Toolkit

for the assessment of
Bus Stop Accessibility and Safety
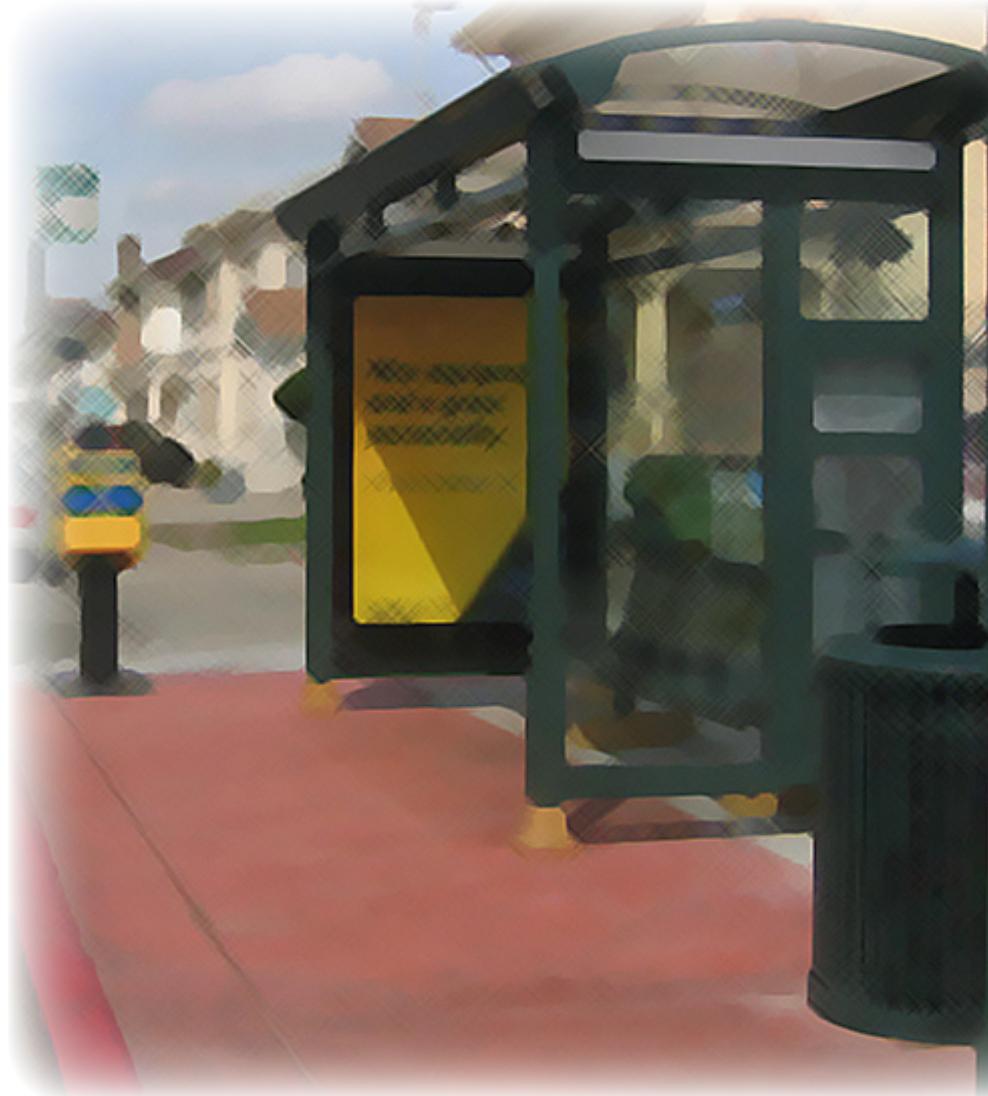
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INTRODUCTION

Bus stops are a key link in the journey of a bus rider. For people with disabilities, inaccessible bus stops often represent the weak link in the system and can effectively prevent the use of fixed-route bus service. Physical, cognitive, and psychological barriers associated with bus stops can severely hamper bus ridership by the disability community, thus limiting their mobility and potentially leading to increased paratransit costs.

This toolkit is primarily targeted towards staff at transit agencies and public works departments who are responsible for bus stop design and placement. The toolkit is intended to be a convenient resource that can be used to enhance the accessibility of specific bus stops, or help in the development of a strategic plan to achieve system-wide accessibility. Disability community representatives should also find in these pages material that can be used to advocate for accessibility improvements and barrier removal.

We encourage you to selectively draw on the sections that are most relevant to your situation. Your feedback on the toolkit will be most appreciated, and can be submitted either via a telephone call to Easter Seals Project ACTION, or via a short survey. Please let us know if there are critical topics that should be included in future versions of the toolkit.

