PEER REVIEW MEMORANDUM

The development of bus stop guidelines and capital plan for the Southeastern Regional Transit Authority (SRTA) provides an opportunity to improve bus service in Southeastern Massachusetts. To inform the development of bus stop guidelines for SRTA, three transit agencies were chosen for a peer review of their bus stop design guidelines, in consultation with SRTA staff. The peer review identifies best practices for the visual design, content, use, and specifications from these guides to include in SRTA's guide.

INTRODUCTION

Interviews with staff at each transit agency were conducted to supplement the guide reviews and understand lessons learned from their development and implementation. Two of the agencies, the Charleston (SC) Area Regional Transportation Authority (CARTA) and the Memphis (TN) Area Transit Authority (MATA), have similarly-sized service areas and/or ridership to SRTA. The third agency, the Massachusetts Bay Transportation Authority (MBTA), provides a local example from an agency with similar jurisdictional authority and relationships with state and regional stakeholders as SRTA. MBTA serves a major urban city and its suburbs, some of which have substantial population density. MATA and CARTA serve smaller urban areas, along with suburban and rural communities. More details on the characteristics of each transit agency's service area are shown in Table 1.

Table 1: Transit Agency Comparison

Urban Area Served	Agency Name	2019 Bus UPT*	Service Area Size	Service Area Population	# Routes	# Stops
New Bedford-Fall River, MA	SRTA	2,666,570	289	322,845	26	1,100
Charleston, SC	CARTA	2,991,215	138	351,988	23	860
Memphis, TN	MATA	5,846,425	281	708,275	27	3,662
Boston, MA	MBTA	99,301,293	3,244	3,109,308	171	8,000

Sources: National Transit Database, Moovitapp.com, MBTA.com, RideCARTA.com, SRTA staff

*Unlinked Passenger Trips (UPT): the number of passengers who board a transit vehicle

The peer review encompasses the major elements of bus stop design, including bus stop spacing, placement, configurations, and typologies; accessibility; amenities; capital improvements; maintenance; signs; and travel lanes; as well as their content relative to appendices, visuals, and key takeaways. Best practices for SRTA to consider in the development of its own guide are outlined in the final section. Within this section, Table 2 provides a summary comparison of bus stop design elements across all reviewed guides.

PEER AGENCIES

Charleston, SC

Intent/Audience

The Berkeley-Charleston-Dorchester Council of Governments (BCDCOG), CARTA, and TriCounty Link (TCL) drafted the Transit and Bus Stop Design Guidelines in October 2021. The BCDCOG is currently working with municipalities to gain their governing bodies' approval of the Guidelines, so it is not yet in use. The Guidelines' intent is to "facilitate the proper siting, design, installation, and maintenance" of bus stops in the region. The Guidelines' audience is people involved in the planning, design, construction, and maintenance of bus stops.

The impetus behind developing the Guidelines came after the South Carolina Department of Transportation (SCDOT) considered, but ultimately did not develop, its own bus stop design guide. BCDCOG decided to lead the development of South Carolina's first bus stop design guide to address previous inconsistencies in bus stop design (e.g., sign heights) and adopt best practices (e.g., preference for far side stops).

The development of the Guidelines included the creation of an active and diverse technical advisory committee comprised of stakeholders with an interest in safe and accessible bus stops, even if they may not be involved in bus stop planning.

While the Guidelines' audience is primarily local and state transportation planning staff, a directory is included for community members, which is intended to make the Guideline understandable to anyone wanting to learn more about bus stop design. The Guidelines also include sufficient detail to be shared with agency maintenance crews installing or maintaining bus stop amenities.

The Guidelines' introduction includes a few useful features, including a table of costs for popular bus stop amenities, as seen in Figure 1, as well a directory to key information for different readers, such as developers, transit agency staff, and community members. The directory is shown in Figure 2.

Figure 1: Table of Capital Material Costs for Bus Stop Amenities

CARTA Approved and Funded Amenities

CARTA's over 860 stops vary in terms of their ridership, existing condition, and level of service. These guidelines include the process for CARTA to prioritize capital improvements at stops. Importantly, they also describe the approved amenities for CARTA stops that the agency could fund for stops. The amenities and the baseline capital costs for each that CARTA could cover are summarized below. These amenities are described in detail in Chapter 5 Bus Stop Amenities.

#	CARTA-Approved Amenity	Total Cost (see note)
1	Bus stop post and sign	$150
2	ADA-compliant landing pad	$4,825
3	Bike rack	$168
4	Solar shelter lighting	$1,550
5	Bench	$906 - $1,620
6	Trash can	$105 - $525
7	Shelter	$12,495
8	Digital signage (not pictured)	$8,515 - $9,315

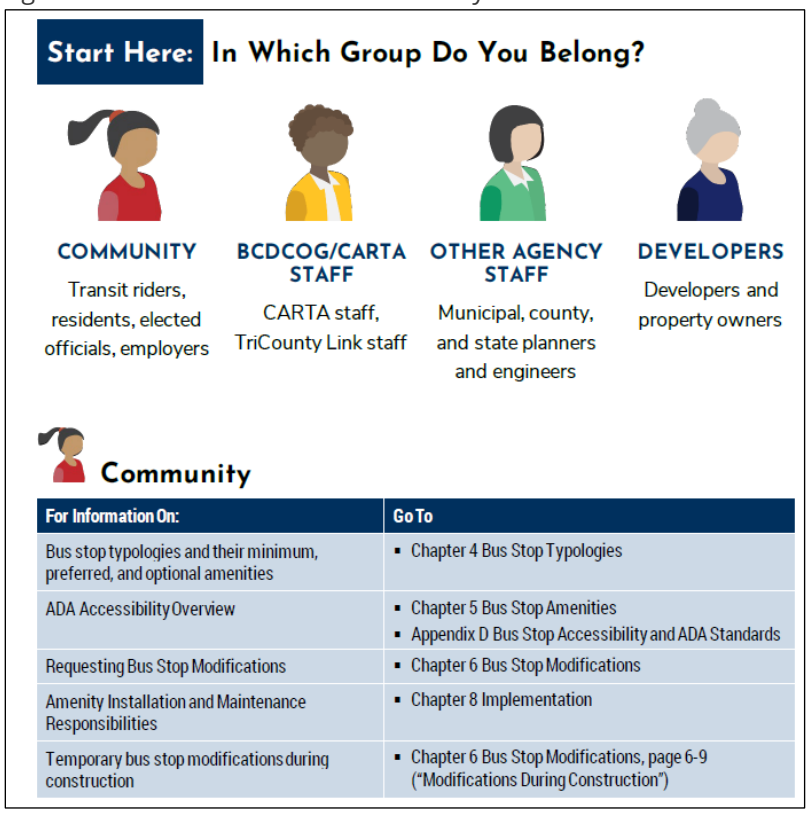
Notes:

Minimum amenities at all CARTA bus stops are a bus stop post, sign, and ADA compliant landing pad. If a municipality calls for additional amenities, CARTA would pay for the baseline cost of those amenities. Any additional costs due to upgraded or additional amenities, including variations in paint schemes, must be borne by the relevant municipality requesting that upgraded amenity. Developers would cover all costs of any new stop or stop improvements, including the installation.

The costs above for bus stop capital items do not include engineering or install fees. Those additional fees are below:

- Engineering fees ranging from $10,000 to $20,000 per shelter/bench
- Shelter installation at approximately $6,500

Figure 2: Charleston Guidelines Directory for Different Users



Start Here: In Which Group Do You Belong?

COMMUNITY
Transit riders, residents, elected officials, employers

BCDCOG/CARTA STAFF
CARTA staff, TriCounty Link staff

OTHER AGENCY STAFF
Municipal, county, and state planners and engineers

DEVELOPERS
Developers and property owners

Community

For Information On:	Go To
Bus stop typologies and their minimum, preferred, and optional amenities	▪ Chapter 4 Bus Stop Typologies
ADA Accessibility Overview	▪ Chapter 5 Bus Stop Amenities ▪ Appendix D Bus Stop Accessibility and ADA Standards
Requesting Bus Stop Modifications	▪ Chapter 6 Bus Stop Modifications
Amenity Installation and Maintenance Responsibilities	▪ Chapter 8 Implementation
Temporary bus stop modifications during construction	▪ Chapter 6 Bus Stop Modifications, page 6-9 ("Modifications During Construction")

Design Components

Stop Spacing

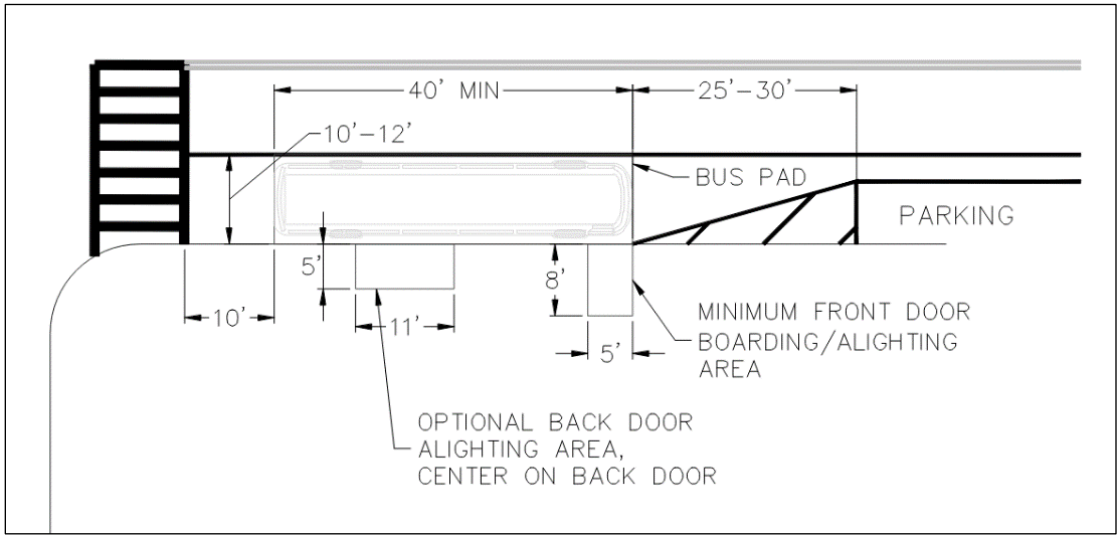
The recommended stop spacing is 1,300 ft., with deviations from this standard possible on very dense or very rural corridors, or to serve large trip generators. The minimum space between stops is 660 feet, or 8 stops per mile. This minimum stop spacing is half the distance of the standard acceptable walking distance to a bus stop (1/4 mile) and can significantly slow bus service. Consequently, the Guidelines recommend only considering the minimum stop spacing in areas with poor pedestrian connections or "significant operation considerations limiting placement."

Stop Placement & Configuration

Bus stops in the Guidelines are organized in different chapters by placement, configuration, and typology. At the top of each chapter is a useful text box briefly describing (in 2-3 sentences) the intent of each section. The Guidelines include descriptions and plan view diagrams for near side, far side, and midblock stops as subcategories of pull-out, in-lane, bus bulb, bus/bike, floating, cycle track, and

transit center stops. Although not yet adopted, the Guidelines' intent is for these diagrams to be useful for engineers designing bus stop improvements. One example diagram is shown in Figure 3. Far side stops are recommended where feasible. The dimensions of bus stops by placement are included in Table 2 at the conclusion of this memo.

Figure 3: Charleston Diagram of a Far Side Stop with Dimensions



Typologies

The Guidelines establish a bus stop typology with six categories: transit centers, transfer stops, park & rides, light rail stations, high activity stops, and standard stops. Each typology has general stop attributes for physical layout and bus frequency in a summary table, which is shown in Figure 4 below.

