approach
- Clear floor space, stable, firm and slip resistant, no changes in level > ¼”

Appendix 3 - 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. Because bus fleets are made up of different vehicles and are subject to change with each vehicle procurement, dimensions for a standard 40-foot transit vehicle were used as a basis throughout this document. However, records indicate at this time the largest vehicle in the Community Connector fleet is 35-feet.

Table 9 - 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

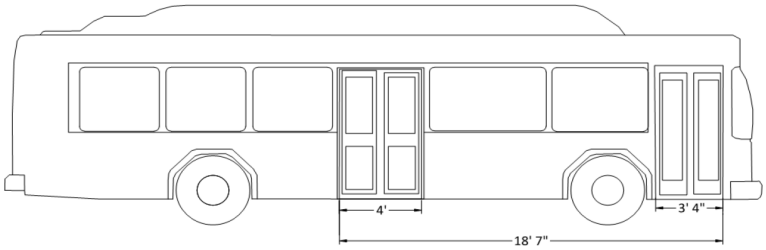
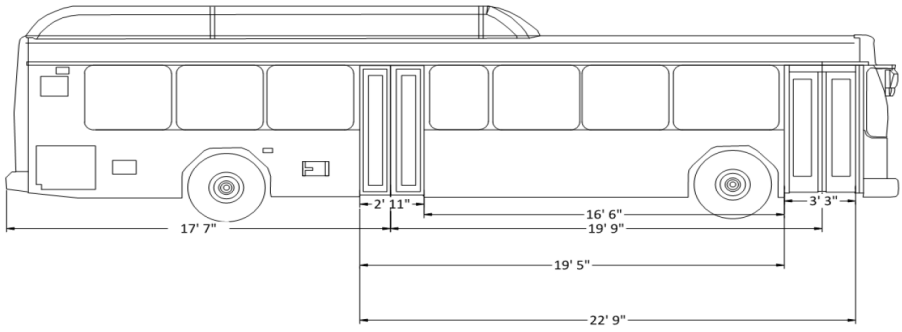
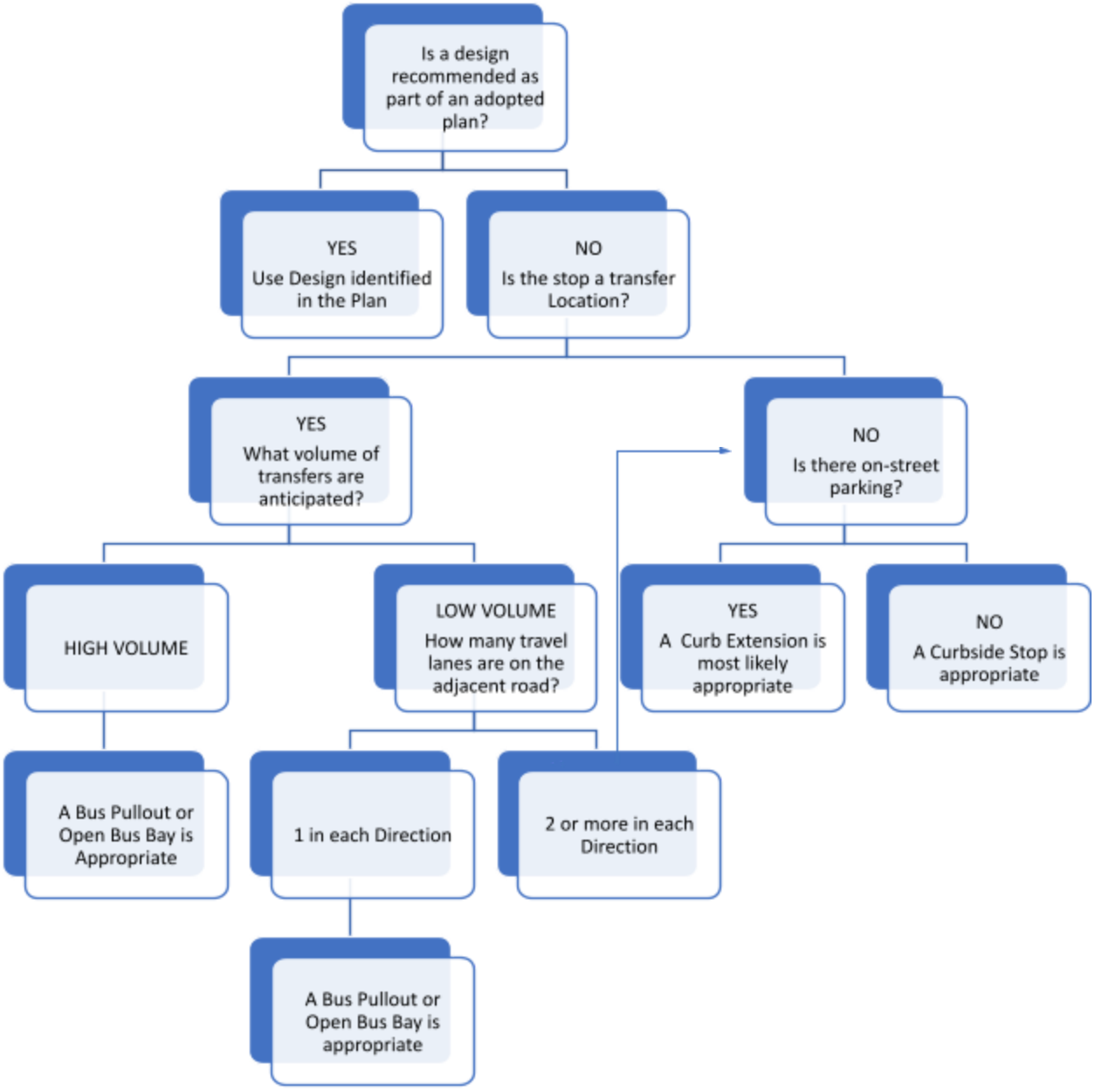