Use the Toolkit to:

- Determine minimum ADA requirements

- Enhance bus stop accessibility through universal design

- Inventory bus stops

- Develop a strategic plan for system-wide accessibility

- Advocate for improvements

CONTACT INFORMATION

The Toolkit for Bus Stop Accessibility and Safety Assessment is provided by Easter Seals Project ACTION (Accessible Community Transportation In Our Nation). Funded through a cooperative agreement with the U.S. Department of Transportation, Federal Transit Administration, Project ACTION promotes cooperation between the transportation industry and the disability community to increase mobility for people with disabilities under the ADA and beyond.

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PROJECT ADVISORY COMMITTEE AND TEAM

The Toolkit was developed by Nelson\Nygaard Consulting Associates with the aid of the Project ACTION Advisory Committee and Team. Committee and Team members represented the diverse interests of transit agencies, people with disabilities, and various local, state and federal agencies.

Members of the Committee:

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MYTHS OF BUS STOP ACCESSIBILITY

Myth 1: Only a small percentage of the transit ridership will benefit from bus stop accessibility improvements.

- Accessibility improvements for people with disabilities enhance the usability of transit systems for all riders. For example, paving a grassy surface to serve as a bus stop landing pad provides a stable surface for waiting patrons; adequate lighting alleviates the security issues of using the bus after dark; and good information reduces ambiguity of the system. Accessibility improvements should be viewed within the context of general system usability, not as "those things you do for those other people."

- Accessibility improvements also benefit people with a range of disabilities, from physical conditions affecting mobility, stamina, sight, hearing and speech to other conditions, such as emotional illness and learning disorders. Such disabilities may or may not be evident to others. The percentage of the U.S. population affected by a condition that constitutes a disability under the Americans with Disabilities Act (ADA) is expected to increase over the coming decades, in part due to the growing elderly population. Additionally, transit users carrying packages or luggage, pushing children in strollers, or otherwise transporting items will also benefit from accessibility improvements.[1]

Myth 2: Bus stop accessibility and safety improvements are not our responsibility.

- As bus stops are located on the public right-of-way or on private property, transit agencies may not have jurisdiction to implement improvements. Though this may be the case, it is in the interest of the transit agency to work with its municipality, community and businesses on bus stop improvements. Bus stops advertise an image of the transit service and agency. Poorly maintained, unsafe, uninformative and inaccessible stops convey a poor image of the agency and discourage use.

- Rising paratransit costs are another reason bus stop safety and accessibility improvements should be the responsibility of the transit agency. Providing an unobstructed landing pad, wayfinding signs, clear transit information at the eye level of a wheelchair user and other basic improvements can encourage some paratransit users to use fixed route transit, decreasing the agency's paratransit costs.

- Lastly, several transit agencies have been sued and lost cases due to the inaccessibility of their bus stops. Transit agencies are required to provide accessible transit, and accessible bus stops are an integral part of an accessible system. Similarly, public works departments are required to construct accessible facilities and ensure program accessibility of existing facilities.

1 Public Rights-of-Way Access Advisory Committee, *Building a True Community* U.S. Access Board 2001.

Myths of Bus Stop Accessibility

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Myth 3: Once we have implemented bus stop accessibility improvements, the stop will always be accessible.

- Though accessibility and safety improvements have been implemented, the stop may not meet standards indefinitely. Many factors may decrease accessibility and safety, including construction, unregulated placement of newspaper vending machines and poor maintenance. Stops should be regularly monitored to ensure that the stop is clear of obstructions.

Myth 4: To change flag stops to fixed bus stops, each new stop must have a landing pad.

- New bus stops should be accessible to all patrons. Agencies are not required, however, to install landing pads at all stops. Where landing pads are provided, they must comply with the requirements stated in the section on Bus Stop Area and Bus Landing Pads. It is recommended that fixed bus stops be located where there is a stable, level, raised and slip-resistant surface to facilitate boarding and alighting for all passengers. If this type of surface is not available at the location chosen for the bus stop, a landing pad should be installed. If patrons who use wheelchairs are not able to use the stop, the transit agency would fail to meet the overarching mandate of Title II of the ADA to provide accessible transportation.

Myth 5: We can prohibit patrons with wheelchairs from boarding and alighting at stops that are not currently accessible.