Figure 4: Charleston Typology Summary Table

Stop Type	Description	Examples	CARTA Buses per Weekday
Transit Centers	Official CARTA transit centers	▪ N. Charleston Super Stop/Shipwatch Sq. ▪ Downtown Transit Center (including Transit Mall, Mary St. @ Meeting St., Visitors Center) ▪ Citadel Mall	~100 Buses every 6 min
Transfer Stops	Stops with transfer activity but are not official transit centers	▪ Calhoun St / Jonathan Lucas St (far side) ▪ Hungry Neck Blvd / Theater Dr (Mt. Pleasant Towne Centre) ▪ Calhoun St / St Philip St	60-90 Buses every 10 min
Park & Rides	Parking lots with connecting services to major activity centers	▪ Citadel Mall P&R ▪ Melnick P&R ▪ Wando Crossing P&R ▪ Walmart-Market at Oakland ▪ James Island Walmart ▪ Dorchester Village Shopping Center	15-60 Buses every 15-60 min
LCRT Stations	Future Lowcountry Rapid Transit Stations	▪ LCRT stations at Mall Drive, Hanahan Road, John Street, and others	Buses every 10 min
High Activity Stops	Stops where ridership, transfer activity, and/or proximity to a major activity center merit higher investment	▪ Medcom St/Trident Medical Center ▪ Waterfront Park ▪ King St/Mt Pleasant St (Joseph Floyd Manor)	30-50 Buses every 30 min
Standard Stops	The most typical stops often served by 1 route		<30 Buses every 30-60 min

The Guidelines also have sections on each typology, as seen in Figure 5, which include:

- Graphic renderings
- Example photographs
- A table of required, preferred, and optional amenities

Figure 5: Charleston Typology Layout

STANDARD STOPS

The vast majority of CARTA stops (about 750) fall into the Standard Stops type. These stops, typically served by only 1 route, experience relatively lower ridership and bus service. Because they range widely in terms of curb condition, ADA compliance, and room available for investment, these stops have minimum requirements that require only ADA compliance and a bus stop sign. These stops have a longer list of preferred amenities that are recommended to be included where space and funding allow.

Example

Standard Stops with a variety of curb conditions, room available for improvements and investment, as well as ADA compliance.

Amenities

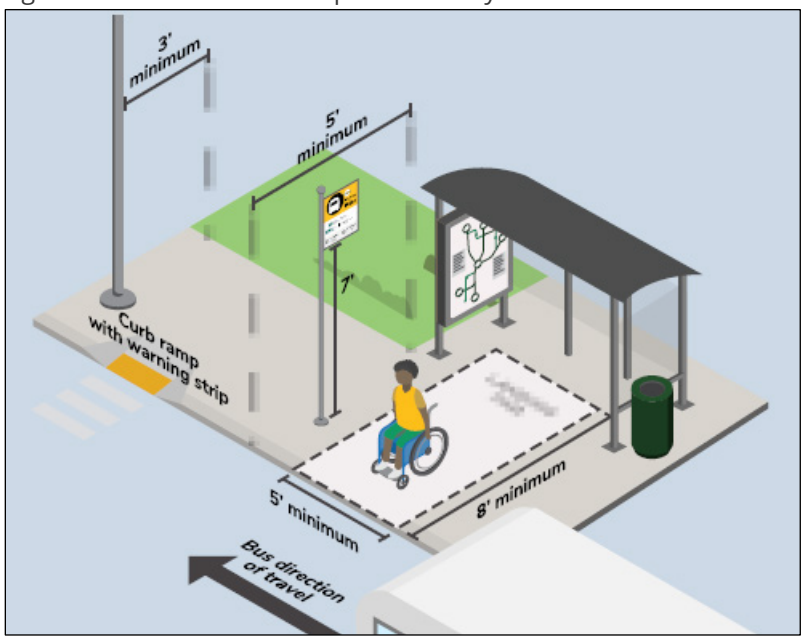
Required	Preferred	Optional
▪ Landing Pad ▪ Bus Stop Sign	▪ Shelter ▪ Lighting ▪ Enhanced Passenger Information ▪ Trash Can ▪ Bench	▪ Real Time Information ▪ Bike Rack ▪ Safety and Security Elements ▪ Fare Machine

Accessibility

The Guidelines include information on accessibility, including minimum ADA requirements that are specified in easy-to-follow text and an instructive graphic,

shown in Figure 6. The Guidelines clearly state that landing areas are a “top priority”, required at all stops, except potentially rapid bus transit stops, which are still in development and may recommend platforms.

Figure 6: Charleston Bus Stop Accessibility Dimensions



Amenities

Each typology has a table with the suggested amenities at each stop. There is a summary table of amenities by typology, which is shown below in Figure 7.

Figure 7: Charleston Bus Stop Amenity Recommendations by Typology

Amenity	Transit Centers	Transfer Stops	Park & Rides	LCRT Stations	High Activity Stops	Standard Stops
ADA compliance	Required	Required	Required	*	Required	Required
Bus stop sign	Required	Required	Required	*	Required	Required
Lighting	Required	Required	Required	*	Required	Preferred
Real-time information	Required	Required	Required	*	Preferred	*Optional*
Enhanced passenger information	Required	Required	Required	*	Required	Preferred
Trash can	Required	Required	Required	*	Required	Preferred
Bench	Required	Required	Required	*	Required	Preferred
Shelter	Required	Preferred	Required	*	Preferred	Preferred
Bike rack	Preferred	Preferred	Required	*	Preferred	*Optional*
Fare machine	*Optional*	*Optional*	*Optional*	*	*Optional*	*Optional*
Electric bus charger	*Optional*		*Optional*	*		
Safety and Security Elements	Required	*Optional*	Required	*	*Optional*	*Optional*
Car Parking	*Optional*		Required	*		

The Guidelines include a section for each amenity with guidance establishing responsibilities for implementation and maintenance. Regarding seating and shelters:

- Developers install and maintain their own shelters.
- CARTA only installs benches at its shelters; benches at stops without shelters are the responsibility of a third party.
- The City of North Charleston installs its own benches at bus stops.

The Roles and Responsibilities table, an example of which is shown in Figure 8, effectively shows the different responsibilities for the installation of different bus stop components.

Figure 8: Example Roles and Responsibilities Table for Landing Areas

Role	Responsibilities and Considerations
BCDCOG/CARTA Staff	▪ Coordinate with dev/town planners to make sure all new/upgraded stops have landing pad and that they meet federal guidelines ▪ Does not own street and road right-of-way, except within certain Transit Centers ▪ Responsible for approving all landing pad designs ▪ Responsible for designing or constructing accessible landing pads and paths *[when appropriate]*
Other Agency Staff	▪ Responsible for designing or constructing accessible landing pads and paths *[when appropriate]* ▪ Coordinate with CARTA for their installation as outlined in Chapter 8 – Bus Stop Modifications
Developer	▪ Responsible for designing or constructing accessible landing pads and paths *[when appropriate]* ▪ Coordinate with CARTA for their installation as outlined in Chapter 8– Bus Stop Modifications

Signs

The Guidelines include a section on bus stop signs. Each sign should include a branded CARTA logo, high visibility colors, a logo, route information, contact information, a bus stop icon, and a bus stop ID. The bottom of the bus stop sign should be 7 ft. above the ground.

Implementation

As shown in Figure 9, the Guidelines use prioritized criteria in a rubric to rank bus stops for investments in amenities. Ridership is one component of the rubric. Stops with fewer than 25 passenger trips (boardings plus alightings) per day score 0 points based on ridership. Other categories of the rubric are existing conditions, zero-car households, Environmental Justice areas, transfer points, proximity to a public or non-profit trip generator, and the existence of an initiative to enhance community identity.

Figure 9: Charleston Prioritization Rubric

Criteria	Responsibility
Passenger Activity – Sum of weekday boardings and alightings	▪ 40 points if sum is greater than 50 ▪ 30 points if sum is between 25-50
Existing Conditions	▪ 20 points if rated as 1 (Very Poor) ▪ 15 points if rated as 2 (Poor) ▪ 10 points if rated as 3 (Fair)
Zero-vehicle households and Environmental Justice Area	▪ 10 points if zero-vehicle household population in the surrounding census block group is greater than CARTA service area average ▪ 10 points if stop is located in an Environmental Justice Area ▪ 20 points if both
Significant Transfer Point	▪ 10 points
Near Medical Facility, Significant Civic Building or Educational Institution (1/4 mile)	▪ 10 points
Part of corridor or neighborhood initiative to strengthen identity	▪ 10 points

The intent is to have the rubric create a more process-oriented and justifiable approach to prioritizing bus stop amenities, compared with the traditional ad hoc method. CARTA's recent installation of automated passenger counters (APC) on its buses was a critical step to creating a reliable source of ridership data needed to use the rubric.

Communication with municipalities varies based on the jurisdiction. Some municipalities have specific shelter preferences for colors and styles and have adopted their own standard shelters with approval from CARTA. The agency will fund these locally preferred shelters up to the baseline cost for its own shelters. Costs beyond this baseline cost will be paid by the organization requesting the shelter. The Guidelines contain standard details for each shelter in the guide's Appendix E, included with this memo as Appendix A.

CARTA already has effective working relationships with SCDOT and municipalities on integrating bus stop improvements into roadway projects, so improving coordination was not a primary reason the Guidelines were developed.

Maintenance

The Guidelines include a summary table with the installation and maintenance responsibilities for each bus stop amenity. CARTA is typically responsible for the maintenance of shelters, signs, lighting, trash cans, passenger information, benches, fare machines, and security equipment. In some cases, municipalities or business districts empty trash cans or maintain security equipment, and these agreements are made on a case-by-case basis. The maintenance of bike racks is determined on a

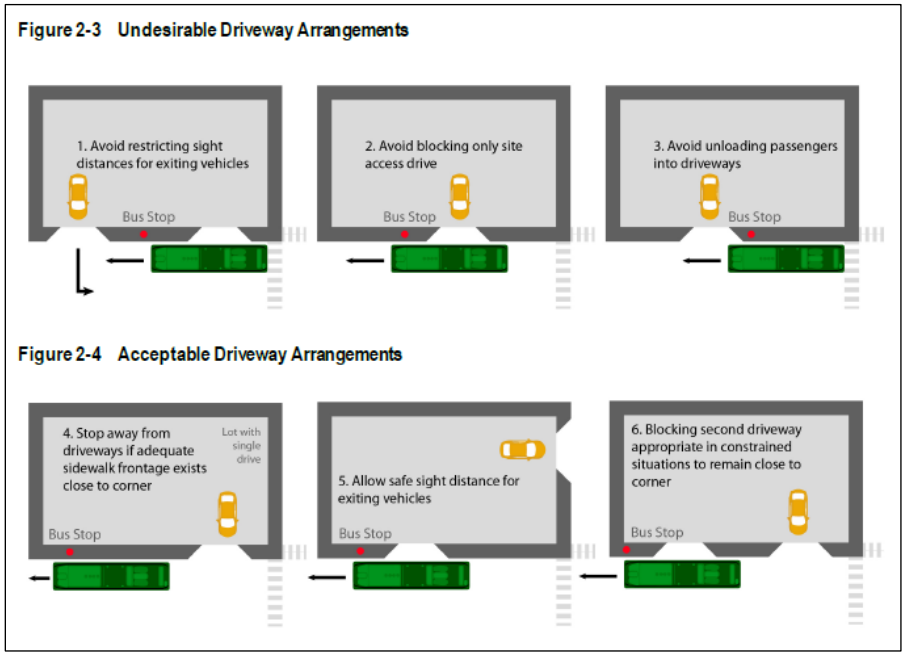
case-by-case basis. CARTA does not have a standard formal agreement for maintenance responsibilities of amenities.

Visuals

Overall, the Guidelines provide useful graphic cues to help the reader navigate the document and communicate key information. The Guidelines make ample use of iconography for design principles, audiences, and amenities. In addition, the Guidelines include tables and text boxes to highlight important information, as well as images of CARTA stops to help provide local context of items discussed in the Guidelines.