Figure 8 - 40-Foot Gillig

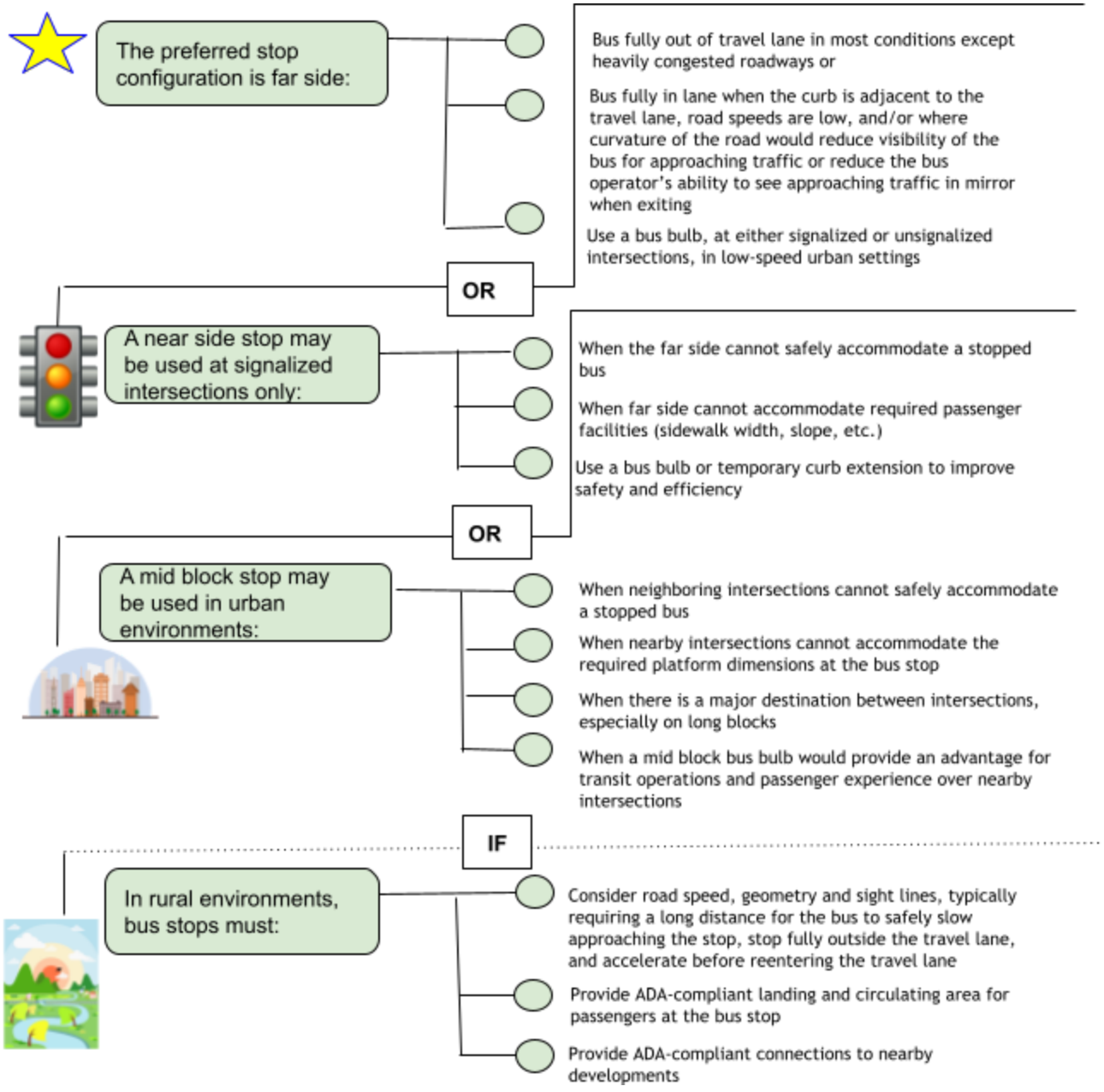


Appendix 4 - Choosing Stop Configurations

Flowchart 1 - Determining if Curb Extension or Bus Bay/Pullout is Warranted



Flowchart 2 - Determining Preferred Stop Location Relative to Intersection



Appendix 5 - Bus Stop Infrastructure and Amenities Specifications

Element Cost Estimates

Concrete Sidewalk	$160 square yard
Reset Granite Curbing	$40 linear foot
Circular Granite Curbing	$75 linear foot
Detectable Warning Panel	$120 square foot
Pavement Markings	$5 square yard
Bus Stop Sign and Pole	$100
Static Message Center	$600
Variable/Digital Messaging	$8,000
Solar Lighting (pole mount)	$1,500
Solar Lighting (shelter system)	$1,750
Simme Seat with Pole	$700
Simme Seat with divider	$750
Simme Seat without divider	$600
6-Foot Bench	$2,000
Small Passenger Shelter - no seating (5'x5')	$3,800
Medium Passenger Shelter (10'x5') with 6' bench and solar light	$8,200