- A transit agency may not legally prohibit the boarding and alighting of passengers with wheelchairs, unless the lift or ramp would be damaged if deployed, or if temporary conditions at the stop prevent any disembarkation. If the bus stop is located in an area where conditions would damage the lift, such as a steep slope, it is recommended that the driver stop at a nearby location that has a stable surface.[2]

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2 ADA DOT Regulation Sec. 37.167(g): Other service requirements, http://www.fta.dot.gov/legal/regulations/us_dot/5601_5606_ENG_HTML.htm

PRINCIPLES OF BUS STOP DESIGN[3]

For a bus stop to be accessible, three elements should be incorporated into the siting and design of the stop. These elements are:

1. Barrier-Free Design
2. Urban Wayfinding
3. Safety and Warning

Barrier-Free Design

Barrier-Free Design entails designing a bus stop and path so that a person with a disability can proceed unimpeded to the sidewalk or an accessible building served by the transit stop. The basic principles of Barrier-Free Design include:

- Planning outdoor elements to minimize obstacles and eliminate travel hazards such as support cables for utility poles and low signage protruding into the travel path.

- Positioning newspaper boxes and other street furniture close to the edge of a travel path, out of the main flow of pedestrian traffic and the bus landing pad.

- Avoiding grade-level changes in sidewalk and platforms wherever possible.

- Providing slip-resistant finishes, good grip and sure footing to ensure surfaces are safe.

- Supplying seating adjacent to pathway routes.

Urban Wayfinding

Wayfinding is the process of movement from one predetermined destination to another, and is an activity that demands complete involvement with the environment. The basic principles of orientation and wayfinding are:

- Providing consistency and uniformity of elements and layout

- Simplifying orientation by using right angles for design elements and layout

The use of paving stones creates a park-like feel and makes this bus stop in Palm Springs, California tactually and visually distinct from the adjacent concrete sidewalk.

Source: Robert Perrone Consulting

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3 Province of Alberta, Transportation & Utilities, *Design Guidelines for Accessible Pedestrian Environments* 1996.

- Providing tactile as well as visual cues and landmarks within designs (examples: sidewalks with grass shoulders or borders; street furnishings such as benches; garbage receptacles; planters located adjacent to but not within path of travel; high contrasts on shelter door frames)

- Illuminating walkways, hazards and waiting areas for orientation and security purposes

- Providing logical, unbroken travel paths from sidewalk to bus boarding platform

- Using color contrast, sound, light and shade to accentuate travel paths between shelter, sidewalk and bus boarding platform

Safety and Warning

As with all aspects of roadway design and bus operations, an important element in the design of bus stops is safety and warning.

The basic principles of safety and warning are:

- Providing a bus stop with good ergonomics and effective wayfinding will also be beneficial for safety and warning purposes

- Placing street furniture such as benches, newspaper vending boxes, and planters to create barriers from hazards

- Ensuring good lighting and visibility from surrounding land uses

- Highlighting the existence of hazards by distinctive markings, signs and higher light levels where inadvertent exposure to hazards cannot be blocked

HOW TO CONDUCT A BUS STOP INVENTORY

Inventorying conditions at and around bus stops is the first step in determining and implementing improvements. The data can also be used to communicate the bus stop location, coordinates, surrounding land uses and its condition for patrons with disabilities to inform them of the stop's travel path and accessibility. Additionally, a database of existing conditions provides the opportunity to comply with ADA regulations, coordinate with other agencies and consider real time information.

For information on how to conduct and maintain a bus stop inventory, refer to *Bus Stop Inventory: Best Practices and Recommended Procedures*, from the Bus Stop Inventory Task Force of the Transit Standards Consortium, Incorporated. The Transit Standards Consortium is comprised of transit industry stakeholders and conducts research, testing, training and maintenance of transit standards to improve transit's quality of service. The Bus Stop Inventory manual is a useful resource in developing and utilizing a valuable inventory.

The manual can be purchased from the website, http://www.tsconsortium.org. The table of contents of the report is reproduced below.

Chapter	Content
1	Introduction
2	Planning a Bus Stop Inventory
3	Components of a Bus Stop Inventory
4	Field Collection
5	Integration and Maintenance
6	Summary and Conclusion
Appendix One	Acronyms, Definitions
Appendix Two	Core Elements, Associated Elements, Related Subsystem Elements
Appendix Three	Design and Development of a Bus Stop Inventory to Support an Intelligent Transportation System: The MARTA Experience
Appendix Four	Creating a Bus Stop Inventory and Transit Scheduling Database for Metro
Appendix Five	Dallas Bus Stop Database Design
Appendix Six	Statement of Work Sample
Appendix Seven	Case Studies

Transit agency official measures the distance between the edge of the shelter and the curb, using a measuring wheel, to determine if enough clearance is available for wheelchair users to board and alight the bus.

Source: Nelson\Nygaard Consulting Associates

Sample Bus Stop Checklist

The Sample Bus Stop Checklist is based on a model utilized by Arlington County in Virginia, and modified to incorporate items and ideas from other checklists and feedback from a series of field tests.[4] Toolkit users are encouraged to customize the checklist according to the needs of their transit services, by changing lines directly in the tool. The Sample Bus Stop Checklist is intended for use by transit and public works agencies. A Quick Bus Stop Checklist is available for advocates and the general public.