The Guide also includes compelling visuals, using icons, graphic renderings, and diagrams to illustrate bus stop improvements. These make the Guidelines' visuals useful to people designing bus stops and other, less technical readers. As shown in Figure 10, there is an informative graphic about designing around driveways:

Figure 10: Charleston Bus Stop Placement Around Driveways



Appendices

ADA standards, specifications for amenities, and checklists for developers, field visits, and bus stop modifications (including removals) are included in the Guidelines as appendices. Where amenity specifications differ by municipality, such as for bus shelters, the Guidelines include each variation. Other appendices to the Guidelines include an amenity installation graphic, and a list of bus stops and the amenities

available at each. The installation graphic is appropriate to share with the public, but it is insufficient to assist professionals in designing or implementing bus stop improvements, which appears to be its intent. The Bus Stop Inventory and Maintenance Field Visits and Developers Checklist, which are shown in Appendices B-C, are particularly useful. However, the Bus Stop Modifications Checklist may be more useful if some of the most referenced information were included in the Checklist itself, to minimize how often a user must refer back to the original guide.

Key Takeaways

The Guidelines are very easy to read and use simple and effective color and font styles. The small icons of amenities located throughout the Guidelines are a nice touch that help orient readers. Each section of the Bus Stop Spacing and Placement chapter includes a "Key Takeaways" heading that succinctly summarizes its main points, and clearly defines the components of bus stop design, while providing technical details. A summary table containing the recommended dimensions at each bus stop would be helpful for someone who wants to quickly find a specification or compare specifications between bus stop types. In addition, the Roles and Responsibilities graphic is effective in clearly identifying the responsible parties for implementing bus stop improvements.

Substantial outreach and a robust technical advisory committee helped gain broad support for the Guidelines. In addition, BCDCOG maintained consistent communication with municipalities and agencies throughout the Guidelines' development. BCDCOG staff indicated that getting early stakeholder buy-in was key to getting the Guidelines to this point. The outreach process will continue after the Guidelines' adoption, first with local policymakers and then with the broader public. This continued "selling" of the Guidelines to local policymakers and the public will likely enhance awareness of transit and the Guidelines' effectiveness. BCDCOG staff would like for municipalities to adopt the Guidelines into their codes of ordinances so developers would have to follow it. It is unclear if the agency will formally ask municipalities to take this additional step after they adopt the Guidelines.

Memphis, TN

Intent/Audience

The Memphis Urban Area Metropolitan Planning Organization (MPO) and MATA adopted the Bus Stop Design and Accessibility Guidelines in 2017. The Guidelines' intent is to advance the proper planning, design, construction, and maintenance of

bus stops. The intent is included in a strong Purpose and Need introductory section of the Guidelines. The Guidelines' audience includes MATA staff and the public.

MATA developed the Guidelines to react to two matters impacting bus stops: the location of shelters being placed through an advertising contract and bus stops placed too closely together. Preparation of the Guidelines included significant outreach to passengers and a meeting at the Memphis Center for Independent Living to get input from people with disabilities (both transit passengers and non-transit passengers).

Design Components

Stop Spacing

Rather than one general stop spacing suggestion, the Guidelines feature six recommended stop spacings based on corridor type and density. Figure 11 details the stop spacing requirements. MATA staff indicated that these guidelines have been effective in advancing bus stop consolidation throughout the service area and that the agency continues to consolidate or remove stops.

Figure 11: MATA Stop Spacing Guidelines

	Key Corridor	Emerging Key Corridor	Mainline	Express	Feeder	Flex/ Shuttle
Minimum Stop Spacing (feet)						
Moderate to High Density Areas	1,000 - 1,100	900 - 1,000	900 - 1,000	1,000 - 1,100	900 - 1,000	600 - 1,000
Low Density Areas	1,000 - 1,300	1,000 - 1,300	900 - 1,000	1,000 - 1,300	1,000 - 1,100	600 – 1,000

Stop Placement & Configuration

The Guidelines discuss stop placements, configurations, and typologies in one chapter on bus stop types. There is a table with the advantages, disadvantages, and recommended uses of different stop placements. Far side stops are recommended where feasible. MATA used this recommendation to justify converting many near side stops to far side stops. The dimensions of bus stops by placement are included in Table 2 at the conclusion of this memo. Stop lengths and sidewalks widths vary by the stop placement and type, for example, 8-10-foot sidewalks are recommended for low volume stops, while 10-15-foot sidewalks are recommended for high volume stops.

Typologies

The Guidelines do not have an independent Typologies chapter. Instead, it discusses stop placements, configurations, and typologies in one chapter on bus stop types. These include:

- Near side (Low and High Volume)
- Far side (Low and High Volume)
- Midblock (Low and High Volume)
- Bus lane
- Turnouts
- Curb extensions
- Protected bike lane
- Super stop
- Bus Rapid Transit (BRT)

Combining the stop placement, configuration, and typology information in one chapter may be confusing for the reader and should likely be avoided to more clearly differentiate each element.

Accessibility

Accessibility is discussed at the beginning of the Guidelines and include a list of requirements and best practices. The list, which is reproduced below, does not differentiate between required and recommended design dimensions.

- 5 ft. x 8 ft. landing area on a firm, even surface (not grass)
- 10 ft. x 4 ft. clear zones
- Max. 2% cross slope perpendicular to the road
- 4 ft. path of travel through or around the stop
- Accessible path from shelter or bus stop sign
- Bus stop length of 60-120 ft.
- Means for people with visual impairments to access information

Amenities

MATA typically maintains all bus stop amenities. Ridership is the primary indicator of amenities to include at bus stops. Stops fall into one of four categories. As shown in Figure 12 below, basic stops have fewer than 75 boardings per day, while high

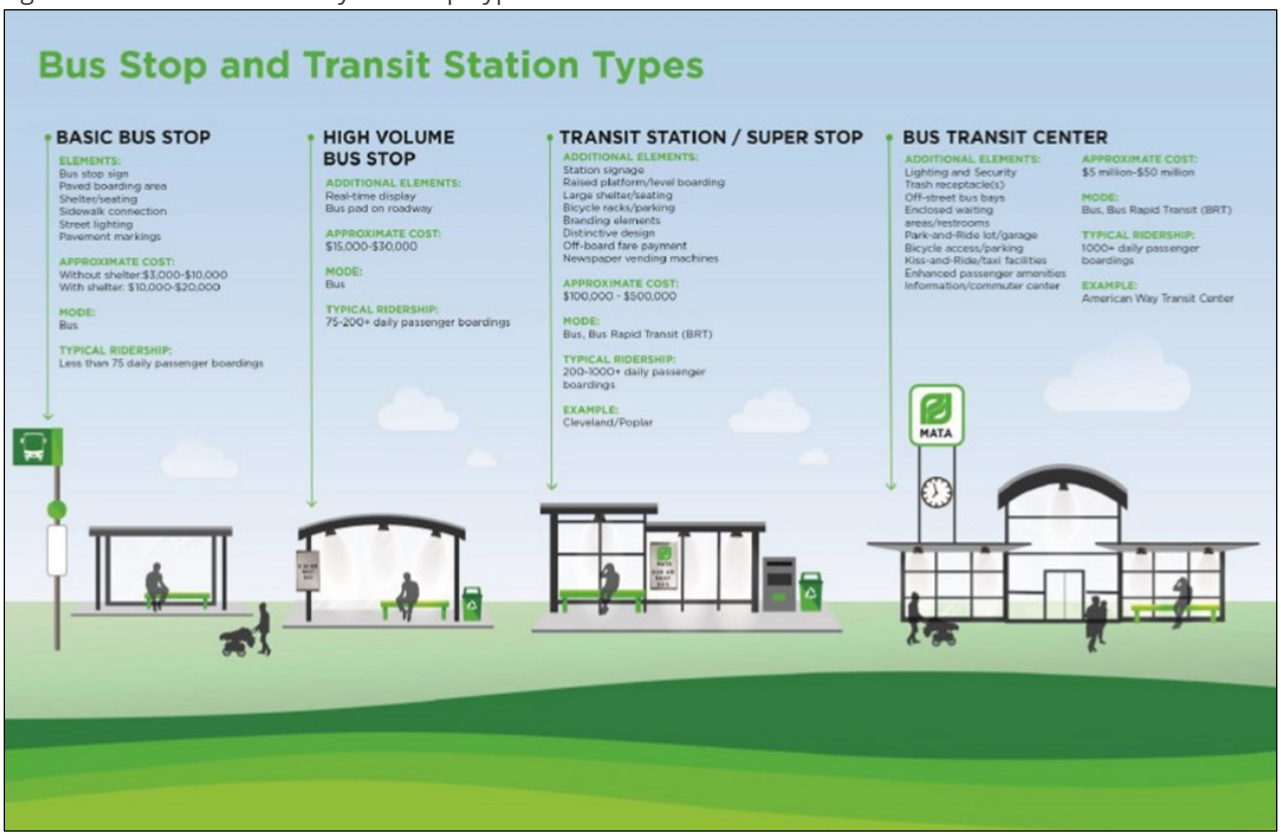
volume stops have at least 75 daily boardings. Super stops are high volume stops with a high level of transfer activity. BRT stations and super stops have level-boarding, as well as amenities and branding consistent with a rapid bus service.

Historically, MATA used an advertising contract to provide shelters across the bus system. Under this contract, shelters were placed to maximize advertising revenue, regardless of their benefit to passengers. When the contract ended, the contractor removed the installed shelters and MATA took shelter placement and management in-house. They use a standard shelter, which agency staff indicate helps with branding and raises awareness of bus service. To date, MATA has installed 25 shelters and plans to install another 25 by mid-2022, to replace the 100 shelters the advertising contractor removed at the end of the contract.

MATA is installing bike racks at stops across Memphis. However, they are not well used due to fears of theft.

Front and rear bus stop signs, as well as shelters and seating, are recommended for all stops. Real-time schedule displays, possibly including other information such as transit service alerts and the weather, can be installed at key bus stops. While lighting is a recommended amenity, the Guidelines indicate that coordination with local utility providers is difficult and, where possible, bus stops should be installed where there is existing sufficient lighting. Figure 12 shows a useful graphic of amenities at different types of stops.

Figure 12: MATA Amenities by Bus Stop Type



Signs

The Guidelines include a section on bus stop signs. Each MATA sign should include route numbers, end points, agency contact information, and a stop ID. The bottom of the bus stop sign should be 6 ft. 8 in. above the ground. While the Guidelines recommend front and rear bus stop signs, MATA staff indicate they are not installing rear signs because they are unnecessary or cannot be accommodated within the limits of the stop.

Implementation

The Guidelines use prioritization criteria to determine the amenities that should be installed at bus stops. Ridership is one criterion, which is shown in Figure 13. Stops with fewer than 25 passenger trips (boardings plus alightings) per day score 0 points based on ridership. The criteria provide a maximum 40 points based on ridership for stops with over 50 boardings and alightings. Other prioritization criteria are existing conditions, presence of minority or low-income populations, transfer points,

proximity to a public or non-profit trip generator, and the existence of an initiative to enhance community identify.