Large Passenger Shelter (20'x10') with 2 10' benches and solar light (includes heater mounding bar in roof)	$24,100
Shelter Accessories 48' vandal resistant LED strip light 120V 36" Infrared heater 1500 watt, 120V 12" Exhaust fan 775 CFM, 120C	 $425 $525 $375
Shelter Pad (10'x5')	$2,500
Trash Receptacle	$800
Bicycle Rack	$600

Element Estimated Dimension Requirements

ADA Landing Pad

- Estimate 20 feet of reset granite curb.
- Length of landing is estimated to be 10 feet measured parallel to the curbline
- Estimated landing area is dependent on sidewalk width
    - Width less than 8 feet: Estimate 8'x10' landing with a 5' transition on either end back to sidewalk width
    - Width greater than 8 feet: dimension of landing area estimated to be 10' x the width of the sidewalk
    - Estimate 20 feet of granite curb

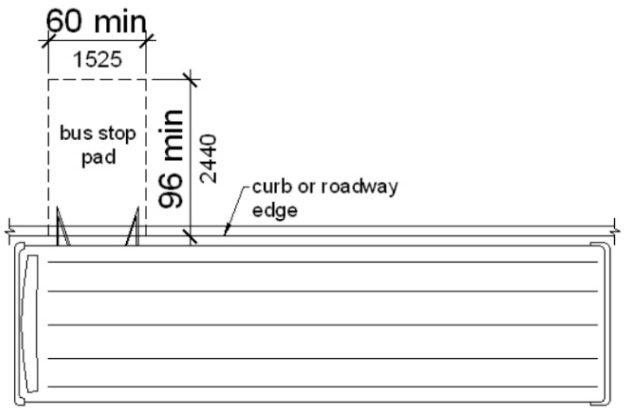
Curb Ramps

- 200 square feet of concrete per ramp
- 25 total feet of circular granite curb per ramp
- One 2'x4' detectable warning panel per ramp