Though the checklist may be completed at any time of day, certain sections, such as the Lighting Assessment, are best performed in the evening or night-time to effectively determine the safety, security and accessibility of the stop.

The equipment needed to acquire data for the site is listed below, divided into "basic" and "additional." These categories are based on the type of information the transit agency is collecting, the use of paper forms or computer and the level of accuracy desired.

- **Basic:**
  - Database
  - Checklist
  - Clipboard
  - Camera (preferably digital to be able to download to a database)
  - Measuring wheel
- **Additional**
  - Handheld device or laptop onto which the checklist can be downloaded
  - Global Positioning System (GPS) to calculate the location of the bus stop
  - Vehicle with GPS outfitted with computer equipment and sensors to transport the crew to the bus stop locations and gather data

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4 Refer to Appendix E for a list of locations where the Checklist was tested.

After conducting the bus stop inventory:

- If the checklist was completed using paper forms, the information gathered should be entered into a database. An Excel spreadsheet or Access database are the most convenient ways to store the information.

- Once a database is created, the data may be used to prioritize improvements according to the condition of the stop or shelter, the use of the stop by persons with disabilities, ridership, and/or the importance of the connections provided by the bus stop location. The database should be updated to include the current conditions at the stop.

Route Name:	Location:	Weather Conditions:	Stop No.:

	PART A: IDENTIFICATION/LOCATION		
			Yes No N/A
A1	Is there a bus shelter?		☐ ☐ ☐
	If YES, what is the number of the shelter?		
			Yes No N/A
	If NO, is there an exterior alternative shelter nearby (i.e. - awning, overhangs, underpass)?		☐ ☐ ☐
A2	Street Name:		
A3	Nearest Cross Street (street name or landmark if mid-block):		
A4	Bus Route Direction:		

North Bound	☐	South Bound	☐	More than one direction	☐
East Bound	☐	West Bound	☐		

A5	What is the purpose of the stop?					
				Both Boarding and Alighting	☐	Other (specify):
	Park and Ride	☐	Boarding	☐		☐
	Kiss and Ride	☐	Alighting	☐	Transfer	☐

A6	What is the average number of daily boardings at the stop?	
A7	Where is the bus stop positioned in relation to the nearest intersection?	
	Nearside (Before the bus crosses the intersection)	☐
	Far Side (After the bus crosses the intersection)	☐
	Mid-block	☐
	Not near an intersection	☐
	Freeway bus pad	☐
	N/A	☐

Date	Time:	Surveyor:

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Route Name:	Location:	Weather Conditions:	Stop No.:

A8	Distance from bus stop pole to curb of cross street in feet:

A9	Adjacent property address or name of business (only if readily visible):

A10 Adjacent Property Description:

Apartment Building ☐	Industrial Site/Bldg. ☐	Park ☐	School ☐
Day Care ☐	Library ☐	Park and Ride ☐	Supermarket ☐
Government Building ☐	Mall/Shopping Center ☐	Place of Worship ☐	Transit station/center ☐
Hospital ☐	Nursing Home ☐	Residence – townhouse ☐	Vacant lot ☐
Human Service Agency ☐	Office Building ☐	Residence – detached ☐ Retail Store ☐	Other (specify): ☐

A11	Distance from previous bus stop (in feet):

Date	Time:	Surveyor:

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Route Name:	Location:	Weather Conditions:	Stop No.:

PART B: PEDESTRIAN ACCESS FEATURES			
Section B-1: Landing Area Assessment			

			Yes No
B1	Is there a landing area at least 5 feet wide and 8 feet deep adjacent to the curb/street?		☐ ☐

B2	Where is the landing area positioned in relation to the curb/street?				
	Below street level (low ground or shoulder)	☐	Shoulder	☐	Other (specify):
			Adjacent	☐	☐
	Sidewalk	☐	Bus Bulb	☐	Off-Road/No sidewalk ☐

B3	What is the material of the landing area?						
	Asphalt	☐	Dirt	☐	Gravel	☐	Other (specify):
	Concrete	☐	Grass	☐	Pavers	☐	☐

B4	Are there problems with the landing area surface?		Yes No ☐ ☐

If YES, rank resulting accessibility potential:	Not Accessible	Minimally Accessible	Accessible
Uneven	☐	☐	☐
Slopes up from the street	☐	☐	☐
Slopes down from the street	☐	☐	☐
Requires stepping over drain inlet	☐	☐	☐
Other (Specify)	☐	☐	☐

B5	Are there any obstacles that would limit the mobility of a wheelchair?	Yes No ☐ ☐
	*If YES, describe obstruction***:**	