Figure 13: MATA Rubric for Basic Bus Stop Upgrades (Excluding Shelters)

Criteria for Basic Bus Stop Upgrade	Points Awarded
Passenger Activity – Sum of Weekday Boardings and Alightings	40 points if sum is greater than 50 30 points if sum is between 25-50
Existing Conditions	20 points if rated as 1 (Very Poor) 15 points if rated as 2 (Poor) 10 points if rated as 3 (Fair)
Significant Transfer Point	10 points
Minority and/or Low-Income Population	10 points if either minority or low-income population in the surrounding census block groups is greater than MATA service area average
Near Medical Facility or Significant Civic Building or Educational Institution (1/4 mile)	10 points
Part of corridor or neighborhood initiative to strengthen identity	10 points
MAXIMUM POSSIBLE:	100 POINTS

The Guidelines have separate recommended prioritization criteria for shelter placement. Ridership is the most heavily weighted criterion. Stops with under 10 weekday boardings score 0 points based on ridership. Other categories in the shelter placement rubric are “unusual” conditions, presence of minority or low-income populations, transfer points, proximity to a public or non-profit trip generator, and the existence of an initiative to enhance community identify. MATA staff indicate that in practice the rubric overemphasizes ridership, particularly since the COVID-19 pandemic reduced ridership at many stops to below the ridership thresholds necessary to justify installing shelters. Due to COVID-19’s impact on ridership, and because the rubric is a guideline rather than a rule, the agency has decided to install shelters even where stops do not meet the ridership threshold. if MATA were to revise the rubric in the long term, it would consider adding weight to transfers and unusual conditions while reducing the weight of ridership. Overall, MATA staff find the rubric to be useful and actively use it to identify locations to place shelters.

As shown in Figure 14, the table of costs for common bus stop amenities helps MATA demonstrate funding needs for systemwide improvements and funding requests when grants become available, such as federal pandemic relief

opportunities. MATA also refers to this table when communicating with policymakers, particularly those requesting a shelter at a particular stop.

Figure 14: MATA Systemwide and Itemized Costs for Bus Stop Improvements

Item for Design & Construction	Cost
Construct Landing Pad and related sidewalk work at 3,000 stops ($7,000/ea)	$21,000,000
Install shelter and foundation at 1,500 stops ($20,000/ea)	$30,000,000
New signs at 4,500 stops ($200/ea)	$900,000
Pavement markings at 3,000 stops ($200/ea)	$600,000
Larger items at 20 selected sites – curb extension, concrete bus pad, fare machines, info kiosk, art, etc ($100,000/ea)	$2,000,000
Other construction-related – police details or flaggers, miscellaneous	$2,000,000
Soft costs – design, public outreach, project management (20% of above)	$11,300,000
ESTIMATED TOTAL:	**$67,800,000**

The Guidelines' recommendation to install 10-15 ft. wide sidewalks at high volume stops is intended for large developments, transit-oriented developments, or along BRT corridors such as the Memphis Innovation Corridor BRT currently in development.

MATA notes great communication with the City of Memphis (home to 97% of MATA bus stops) and surrounding jurisdictions, so improving coordination was not a goal of the Guidelines. MATA does not regularly interact with the Tennessee Department of Transportation (TDOT), since TDOT project coordination occurs through the City of Memphis.

Maintenance

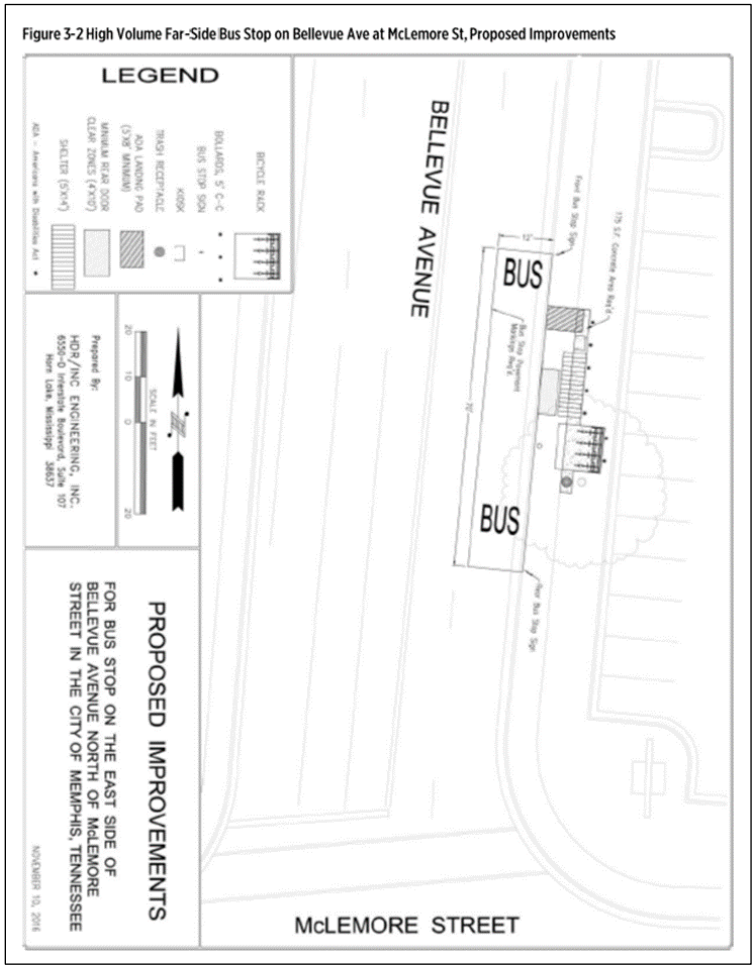
Maintenance responsibilities are only vaguely discussed in the Guidelines. However, the Guidelines indicate that typically a municipality or property owner maintains and empties trash cans at bus stops.

Visuals

The Guidelines include example diagrams of proposed bus stop improvements on local streets at different stop types that are helpful for engineers to visualize

designing bus stop improvements in the region. Figure 15 includes an example diagram, which would benefit from being rotated 90 degrees on the page, so it does not have to be read sideways. MATA staff often share these diagrams with consultants and municipal staff. However, except for the Amenities chapter, the Guidelines do not include many visuals.

Figure 15: MATA Diagram for a High Volume, Far Side Stop



Appendices

Appendices to the Guidelines include MATA's bus stop survey results and survey instrument, a bus stop inventory checklist, an example easement agreement, and a list of bus stops and the amenities available at each. The bus stop inventory checklist uses low resolution images that are rotated 90 degrees, so they are difficult to read. The other appendices include example easement and maintenance agreements.

Key Takeaways

MATA staff indicated they are satisfied with the Guidelines and its success in advancing bus stop improvements in and around Memphis. The Guidelines, combined with MATA's 2018 redesign of its bus network, have greatly improved bus operations and the passenger experience over the past few years.

Although the City of Memphis did not formally adopt the Guidelines or issue a directive advising staff to follow it, the Guidelines' adoption by the Memphis Urban Area MPO, who was a partner in the Guidelines' preparation and funding, signaled to the City and surrounding jurisdictions that they should follow it. MATA staff went so far as to indicate that most municipal and MPOs are familiar with the Guidelines. This may indicate that a strong MPO can encourage the adoption of new transit guidelines across local jurisdictions.

The Guidelines use simple and effective color and font styles. It appears to be more of an internal document than the Charleston Transit and Bus Stop Design Guidelines, which was intentionally written to be easy to follow for people who do not work for a transit agency or MPO. Additional tables or graphics containing key design specifications would improve the document's readability and the ease of finding information, as some of the key specifications are in bullets that do not stand out from the text. In addition, the accessibility information in the introduction should differentiate between required and recommended features. MATA's targeted outreach to the population that would most benefit from accessibility improvements is commendable.

Boston, MA

Intent/Audience

The MBTA adopted its Bus Stop Planning & Design Guide in 2018. The Guide's primary audience is MBTA's Service Planning team, but consultants and municipalities are also targeted. The Guide has five goals:

- *Define minimum criteria for bus stop safety, accessibility, and operations*
- *Promote consistency in bus stop placement and design*
- *Support bus service operational improvements relating to reliability and schedule adherence*
- *Encourage local jurisdictions, developers and businesses to design bus stops that are serviceable by the MBTA, and meet operational standards*

- *Promote greater use of transit through the provision of safe, comfortable, accessible, and convenient transit facilities*

The Guide is intended to recommend best practices and must be implemented with consideration for existing design directives from MassDOT.

The Guide begins with an overview of the bus stop design and review process. This is useful to stakeholders in bus stop design who are not familiar with, or are new to, the process (e.g. – municipal staff, consultants, and developers).

Design Components

Stop Spacing

According to the Guide, approximately 10-20% of MBTA's bus stops are spaced closer together than recommended. The Guide includes a list of the advantages and disadvantages of increasing bus stop spacing, including the impact on parking. The Guide notes that making a stop accessible can remove several parking spaces, although it does not quantify the parking losses from different stop configurations (see Figure 25 for the parking impacts included in the Rhode Island Bus Stop Design Guide). Figure 16 includes MBTA's bus stop spacing requirements.

Figure 16: MBTA Bus Stop Spacing Guidelines

Bus Operating Environment	Average # of Stops per Mile	Average Distance Between Stops
Central Business District (CBD)	4-5	1,000-1,300 feet
Urban outside CBD and Key Bus Routes	4-7	750-1,300 feet
Suburban	4-5	1,000-1,300 feet
Bus Rapid Transit/Limited Stop Service	2-4	1,300-2,600 feet

There is a detailed section on bus stop removal and consolidation, including the example consolidation analysis shown in Figure 17. Any stop that has less than 20% of a route's average weekday ridership can be considered for relocation or removal. Among the three guides reviewed, only MBTA's includes a stop consolidation analysis.

Figure 17: Example MBTA Bus Stop Consolidation Analysis

Table 3.2: Consolidation Example-Existing Conditions

Stop ID #	Distance Between Stops	Less Than The Minimum Spacing of 750'?	Stop Usage (Boardings + Alightings)	Exceeds 20% of The Route's Average Usage?
2251			75	Yes
	710'	Yes		
2252			25	No
	970'	No		
2253			15	No
	550'	Yes		
2254			110	Yes

Table 3.3: Consolidation Example- Proposed Conditions

Stop ID#	Distance Between Stops	Projected Stop Usage (Boardings + Alightings)
2251		87
	1195'	
2252 (relocated)		22
	1035'	
2254		117

Bus Stop Placement & Configuration

The Guide includes a table with the pros and cons of different stop placements. As shown in Figure 18, MBTA recommends the following bus stop lengths by stop type:

Figure 18: MBTA Bus Stop Lengths

Stop Placement	40' Bus		60' Bus	
	Standard [1]	Minimum [2]	Standard [1]	Minimum [2]
Curb Extension/ Bulb out	50'	40'	70'	60'
Near-side	100'	90'	120'	110'
Far-side [3]	80'	60'	100'	80'
Mid-block [3]	12'	100'	140'	120'

Note: A typo exists on the 40' Bus Standard Mid-block dimension; it should be 120', not 12'

The Guide includes graphics showing the required dimensions at far side, near side, and midblock bus stops. MBTA confirmed that these graphics are useful to

designers of bus stop improvements. The dimensions of bus stops by placement are included in Table 2 at the conclusion of this memo.

Discussion on configurations is limited to turnouts and curb extensions. Guidance on the use of bus turnouts is provided after the section on amenities. Among the recommendations for the use of turnouts is to only use them at far side stops. It would be more intuitive if this section was immediately preceding the discussion of bus stop placement.

The Guide provides minimal suggestions for planning around bicycle infrastructure and only in the context of traditional bike lanes. The conclusion of the Guide includes brief discussions of bus priority measures, such as transit signal priority (TSP), queue jump lanes, and bus lanes. It is anticipated that the MBTA's forthcoming update to the Guide will provide more substantial guidance on bus/bike infrastructure integration and on bus priority measures.