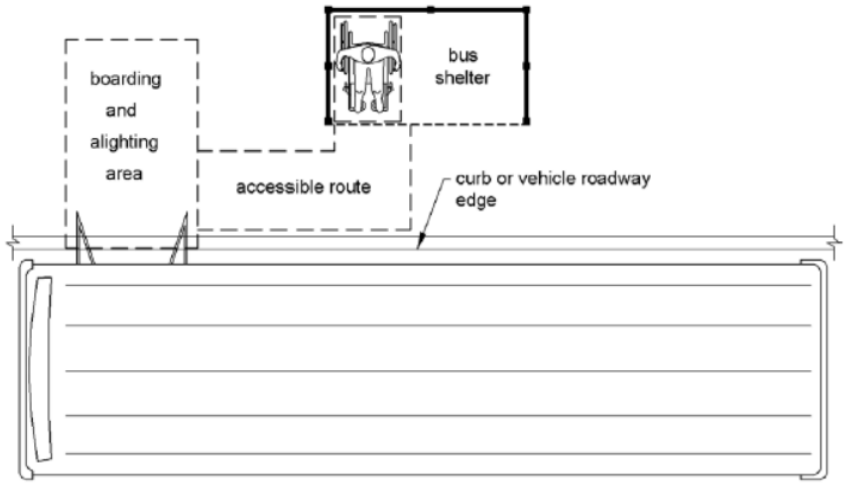
Sidewalks

- Estimate length of sidewalk necessary to connect landing area to a crosswalk or existing sidewalk
- Width to match existing sidewalk
- If no existing sidewalk, estimate width of 5 feet

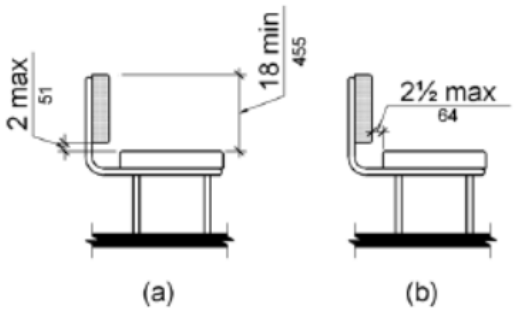
ADA Bus Stop Landing Pad Specifications



ADA Bus Shelter Specifications



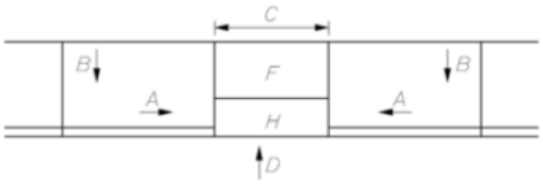
ADA Bench Back Support Specifications



ADA Specifications for Sidewalks and Curb Ramps

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

Perpendicular Ramp



Parallel Ramp

Bus Shelter Design Specifications

Bus Stop Sign and Pole Specifications

Bus Stop Seating Specifications

Appendix 6 - Public Participation

Introductory presentations were made to City/Town Councils discussing the bus stop project and timeline for completion and public meeting and comment periods.

Date	City / Town
January 21, 2021	Town of Orono
January 25, 2021	City of Bangor
February 1, 2021	City of Old Town
February 9, 2021	City of Brewer

The Draft Bus Stop Policy and Design Guidelines document and notice of public comment period was posted on _____. The public comment period ended on _____. All relevant comments received on the draft will be included in the final document, as well as responses to those comments.

Schedule of Public Meetings

Date	Time	Location
Monday, March 15, 2021	6:00 p.m.	Old Town City Council Workshop
Monday, April 5, 2021	6:00 p.m.	Hampden Town Council
Monday, April 12, 2021	6:30 p.m.	Veazie Town Council
Tuesday, April 13, 2021	6:00 p.m.	Brewer City Council
Thursday, April 15, 2021	5:00 p.m.	Orono Town Community Development Committee
Monday, April 26, 2021	5:15 p.m.	Bangor City Council Workshop

Appendix 7 - 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

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