Date	Time:	Surveyor:

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Route Name:	Location:	Weather Conditions:	Stop No.:

B6	Additional landing area comments:

B7	Landing area recommendations:	
	Widen sidewalk to expand landing area to 5 feet wide and 8 feet deep	☐
	Install curb bulb or remove on street parking	☐
	Move object to improve accessibility (specify where):	
	Make the following repairs (specify):	
	Other (specify):	

Section B-2: Connections (Trip Generators)

B8	What are the primary trip generators for passengers at this stop? (Check all that apply)

Apartments - large building/complex	☐	Human service agency – what kind?	☐	School –Elementary/Middle	☐
Apartments - small building	☐	Library	☐	School -High	☐
Townhomes	☐	Major Shopping/employment (Mall, Wal-Mart, Kmart, Target, other big department store)	☐	School - College/University/ Technical school	☐
Detached homes	☐	Neighborhood Shopping (supermarket, drugstore, Goodwill, strip mall with basic needs shopping)	☐	Senior center	☐
Day care/pre-school	☐	Nursing home/assisted living	☐	Transfer to other bus routes	☐
Gas station	☐	Office building/employment	☐	Transit station/center	☐
Government building	☐	Park and Ride lot	☐	Other (Specify):	☐
Hospital/major clinic	☐	Place of worship	☐		
Hotel	☐	Restaurant	☐		

Date	Time:	Surveyor:

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Route Name:	Location:	Weather Conditions:	Stop No.:

B9	How wide is the sidewalk?							
	No sidewalk □	less than 3' □	3'-5' □	5' or greater □	N/A □			

B10	Are there physical barriers that constrict the width of the sidewalk within the block on which the bus stop is located?		Yes No □ □

	If YES, what is the narrowest useable width:
	Less than 3' □ 3' or greater □

B11	Rank the condition of the sidewalk:									
	1 □		2 □		3 □		4 □		5 □	

1=hazardous – large breaks, cracks, root uplifting, someone could get hurt from normal use or use of a wheelchair would be difficult
2=in poor shape though not hazardous – very rough, some root uplifting, cracks, breaks
3=fair – minor root uplifting, minor cracks or breaks
4=good – not perfect but no immediate repair
5=cosmetically excellent; new

B12	Does the landing pad connect to the sidewalk?	Yes No □ □

	If YES, what does the sidewalk connect to:
	One of the trip generators listed in Question B8 □ The nearest intersection □

B13	Where is the nearest street crossing opportunity?
	The nearest intersection □ Mid-block crosswalk □

B14	What pedestrian amenities are at the nearest intersection (or other crossing opportunity)?

Curb cuts all corners/ both sides	□	Pedestrian crossing signal	□	Traffic Light	□
Visible crosswalk	□	Audible crosswalk signal	□	Crossing guard assistance	□
Curb cuts at some corners/one side	□	Accessible Pedestrian Signal (APS)	□	Tactile warning strip on curb cut	□
				Other (specify):	□

Date	Time:	Surveyor:

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BUS STOP CHECKLIST   **PART B: PEDESTRIAN ACCESS FEATURES**

Route Name:	*Location:*	*Weather Conditions:*	*Stop No.:*

		Yes No N/A
B15	Is there a companion bus stop across the street?	☐ ☐ ☐

		Yes No
B16	Are there connections to other transportation services at this bus stop?	☐ ☐
	If YES, check all that apply	

Bus services, same or other agency ☐	Local Rail ☐	Commuter Rail ☐
Greyhound ☐	Other (Specify):	☐

B17	Pedestrian connection recommendations:	
	Construct sidewalk	☐
	Widen sidewalk	☐
	Improve landing area connections to sidewalk	☐
	Install curb cut(s) at:	
	Move object to improve accessibility (specify where):	
	Make the following repairs (specify):	
	Other (specify):	
B18	Additional pedestrian connection comments:	

Date	*Time:*	*Surveyor:*

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Route Name:	Location:	Weather Conditions:	Stop No.:

PART C: PEDESTRIAN COMFORT AMENITIES				
Section C-1: Shelters (move to Section C-2 if there is no shelter)				
C1	What is the orientation of the bus shelter in relation to the street?		
	Facing towards the street			☐
	Facing on-coming traffic			☐
	Facing away from the street			☐
C2	What kind of shelter is it? Insert shelter relevant to your system.			
	Own transit agency ☐	Another transit agency (shared stop) ☐	Other (Specify): ☐	
C3	If non-standard shelter, what are the approximate dimensions (width, height and depth in feet) of the interior standing area?			
	Width:			
	Height:			
	Depth:			
C4	Does the shelter have a front center panel (i.e. two openings)? *If YES, what are the dimensions of the opening?*	Yes No ☐ ☐		
C5	Could a person using a wheelchair maneuver into the shelter?	Yes No ☐ ☐		
C6	Could a person using a wheelchair fit completely under the shelter (minimum space of a common mobility device is 30 in. by 48 in. (760 mm by 1200mm))? What are the dimensions of the clear space in the shelter?	Yes No ☐ ☐		
C7	What is the distance of the front of the shelter from the curb in feet?			