Typologies

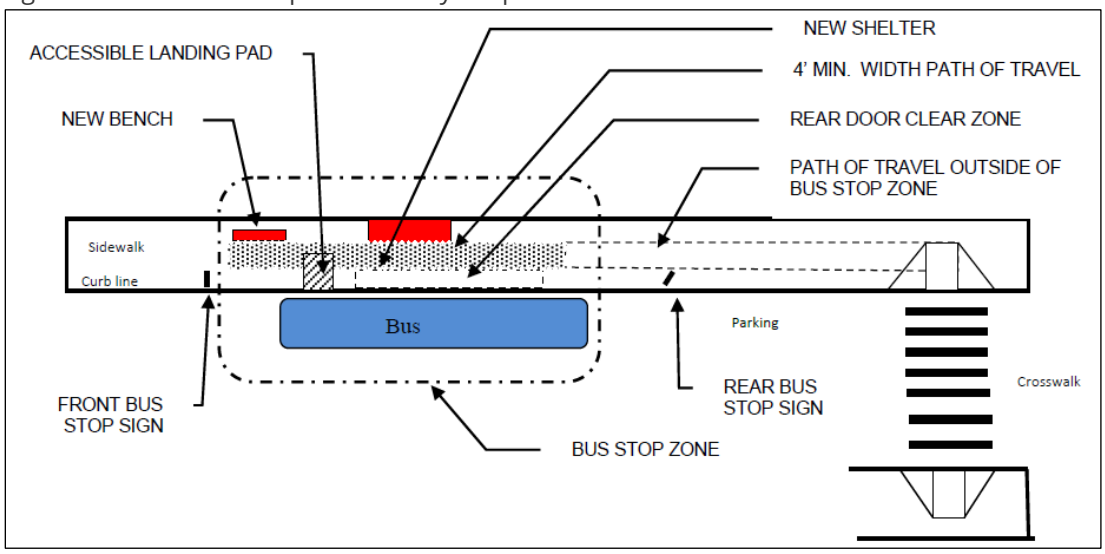
MBTA's Guide does not include bus stop typologies.

Accessibility

Besides the ADA landing area and rear door clear zone requirements that are standard across transit agencies, MBTA recommends a minimum 4 ft. clear zone along the entire bus stop for the bus operator to have the most flexibility in serving passengers. In addition, MBTA recommends a 10 ft. x 8 ft. landing area, 5 ft. more along the curb than required by the ADA.

While the Guide contains all the pertinent information on accessibility, MBTA received feedback that the accessibility information in the Guide could be more straightforward. For example, the bus stop accessibility graphic shown in Figure 19 could include dimensions. The forthcoming update to the Guide will likely address this concern.

Figure 19: MBTA Bus Stop Accessibility Graphic



Note: The graphic depicts a 5 ft. x 8 ft. landing area, while a 10 ft. by 8 ft. landing area is preferred. In addition, the shelter leader is pointing to the wrong element.

Massachusetts Architectural Access Board (MAAB) regulations include those for transit stations and platforms, but not traditional bus stops or shelters. The regulations apply to many of the elements of bus stop design outside the stop itself, including curb ramps, sidewalks (min. 4 ft. width), accessible paths of travel (min. 3 ft. width), wheelchair clearances, and protruding objects. These regulations will also apply to bus stops in SRTA's service area.

Curb reveal should be between 6-9 inches.

There is a particularly informative section on planning for construction impacts on bus stops. When construction projects, facilitated by either public and private parties, impact access to bus stops, temporary access to bus stops must be provided. MBTA approval is required for all temporary access plans to bus stops, which must be ADA compliant.

As shown in Figure 20, MBTA's Guide includes a table showing when accessibility requirements need to be followed for common bus stop improvements.

Figure 20: MBTA Accessibility Requirement Triggers

Scope of Work	Accessibility Requirements Triggered			
	Adequate Bus Stop Length (See Chapter 4)	Accessible Landing Pad	Accessible Path Of Travel To The Sidewalk	Path Of Travel To And Across Closest Street
Create new stop or move stop to a new location [1]	X	X	X	X
New shelter	X	X	X	
New bench				
Lengthen bus stop		X [3]	X [3]	
Install/move bus stop sign [2]	X			
New bus stop pavement markings	X			
New sidewalk or curb at a bus stop	X	X	X	
New bus stop curb extension	X	X	X	X

[3] Only if lengthening requires moving the front bus stop sign

Amenities

The Guide includes criteria for installing benches and shelters. For a bus stop to be eligible to receive a bench, it should have at least 50 daily boardings. Stops with at least 150 boardings are eligible for two benches. As shown in Figure 21, MBTA created an eligibility rubric that can make stops with lower ridership eligible for a bench if the stops score at least 70 points:

Figure 21: Bench Eligibility Rubric

Eligibility Criteria	Points
50+ Average weekday boardings (ADB)- all routes*	70
26-49 Average weekday boardings	50
5-25 Average weekday boardings	35
MBTA initiative to strengthen route or stop identity	20
Facilities for seniors, disabled, medical or social services in close proximity to stop	20

*At stops with 150+ average weekday boardings, two benches should be provided where feasible,

Note: Table heading color comes directly from the Guide

Approximately 8% of MBTA's bus stops have shelters. Many are installed and maintained through an advertising contract, although ownership reverts to the MBTA when the contract is over. The City of Boston has a separate agreement with an advertising company to install and maintain shelters, benches, and other street furniture.

The MBTA uses a rubric for shelter eligibility that is similar to its scoring system for benches (see Figure 22).

Figure 22: Shelter Eligibility Rubric

Eligibility Criteria	Points
70+ Average weekday boardings	70
25-69 Average weekday boardings	50
MBTA initiative to strengthen route or stop identity	10
Facilities for seniors, disabled, medical or social services nearby	20
Minority and/or low income area	15
Bus route transfer/connection point	5
Infrequent bus service (no more than every 30/60 minutes peak/off peak)	10
Poor site conditions at bus stop (weather exposure etc.)	10
Passing Score:	**70**

All stops eligible for a bench and shelter must past suitability tests before getting installed. In addition, stops eligible for benches, shelters, or seating get included in its triennial Title VI reporting. For each of these amenities, MBTA looks at the number of stops eligible for the amenity and the number of stops where the amenity currently exists. These counts are classified into minority and non-minority locations. The ratio between the two classifications is calculated and checked to see if it is above or below MBTA's Disparate Impact Threshold of a 20% difference.[1] MBTA has numerous specifications for its shelters, including specifying that the area for a standard shelter be 5 ft. x 12-18 ft. Maintenance of bus shelters varies and could be under the purview of MBTA, an advertising contractor, municipality, or other third party.

[1] https://cdn.mbta.com/sites/default/files/2017-11/2017-2020-mbta-title-vi-report.pdf (pg. 6-53)

The Guide also provides suggestions on the installation of trash cans, lighting, landscaping, newspaper/vendor boxes, and bike parking. MBTA encourages municipalities to require developers to install bus stop amenities for projects at or near bus stops.

While the MBTA is phasing out schedule cases at most bus stops, real-time schedule displays are an option for bus terminals. The real-time schedule displays should be visually and audibly accessible, as well as vandal resistant.

Signs

The Guide suggests that bus stop signs clearly identify the existence of the stop and the transit operator(s) serving it. In addition, the signs should provide information on the routes serving the stop and define the boundaries of the stop. Signs should be installed 6 ft. 8 in. above the sidewalk, 12-18 in. from the curb, and 4-6 ft. from a building or fence.

Implementation

MBTA works with cities and towns to advance bus stop improvements on an ad hoc basis. The level of communication depends on the municipality. Most consultants working on roadway projects impacting a bus stop contact MBTA to discuss bus stop improvements. Municipalities and project representatives or consultants sometimes contact the MBTA to discuss bus stop improvements. A common challenge with advancing bus stop improvements across the MBTA bus network is parking impacts, although some municipalities are more concerned with parking impacts than others.

For shelters owned by MBTA, boardings and equity are key factors in shelter placement decisions and have more weight than advertising revenue generation.

Maintenance

For bus stop amenities owned by MBTA, the agency's Service Planning department is the liaison for coordinating repairs with other MBTA departments.

Shelter ownership varies, but the MBTA owns a limited number of shelters. The Authority uses an advertising contract to maintain most shelters. Municipalities can acquire shelters through MBTA's new amenities contract with Intersection and Intersection will have maintenance responsibility over them.

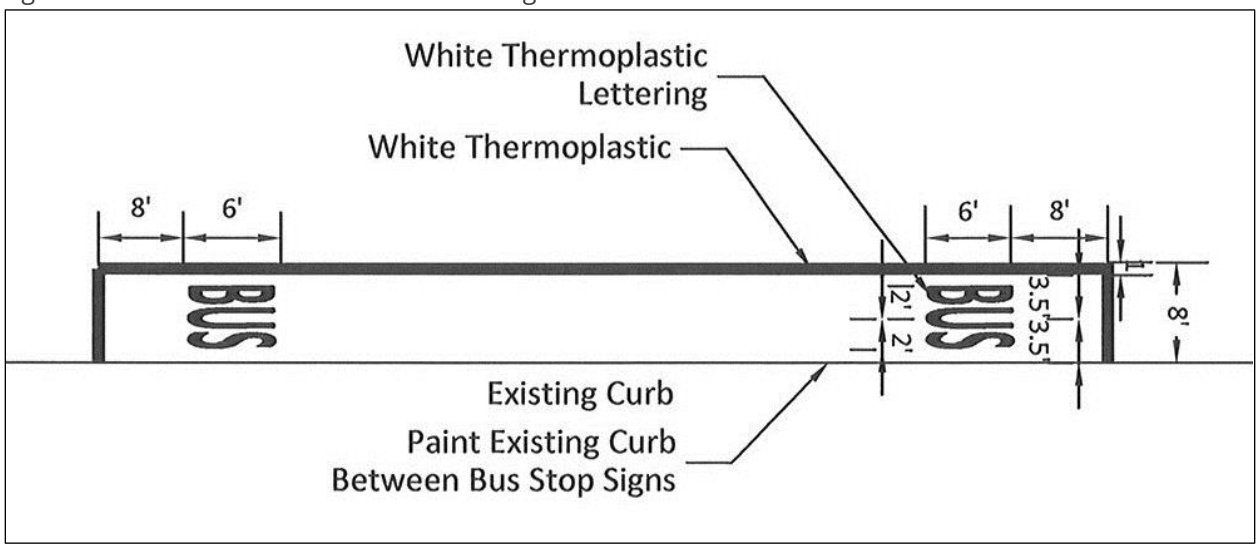
MBTA removes snow from bus stops on key bus routes only. Snow removal for stops on other routes is generally the responsibility of the municipality or abutter,

but it is a grey area, further complicated by sidewalk/roadway ownership and the limits of a bus stop.

Visuals

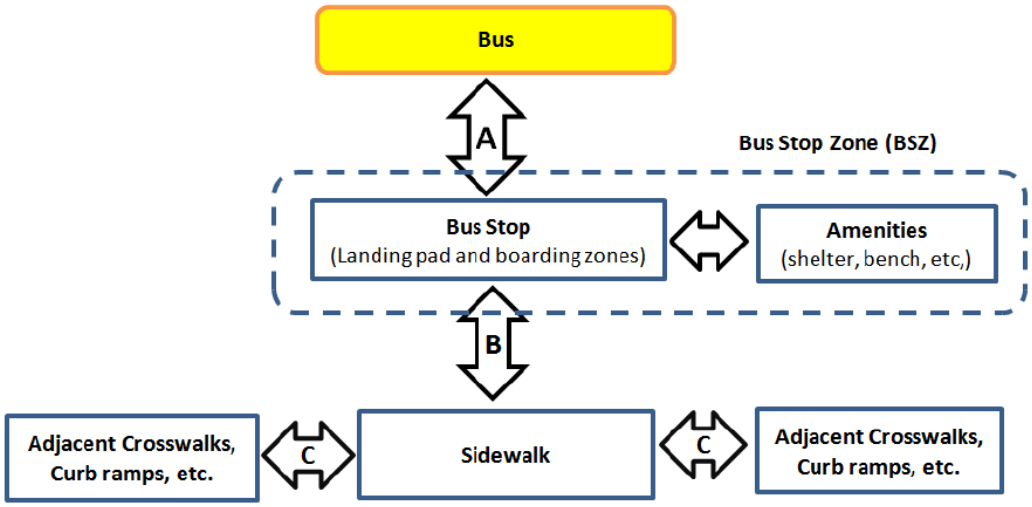
While the Guide does not include many graphics, the graphics that are included are effective for more technical audiences, e.g., transit agency staff, planners, and engineers. For example, the pavement marking detail in Figure 23 is helpful to professionals designing bus stops.