0 - 2'	☐	2' - 4'	☐	4' - 6'	☐	6' - 8'	☐	8' - 10'	☐	>10'	☐

Date	Time:	Surveyor:

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BUS STOP CHECKLIST   **PART C: PASSENGER COMFORT AMENITIES**

Route Name:	*Location:*	*Weather Conditions:*	*Stop No.:*

		Yes No
C8	Are there damages to the bus shelter?	☐ ☐
	If YES, check all that apply:	
	Broken panels	☐
	Graffiti	☐
	Holes in the roof	☐
	Missing panels	☐
	Needs repainting	☐
	Other (specify):	☐
C9	What is the approximate age of the shelter?	
C10	Rank the condition of the shelter:	

1	☐	2	☐	3	☐	4	☐	5	☐

1=hazardous – broken glass, unstable
2=in poor shape though not hazardous
3=fair – needs repainting, glass panels need thorough cleaning, protruding but not hazardous bolts
4=good – not perfect but no immediate repair need
5=cosmetically excellent; new

C11	Additional shelter comments:

Date	*Time:*	*Surveyor:*

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Route Name:	Location:	Weather Conditions:	Stop No.:

C12	Shelter recommendations:	
	Remove center panel	☐
	Make the following repairs (specify):	☐
	Move object to improve accessibility (specify where):	
	Move shelter to improve accessibility (specify where):	
	Other (specify):	

Section C-2: Seating Assessment (move to Section C-3 if there is no seating)

C13	What is the type of seating available?	
	Bench inside shelter – *skip to question C15*	☐
	Freestanding bench	☐
	Fold down bench	☐
	Leaning bench	☐
	Other (specify):	☐

C14	If not inside shelter, what is the distance of the seating from the curb in feet?										
	0 - 2'	☐	2' - 4'	☐	4' - 6'	☐	6' - 8'	☐	8' - 10'	☐	>10' ☐

		Yes No
C15	Are there problems with the seating?	☐ ☐
	If YES, check all that apply:	
	Broken pieces	☐
	Needs painting	☐
	Graffiti	☐
	Not securely installed	☐
	Other (specify):	☐

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BUS STOP CHECKLIST　　　　　　　　　　　**PART C: PASSENGER COMFORT AMENITIES**

Route Name:	Location:	Weather Conditions:	Stop No.:

C16	Rank the condition of the seating:				

1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

1=hazardous – broken, someone could get hurt from normal use
2=in poor shape though not hazardous
3=fair – needs repainting, needs cosmetic attention,, protruding but not hazardous bolts
4=good – not perfect but no immediate repair need
5=cosmetically excellent; new

C17	Additional seating comments:

C18	Seating recommendations:
	Move seating to improve accessibility (specify where):
	Make the following repairs (specify):
	Other (specify):

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Route Name:	Location:	Weather Conditions:	Stop No.:

	Section C-3: Trash Assessment (move to Section C-4 if there is no trash receptacle)		
C19	What is the type of installation for the trash receptacle?		
	Attached to the shelter		☐
	Free standing		☐
	Garbage bag		☐
	Bolted to sidewalk		☐
	Other (specify):		☐
C20	Are there problems with the trash receptacle and surrounding area?	Yes ☐	No ☐
	If YES, check all that apply:		
	Trash can very full		☐
	Graffiti at bus stop		☐
	Bus stop littered		☐
	Grocery carts left at stop		☐
	Trash can not securely installed		☐
	Adjacent property littered		☐
	Other (specify):		☐
C21	Additional Comments:		
C22	Trash recommendations:		
	Install trash can due to litter problem		☐
	Make the following repairs (specify):		
	Move trash can to improve accessibility (specify where):		
	Other (specify):		

Date	Time:	Surveyor:

Route Name:	Location:	Weather Conditions:	Stop No.:

	Section C-4: Newspaper Boxes (move to Part D if there are no newspaper boxes)		
C23	Are the newspaper boxes a barrier to sidewalk use?		Yes No ☐ ☐
C24	Are the newspaper boxes a barrier to bus access/egress?		Yes No ☐ ☐
C25	Are they chained to the bus stop pole, shelter, or bench?		Yes No ☐ ☐
C26	Are they blocking access to posted bus schedule info?		Yes No ☐ ☐
C27	Additional newspaper box comments:		
C28	Newspaper box recommendations:		
	Move trash can to improve accessibility (specify where):		
	Other (specify):		