Figure 23: MBTA Standard Pavement Marking Detail



There is also a simple but effective flow diagram, shown in Figure 24, that shows each of the elements of accessibility that need to be considered when designing bus stops and how they relate to each other. However, this diagram could be made more effective if it was modified to fit an aerial image or graphical layout of a bus stop, and if the diagram described the meaning of the A, B, and C arrows. Enhancing the graphics and visual appeal of the Guide is a priority of the forthcoming update.

Figure 24: Diagram of Accessibility Components of a Bus Stop



Appendices

The Guide's appendices include a table outlining MBTA's bus stop amenity approval process, the specifications for a standard MBTA shelter, reference documents (NACTO, AASHTO, ADA, etc.), and the contact information for MBTA staff involved in bus stop planning.

Key Takeaways

While the content of the MBTA Guide is useful and informative, the flow of content appears disjointed. It jumps from discussion of bus stop configuration to amenities and then to other roadway treatments. The Guide would be more intuitive if it discussed all elements of bus stops within the roadway before moving on to bus stop amenities. The forthcoming update to the Guide is expected to include more effective visuals and more discussion on bus priority and designing for bus-bicycle interactions at bus stops. MBTA staff stated that some people question whether the Guide has too much or too little information. This is a difficult balance that MBTA achieves well.

Conversations with MBTA staff indicate that it is possible to have a bus stop guide widely used among its intended audience. Most consultants in the MBTA service area are aware of the Guide. Based on limited feedback and questions from the consultant community, MBTA believes that the Guide's content is straightforward to them.

Other key takeaways from the MBTA Guide are having boardings and equity be the primary factors behind shelter placement, not advertising revenue, by ensuring that the Authority has control over determining shelter placement priorities. In addition, MBTA received feedback that some users of its Guide found the accessibility requirements to be confusing. Accessibility requirements should be clear, easy to find, and simple to follow. Including a section at the beginning of a bus stop design guide with key accessibility requirements could address this.

NACTO

The National Association of City Transportation Officials (NACTO) published the Urban Street Design Guide in 2013. The Guide takes a people-focused approach to street design that differs from traditional roadway and highway design practices. The Guide uses national case studies to develop a toolbox of methods to improve the safety, livability, and economic vibrance of urban areas.

The Guide offers several recommendations for bus stop design:

- There should be safe access to stops via sidewalks and crosswalks
- Far side stops are preferable for pedestrian safety
- Ridership at a stop will determine whether the existing sidewalk width is sufficient for waiting passengers. Widening the sidewalk at the back or creating a bulbout at the curb are two strategies to increase space for waiting
- Bulbouts should be 40 ft. long x 6 ft. wide and be level with the sidewalk. Besides increasing the waiting space for passengers, bulbouts are useful where buses would otherwise have a difficult time merging back into traffic. While far side bulbouts are preferable, near side bulbouts can be implemented, ideally with right turn restrictions for general purpose traffic
- Bus turnouts should only be used where buses will not face significant delay merging back into traffic
- Shelters should be provided at stops with a high number of boardings
- Passenger information to provide at bus stops includes the transit agency name, routes served, a route map, and a schedule.
- All stops should have lighting sufficient to provide personal safety and security
- Midblock stops should have midblock crosswalks that are either signalized or have enhanced safety treatments

NACTO released its Transit Street Design Guide in 2016. While the Guide's focus is high intensity transit corridors, it provides useful guidance on bus stop placement and amenities. The Guide discusses the benefits and considerations (but generally not the dimensions) for the following bus stop placements:

- Far Side, In Lane
- Far Side, Pullout
- Near Side, In Lane
- Near Side, Pull Out
- Midblock, In Lane
- Midblock, Pullout

The Guide also discusses the benefits and considerations for bus stop amenities, including shelters, seating, fare vending machines, passenger information, transit curbs, bus pads, bike racks, and green infrastructure.

BEST PRACTICES

All three bus stop design guides reviewed provide comprehensive resources for their agencies. Interviews with agency staff found widespread agreement that creating the guide was worthwhile.

The key takeaways from these guides can be divided into three categories: process, style, and substance.

Process

- Include a section on existing and desired coordination with other jurisdictions. For SRTA, that would include municipalities, MassDOT, and the Southeastern Regional Planning & Economic Development District (SRPEDD). Since the majority of SRTA stops are in Fall River and New Bedford, SRTA may choose to include different processes for these two specific communities and the other communities served by SRTA.
- Incorporate SRTA's Bus Stop Location Policy into the guide so that all transit agency processes and guidelines on bus stops are in one cohesive document.
- Ridership thresholds for shelters and other amenities make the process for adding bus shelters more objective and transparent, and able to withstand political pressures.

- Identify roles and responsibilities for the installation and maintenance of each component of a bus stop (sidewalk) and amenities (shelters, trash removal, etc.).
- Strong coordination with partner entities facilitates use of the guides and the integration of bus stop improvements into local and state roadway projects.
- Integrating shelter placement requirements into shelter management contracts helps locate shelters where they are most needed. Without such requirements, advertising contractors will likely place shelters where they can generate maximum revenue, regardless of the benefit to riders. In addition, shelter ownership should revert to the transit agency at the conclusion of the advertising contract.

Style

- Use effective, clear, and clean fonts and styles. Charleston provides the best example, with serif fonts and color headings, tables, and text boxes.
- Key specifications should be prominent, such as in a table.
- Diagrams should include key dimensions where possible. For example, Figure 19, the Bus Stop Accessibility graphic from MBTA, would benefit from having dimensions added.
- Visuals that highlight key dimensions and elements, rather than fully engineered site plans, communicate bus stop components to a wider audience while still being useful to bus stop designers.
- Breaking up text with graphics or images improves readability.
- Use text boxes at the beginning of sections to highlight key takeaways.
- Consider the audience when developing graphics and visuals. A guide intended for engineers and transportation planners may want to include more straightforward visuals than a guide intended, at least in part, for the public or generalist municipal planners, who may prefer more icon-based graphics.

Substance

- Guidelines may be more effective if the audience is focused on transit agency staff, municipal planners, consultants, and designers, as opposed to including the general public.

  - To inform but not overwhelm members of the public and policymakers who may have an interest in bus stops, a 1–2-page briefing memo acting as a "Bus Stops 101" primer could be included in the guide. This may include the key elements of bus stop accessibility, placement, amenities, a link to the full guide, and contact information for transit agency staff.

Figure 25: MBTA Bus Stop Sign

- Far side stops are preferred among all agencies reviewed, as well as NACTO, particularly because they lead people to walk behind the bus, not in front, to cross the street.
- Stop spacing requirements should vary based on density and land use context to balance access to transit and quality of service provided.
- Constructing larger landing areas than required by ADA, such as MBTA recommends, should be a "desirable" specification where it is feasible.
- Bus stop signs should ideally have a clearly identifiable shape that differs from a standard parking sign. Figure 25 shows a bus stop sign from MBTA whose shape makes it recognizable as a bus stop sign, even from the back. In addition, bus stop signs should include route information, destinations, a stop ID, and transit agency contact information.
- Ridership, specifically boardings, should be one of or the primary factor for determining shelter placement.
- A rubric with weighted criteria can help objectively evaluate and prioritize the installation of amenities. The criteria should include ridership and equity/Environmental Justice presence, but may also include stop conditions, transfer points, and the presence of a non-profit trip generator, such as an educational or medical institution. Ridership thresholds should be discounted to account for lost ridership during the COVID-19 pandemic.
- A table of amenity costs can be a helpful communication tool.
- A table of the recommended amenities by bus stop type can help designers quickly identify which amenities to include in a bus stop design and help other readers confirm which amenities the transit agency should consider for a stop.

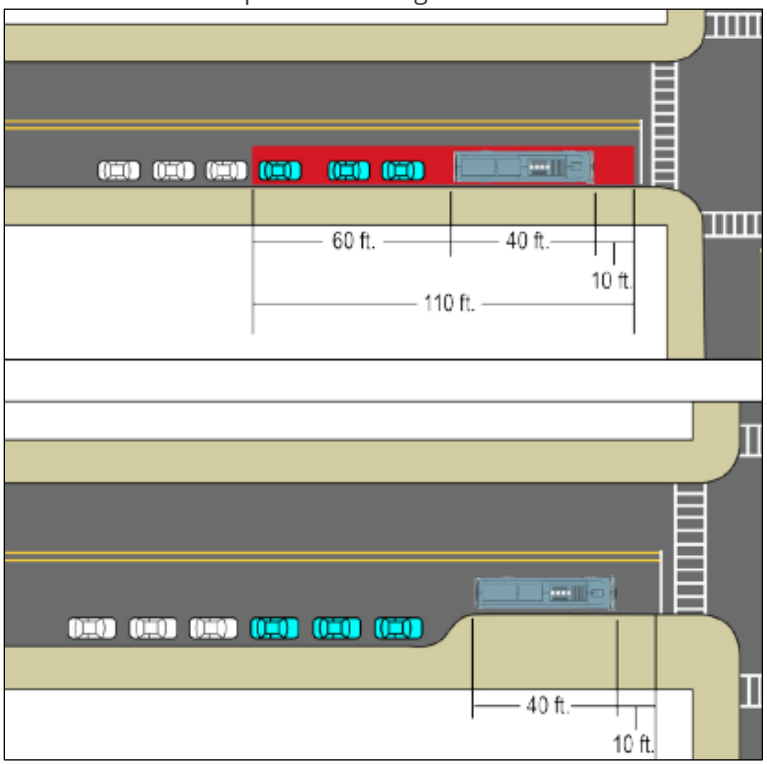
- A summary table of dimensions for all bus stop placements and parking impacts is useful for a reader to quickly find key information. Figure 26 is an example of a summary table from the Rhode Island Bus Stop Design Guide:

Figure 26: Example Stop Placement Dimension Summary Table

Stop Placement	Decel. Lane (feet)	Stopping Area (feet)	Accel. Lane (feet)	Total (feet)	# 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
Pull Out (Closed Bay)	60	40	20	120	6+

- Quantify parking impacts for common bus stop placements, including how the use of curb extensions can minimize parking impacts. Figure 27 provides a good visual of the benefit of curb extensions on parking supply.

Figure 27: Curb Extension Impact on Parking



- While guidance on designing for bus/bicycle interactions and transit priority elements may not currently be a top priority for SRTA and municipalities in its service area, they may be in the future. Consideration should be given to a

high-level inclusion of these topics and guidance produced by MassDOT, MBTA, and NACTO on bicycle-friendly roadway designs and transit priority.

- Including a list of systemwide bus stops as an appendix has limited benefit. Such a large list requires the use of small font, making the list difficult to read. In addition, there is no simple way to sort and order a large list of bus stops that would be intuitive for a reader. Lastly, the list of bus stops and their amenities will quickly become outdated as SRTA uses its guide to add, remove, relocate, and upgrade stops.
  - A better alternative is for SRTA to create an online database of stops and amenities and provide a link to it in its guide. SRTA or SRPEDD would update the list periodically.

The following Table 2 summarizes the key dimensions and recommendations in each bus stop design guide.

Table 2: Transit Agency and NACTO Guideline Summary Table

	Charleston	Memphis	Boston	NACTO
Stop Spacing	1,300 ft., min, 660 ft.	Varies by route type and density, but approx. 1,000 ft.	Varies by route type and density but approx. 1,000-1,300 ft. Min 750 ft.	800 ft. for local bus, 1,320-2,640 ft. for rapid bus
Stop Removal	<5 daily ons + offs	n/a	<20% of a route's total ons + offs	n/a
Far Side Stop	Pullout: 65-70 ft. In-Lane: 40 ft. Bulbout: 40 ft.	70 ft. In-Lane: 40 ft. Floating: 40 ft.	80 ft., min 60 ft.	n/a
Near Side Stop	Pullout: 80 ft. In-Lane: 80 ft. Bulbout: 80 ft.	90 ft. In-Lane: 40 ft. Floating: 40 ft.	100 ft., min 90 ft.	n/a
Midblock Stop	Pullout: 105-110 ft. In-Lane: 80 ft. Bulbout: 80 ft.	110 ft. In-Lane: 40 ft. Floating: 40 ft.	120 ft., min 100 ft.	n/a
Preferred Placement	Far side	Far side	Far side	Far side
Curb Reveal	n/a	n/a	6-9 in.	n/a
Landing Area	5 x 8 ft.	5 ft. x 8 ft.	10 ft. x 8 ft.	5 ft. x 8 ft.
Clear Zone	10 ft. x 4 ft.	10 ft. x 4 ft.	10 ft. x 4 ft.	n/a

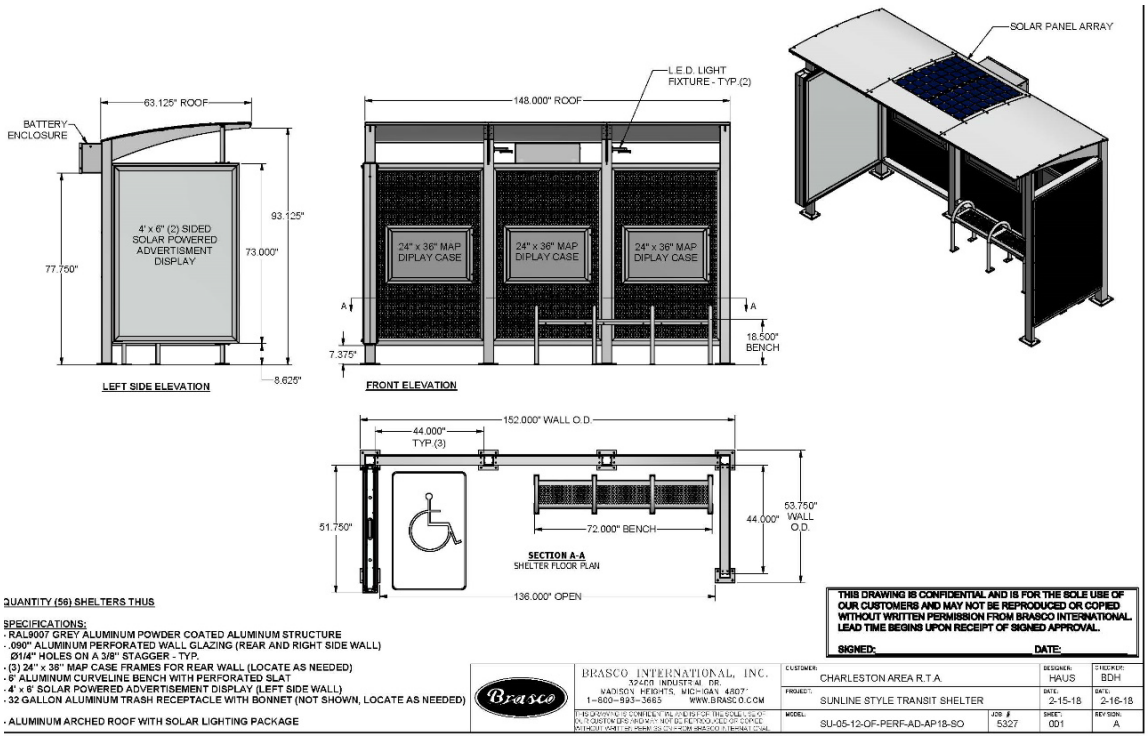
Accessible Path	3 ft.	4 ft.	4 ft., current practice is 5 ft.	3 ft. min., 8-12 ft. preferred
Sidewalks	n/a	5 ft. min., 8 ft. preferred on most routes; 10-15 ft. on BRT corridors	4 ft. (path of travel)	5 ft. min, 6-8 ft. preferred
Sign Elements	Route number(s), route destinations, logo/branding, bus stop icon, bus stop ID, contact info, high visibility colors, double sided, front placement only	Route number(s), route destinations, contact info, bus stop ID, branding, double-sided, front and rear placement	Route numbers(s), transit operator, contact info, parking regulations, front and rear placement	n/a
Sign Height	7 ft. from ground	6 ft. 8 in.	6 ft. 8 in.	n/a
Bus/Bike Designs	Yes	Yes	No	Yes
Top Amenity Factors	Ridership, stop conditions	Ridership, stop conditions	Ridership, equity	n/a

APPENDIX A

Shelter Specifications

CARTA's standard shelter is manufactured by BRSCO. The shelter is ADA compliant and made of aluminum. .Shelters must be built on and secured to a reinforced concrete foundation; CARTA requires that the poured foundation for its standard shelter be 8" deep reinforced concrete. Bus shelters should provide a clear line of sight to approaching buses and ensure that waiting passengers are visible to bus operators and other street users.

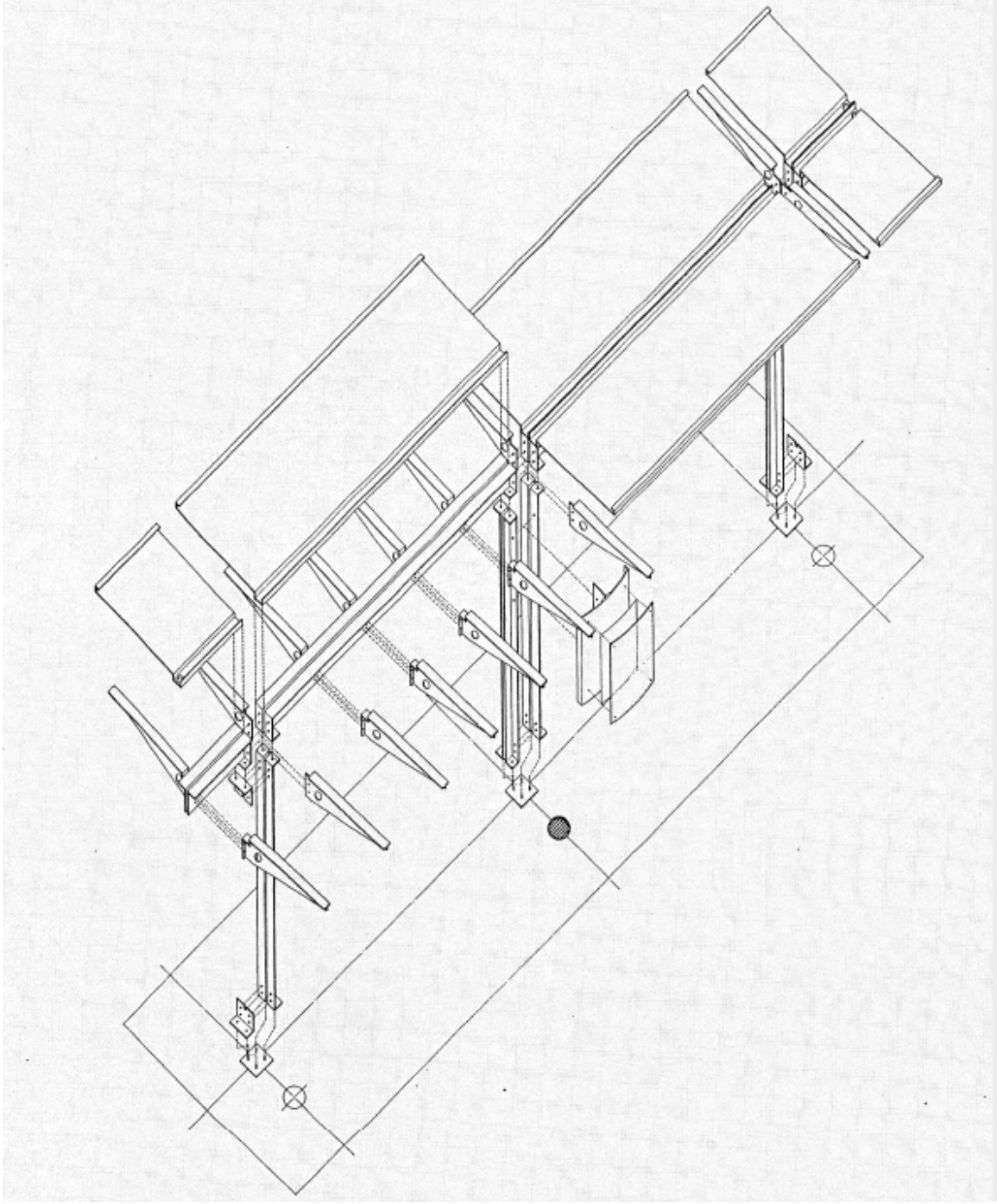
Its specifications and two example photos are below. The shelter comes in gray and green.




FOR LEASE
225-5700
Allstate
MARISCOS
FRAMING
POPCORN
AUTO
REGISTRATION
sunmetro
533-3333
make el paso sh

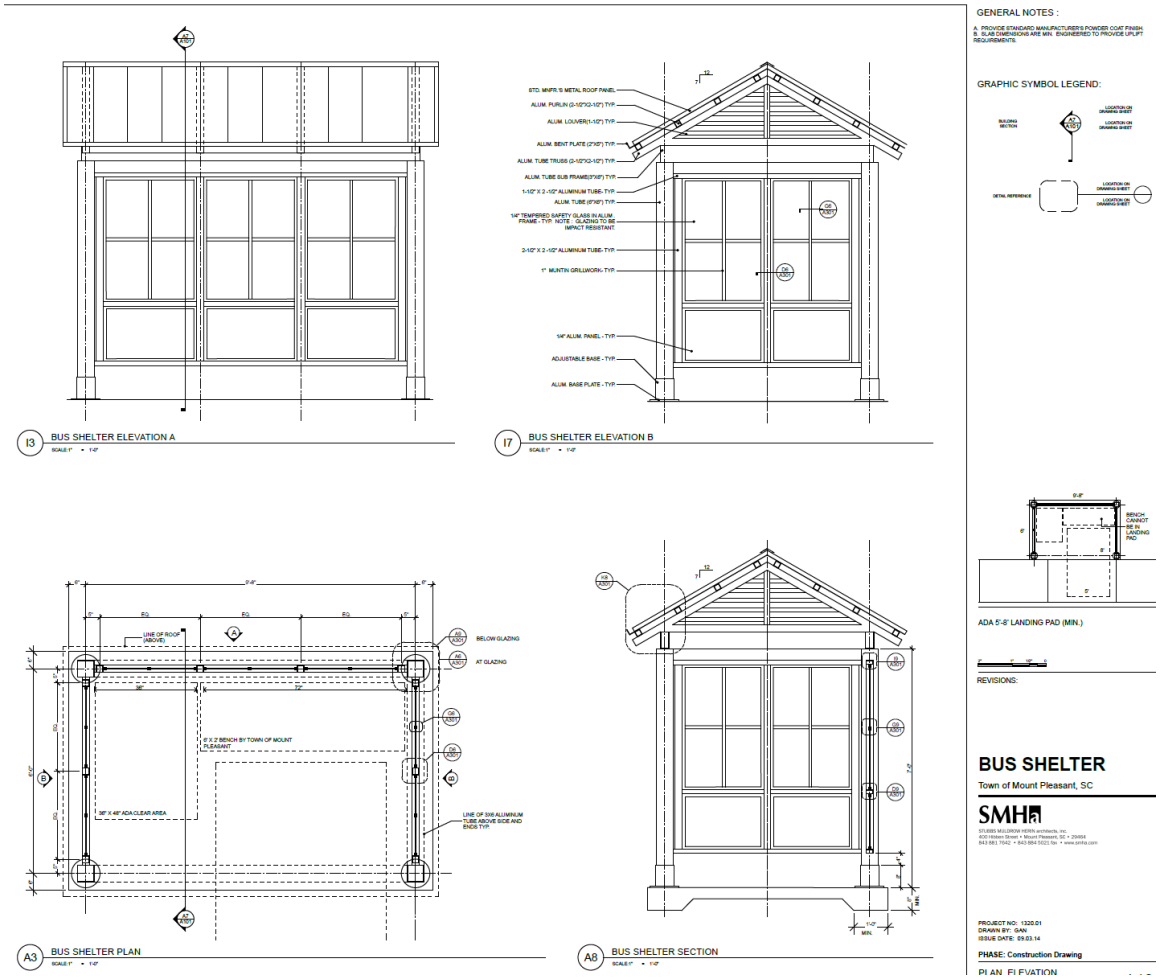

Coburg Rd
COBURG
Bank of

The City of Charleston has approved and adopted two shelter designs. The first is the Standard CARTA Stop. The second is the Historical Shelter Design, which is the preferred shelter design for all shelters installed south of Line Street. The Historical Shelter features a unique roof structure. Dimensions and additional photos the historical shelter designs are below. Poured foundations for historic shelters must be 12” deep reinforced concrete.




CLEARANCE 9' 7"
Comfort INN

The Town of Mount Pleasant has adopted a standard BRASCO bus shelter for all shelters within the municipality. The Mount Pleasant shelter features a gable roof design. Similar to the City of Charleston's shelter designs, Mt. Pleasant's has been adopted by the city so that the town's Design Review Team is generally only asked to approve shelter locations. Shelter specifications for Mt. Pleasant's design are below. Poured foundations for custom shelters like that approved by the Town of Mount Pleasant must be 4" deep with an 18" edge around the perimeter, and they must also include a "turn down" edge and 4 12" x 30" depth footers of reinforced concrete.



The Town of James Island uses the CARTA standard shelter but painted blue**.** Shelters must be built on and secured to a reinforced concrete foundation; CARTA requires that the poured foundation for its standard shelter be 8” deep reinforced concrete.

APPENDIX B

APPENDIX B: CHECKLIST FOR BUS STOP INVENTORY AND MAINTENANCE FIELD VISITS

In addition to being useful for updating and maintaining this guide, bus stop data is important to facilitate planning throughout the region. The information that is currently known about CARTA bus stops is attached at Appendix G: CARTA Bus Stop Database. CARTA staff will continue to maintain this information with regular field visits and bus stop inventory updates. Additional up-to-date information for each stop should also be collected for CARTA's bus stop inventory, and this checklist includes a list of all bus stop attributes to collect. This checklist will also be used by CARTA maintenance during regular field visits to inspect bus stops.

General Information	
Created on:	Updated on:
Stop ID #	
Stop Name	
Routes Served	
Bus direction	☐ Inbound ☐ Outbound ☐ Terminal
Location relative to intersection	☐ Near-side ☐ Midblock ☐ Loop ☐ Far-side ☐ Off-street (e.g. in a parking lot or transit center)
Amenities available:	☐ Sidewalk ☐ Crosswalk ☐ Bus stop sign ☐ Mounted on post (with square mount) ☐ Mounted on post (with u-channel) ☐ Mounted on existing pole (e.g. electric pole) ☐ Lighting ☐ Street light ☐ CARTA solar pole-mounted ☐ Pole mounted (not solar) ☐ Building light ☐ CARTA solar shelter light ☐ Seating ☐ CARTA approved seating ☐ Commercial advertising bench ☐ Non-standard bench ☐ Lean bar ☐ Other: _____ ☐ Trash receptacle ☐ Mounted trash can (10 gal) ☐ Trash can on ground (28+ gal) ☐ Other ☐ Shelter ☐ Bike rack ☐ Real time information ☐ Existing overhead shade (from a tree, building awning, building overhang, etc.)

Landing Zone and Sidewalk Information	
Is there an accessible 5' wide by 8' deep landing zone in front of the bus stop sign?	☐ Yes ☐ No
If not, landing area width and depth	Width:_____ Depth:_____
Does the landing zone comply with the other following ADA standards? 1. A cross slope no greater than 2% (1/50). 2. Any connections to a street, sidewalk, path etc. are at least 3' wide.	 ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
Do elements obstruct the landing area (e.g. barrels, news boxes, bench, bike racks, etc)	☐ Yes ☐ No
What is the material of the landing area?	☐ Hard paving material (concrete, stone, asphalt) ☐ Soil ☐ Grass ☐ Other
What is the material of the sidewalk?	☐ Concrete ☐ Asphalt ☐ Stone ☐ Other:_____
Are there physical barriers that constrict the width of the sidewalk? If yes, take and include a photo.	☐ Yes ☐ No
Are there any problems with the sidewalk or landing area surface? If yes, take and include a photo.	☐ Yes ☐ No
Rank the sidewalk condition (1-5)	_____
If stop is not accessible, is it feasible to shift the stop to an alternate location nearby?	
Is there a level and clear boarding area at each back door of the bus?	☐ Yes ☐ No
Seating Information	
What is the seat height of the bench	Width:_____ Depth:_____

Does the bench comply with the following ADA standards? 1. Seat dimensions: 20 inches minimum to 24 inches maximum in depth and 42 inches minimum in length. 2. Seat height: 17 inches minimum to 19 inches maximum above the floor or ground. 3. Back support: 42 inches minimum in length and that extends from a point 2 inches maximum above the seat to a point 18 inches minimum above the seat. 4. Structure supporting vertical or horizontal forces of 250 pounds applied at any point on the seat, fastener, mounting device, or supporting structure. 5. Exposed benches: slip resistant and designed to shed water. 6. If installed inside the shelter it must be installed in such as manner to allow a wheelchair passenger to still use the shelter (30″). 7. Do not install bench on ADA landing pad 8. Minimum of 2′ between the bench and back face of curb. 9. Minimum of 3′ circulation space on either side of the bench for access.	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
Rank the bench condition (1-5)	_____
Which way does the bench face?	☐ Parallel to curb ☐ Perpendicular to curb ☐ Angled to curb
Shelter Information	
What type of shelter is it?	☐ CARTA standard shelter ☐ Historic district shelter ☐ Domed top shelter ☐ Gable roof shelter ☐ Other:_____
Shelter dimensions	Width: _____ Depth: _____ Height: _____
Distance from front of shelter (windscreen or post) to curb	_____

Distance from back of shelter (windscreen or post) to back of sidewalk or building/fence/wall	_____
Is the shelter in the middle of the sidewalk and obstructing the general pedestrian path of travel?	☐ Yes ☐ No
Is there a 32" deep x 48" wide accessible space fully within and under the shelter roof?	☐ Yes ☐ No
Does the shelter comply with the following ADA standards? 1. Clear path of 3' minimum in front or behind shelter for sidewalk. 2. Entrance must be 2'8" wide at minimum. 3. Minimum clear floor area of 30 inches wide by four feet deep. 4. Not placed on the ADA landing pad. 5. Minimum height of 6'8". 6. If it abuts a building, there must be 12" between the shelter and building at minimum. 7. Connected to route to the landing pad.	 ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
Does the shelter have a bench?	☐ Yes ☐ No
Who owns the shelter?	_____
Information Features	
Is there a bus stop sign?	☐ Yes ☐ No
Bus stop sign is posted how high above the ground/surface (in inches)?	Height:_____
Does it include the correct Stop ID?	☐ Yes ☐ No
List the route numbers indicated on the bus stop sign	_____ _____ _____
Are existing signs and/or posts damaged, worn or not secured?	☐ Yes. Explain: _____ ☐ No
What is the sign face orientation to the curb?	☐ Parallel to curb ☐ Perpendicular to curb ☐ Angled to curb

What is the distance from the pole/post/other to the street edge/curb (in inches)?	_____
Does the bus stop sign mounting/placement conform with the following ADA Standards?	☐ Yes ☐ No ☐ N/A
1. If it is mounted on a wall or telephone pole and between 27" and 80" off the ground, it cannot protrude into the pathway by more than 4". Below 27" can protrude any amount.	☐ Yes ☐ No ☐ N/A
2. If it is mounted on its own pole between 27" and 80" from the ground, it can overhang by up to 12".	☐ Yes ☐ No ☐ N/A
3. If the bottom of the sign is mounted less than 80" from the ground, a barrier must be provided to warn the visually impaired.	☐ Yes ☐ No ☐ N/A
Is there a route map posted?	☐ Yes ☐ No
Is there a schedule posted?	☐ Yes ☐ No
Is there an area map posted?	☐ Yes ☐ No
Is parking allowed in the bus stop (i.e. is the bus stop mistakenly painted to members of the public to parallel park in it or use the curb for pick up/drop off)?	☐ Yes ☐ No
Miscellaneous Information	
Is bus stop near an at-grade railroad crossing?	☐ Yes ☐ No

Ranking System

Regarding rating conditions at each stop, a suggested scoring system is shown below:

- Score of 5 = Stop is already fully accessible and in excellent condition
- Score of 4 = Good condition, functionally accessible, deficiencies are minor
- Score of 3 = Fair condition, some significant issues for safety and/or accessibility
- Score of 2 = Poor condition, not accessible, very significant problems
- Score of 1 = Very poor condition, difficult for anyone to use stop

APPENDIX C

APPENDIX C: DEVELOPER CHECKLIST

When CARTA receives a request for bus stop addition or relocation, it evaluates the proposed bus stop location using the access, safety, and operational efficiency factors outlined in Chapter 6 – Bus Stop Modifications. This checklist is designed to guide property developers though the bus stop addition or relocation process. Projects covered in this checklist include, but are not limited to, new developments, renovations, road projects, and streetscape projects.

First things first: defining the need

Property developers interested in upgrading transit service to a development must contact CARTA during the project planning phase to explore whether it is operationally feasible to provide new or relocated transit stops on or adjacent to the proposed development. If feasible, CARTA will determine what type of bus stop and what level of amenities should be provided.

To make a bus stop-related request for CARTA, email Transit Planning at belenv@bcdcog.com or call BCDCOG at (843) 529-0400.

Developer Checklist:

	Transit Circulation and Stop Placement
	Design all roadways and driveways that will accommodate buses to have lane widths between 10-12 ft. (See Chapter 7 -- Operational Considerations)
	For all intersections and driveways that will accommodate buses, design corners for a 50 ft. (15.2m) outside and 30 ft. (9.1m) inside turning radius. (See Chapter 7 -- Operational Considerations)
	For all roadways, driveways, and stop areas that will accommodate buses, design pavement cross-sections to withstand the wear-and-tear that will be generated by heavier vehicles (ideally including concrete pads at bus stop areas) (See Chapter 3 – Bus Stop Configurations)
	Locate proposed bus stop in a safe, visible, and well-lit location in reasonable proximity to primary destinations (See Chapter 2 – Bus Stop Placement)
	If the proposed bus stop will be located in the public right of way, secure right-of-way and appropriate encroachment permits. (See Chapter 6 – Bus Stop Modifications)
	Bus Stop Design and Accessibility
	Allocate sufficient length along the curb lane to accommodate the proposed bus stop configuration. (See Chapter 3 – Bus Stop Configurations)
	Allocate sufficient right of way behind the curb to meet ADA requirements and accommodate all required amenities for the proposed bus stop type, at a minimum. (See Chapter 3 – Bus Stop Configurations)

	Coordinate with CARTA for bus stop design and amenity placement consistent with the Transit and Bus Stop Design Guidelines.
	Coordinate an amenity installation and maintenance agreement with CARTA and any other involved local parties.
	Coordinate with local public works agencies for utility services and pavement markings, if necessary.
	Provide adequate pedestrian walkways to transit stops. Ensure proposed bus stops are connected to the development and any primary destinations with an ADA-compliant pedestrian access path free of obstacles. (See Chapter 5 – Bus Stop Amenities and Appendix D – Bus Stop Accessibility Guidelines).