Date	Time:	Surveyor:

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Route Name:	Location:	Weather Conditions:	Stop No.:

PART D: Safety and Security Features		
Section D-1: Traffic and Pedestrian Issues		
D1	Where is the bus stop area located?	
	In travel lane	☐
	Bus lane/pull off area	☐
	Paved shoulder	☐
	In right turn only lane	☐
	Unpaved shoulder	☐
	Off street	☐
	"No Parking" portion of street parking lane	☐
	Other (specify):	☐
D2	Is the bus stop zone designated as a no parking zone?	Yes No ☐ ☐
	If YES, indicated by:	
	One "No Parking" sign	☐
	2 or more "No Parking" signs	☐
	"Bus Only" sign	☐
	Painted curb	☐
	Painted street	☐
D3	Are cars parked between the landing area and the bus stopping area?	Yes No ☐ ☐
D4	What is the posted speed limit in MPH?	Not posted	☐
D5	What are the traffic controls at the nearest intersection for the street?	
	Traffic signals	☐
	Flashing lights	☐
	Stop/Yield sign	☐
	None	☐
	Other (specify):	☐

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Route Name:	Location:	Weather Conditions:	Stop No.:

D6	How many total lanes are on both sides of the road?										
	1 □	2 □		3 □		4 □	Other (specify): □			N/A □	

		Yes No N/A
D7	Is there on-street parking permitted just before or after the bus stop zone?	□ □ □
	If YES, what is the length of the "No Parking" area in feet:	

		Yes No
D8	Are there potential traffic hazards?	□ □
	Yes, *check all that apply:*	
	The bus stop is just over the crest of a hill	□
	The bus stop is just after a curve in the road	□
	The bus stop is near an at-grade railroad crossing	□
	Waiting passengers are hidden from view of approaching bus	□
	A stopped bus straddles the crosswalk	□
	Bus stop just before crosswalk	□
	High speed traffic	□
	No crosswalk	□
	Other (specify)	□
D9	Additional traffic safety comments / recommendations:	

Section D-2: Lighting Assessment (assessment preferably taken in the evening or at night)
Go to Section D-3 if no lighting

D10	What type of lighting is available?	
	Street light	□
	Shelter lighting	□
	Outside light on adjacent building	□
	Other (specify):	□

Date	Time:	Surveyor:

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Route Name:	Location:	Weather Conditions:	Stop No.:

		Yes	No
D11	Does the light produce a glare?	□	□
D12	How even is the light distributed?	□	□
D13	Additional comments:		

Section D-3: Pay Phone

		Yes	No
D14	Is there a pay phone within the immediate vicinity?	□	□
	If NO, skip to Question D16.		
D15	Is the pay phone within reach of a wheelchair user?	□	□
D16	If no pay phone is provided, is there a police call box?	□	□
D17	Additional comments:		

Section D-4: Landscaping Assessment

		Yes	No
D18	Are there problems with the landscaping around the bus stop?	□	□
	If YES, check all that apply:		
	Trees/bushes encroaching on the landing area		□
	Trees/bushes encroaching on the sidewalk		□
	Tree branches that would hit the bus		□
	Other (specify):		□

Date	Time:	Surveyor:

Route Name:	Location:	Weather Conditions:	Stop No.:

D19	Additional comments:	
	Section D-5: Safety Recommendations	
D20	Improve pedestrian safety by:	☐
	Trim trees or branches	☐
	Move bus stop to:	
	Other (specify):	

Date	Time:	Surveyor:

Route Name:	Location:	Weather Conditions:	Stop No.:

	PART E: Information Features		
		Yes	No
E1	Is there a bus stop sign?	☐	☐
	If NO, move to question E6.		
E2	What provider name is on the bus stop (*list all providers utilizing stop*)?		
	Provider 1:		
	Provider 2:		
	Provider 3:		
	Provider 4:		
		Yes	No
E3	Are bus routes indicated on the bus stop sign?	☐	☐
	If YES, what routes?		
E4	How is the sign installed?		
	On its own pole		☐
	On a building		☐
	On a utility pole		☐
	On a shelter		☐
	Other (specify):		☐
		Yes	No
E5	Are there problems with the signage?	☐	☐
	If YES, check all that apply:		
	Sign in poor condition		☐
	Pole in poor condition		☐
	Sign position hazardous to pedestrians		☐
	Sign not permanently mounted		☐
	Lighting on sign is poor		☐
	Other (specify):		☐

Date	Time:	Surveyor:

BUS STOP CHECKLIST   **PART E: INFORMATION FEATURES**

Route Name:	Location:	Weather Conditions:	Stop No.:

		Yes	No
E6	Is there route/schedule/map (circle as appropriate) information posted?	☐	☐
	If NO please move to question E9.		
E7	Where is the route/schedule/map (circle as appropriate) information posted?		
	On Pole under bus stop sign	☐	
	On its own pole	☐	
	On a building	☐	
	On a utility pole	☐	
	On a shelter	☐	
	In a shelter	☐	
	Other (specify):	☐	
		Yes	No
E8	Is the information at eye level of a wheelchair user?	☐	☐
		Yes	No
E9	Is there a schedule rack?	☐	☐
		Yes	No
	If YES, are repairs needed?	☐	☐
		Yes	No
E10	Is there real time information display?	☐	☐
		Yes	No
	If YES, is it at eye level of a wheelchair user?	☐	☐
E11	Is signage text ADA compliant (refer to the *Toolkit for the Assessment of Bus Stop Accessibility and Safety* for guidelines)?	Yes ☐	No ☐
E12	Is information provided in Braille or by a Talking Signs® transmitter for people with visual impairments?	Yes ☐	No ☐
E13	Additional signage & information comments:		
E14	Signage & information recommendations:		
	Make the following repairs:	☐	
	Other (specify):	☐	

Date	Time:	Surveyor:

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Route Name:	*Location:*	*Weather Conditions:*	*Stop No.:*

PART F: Diagrammatic Sketch or Photograph		
Sketch or photograph the layout of the bus stop area and any traffic controls. On sketch or photograph, be sure to note locations of:		
Bus stop sign pole	Newspaper boxes	Traffic signals/stop signs
Other poles	Anything else installed at bus stop	Railroad tracks
Landing Pad	Sidewalks	Bus stop across the street
Shelter	Sidewalk barriers	Heating units in shelters
Bench	Crosswalks	Bike racks
Trash can	Curb cuts	North/South/East/West

Date	*Time:*	*Surveyor:*

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CREATING ACCESSIBLE AND SAFE BUS STOPS

Distinction Between ADA Requirements and Universal Design[5]

Accessible design focuses on compliance with laws and regulations and state or local building codes. The laws and regulations are intended to eliminate certain physical barriers that limit the usability of environments for people with disabilities. These typically were based on the requirements detailed by the American National Standards Institute. With the passage of the Americans with Disabilities Act (ADA) in 1990 and the subsequent development of the ADA Accessibility Guidelines, accessible design has focused more recently on satisfying these minimum technical criteria to allow most people with disabilities to use the built environment. The ADA Standards are the minimum requirements that comply with the law. They are not necessarily "best practices."

Universal design is intended to create environments that are usable by all people. While considerations for people with disabilities are certainly necessary for universal design, they are not sufficient when planning and designing for the whole population. Universal design provides a higher level of access for people with disabilities. It also accommodates the needs and wishes of everyone - e.g., children, older adults, women and men. Parents pushing strollers, travelers pulling luggage, the older man needing a little more time to cross a street - all benefit from features of universal design. For additional background information on universal design, visit the Global Universal Design Educator's Network, http://www.udeducation.org/.

> The ADA Standards are the minimum requirements that comply with the law. They are not "best practices." Universal design is intended to create environments that are more usable by all people, including people with disabilities.

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5 City of New York Office of the Mayor, *Universal Design New York.* Center for Inclusive Design and Environmental Access, School of Architecture and Planning, University at Buffalo, Buffalo, New York 2001.

This bus stop in New York City has a bus landing area that is free of obstructions for both front and rear doors. The sidewalk adjacent to the bus stop platform is wide enough to handle high pedestrian activity and for a wheelchair user to pass without entering the bus stop area.

Source: Metropolitan Transportation Authority

Design Guidelines

The following sections list accessibility benefits, minimum ADA requirements and universal design recommendations for the various elements of a bus stop.

Bus Stop Area and Bus Landing Pads

A bus stop platform is a designated bus stop area clear of obstructions to facilitate boarding and alighting for all users.

Accessibility Benefits

Providing a designated bus stop area benefits all transit users. An area the length of the bus for transit purposes provides a comfortable waiting, alighting and boarding area for both front and rear doors and denotes the transit agency's presence. Wheelchair users will have less difficulty boarding and alighting the bus when there is a stable, level and unobstructed landing pad to operate the wheelchair lift and ramp. Wheelchair and scooter users require more space to wait and turn around than other transit users and therefore benefit from sufficient area at the bus stop to maneuver.[6]

Minimum ADA Requirements

Providing accessible bus stops requires choosing appropriate locations or improving the existing location. Coordination and cooperation with public works agencies, municipal government and business owners can enhance the connectivity between the land use and the bus stop. To ensure optimum bus stop placement, coordination should occur during the planning/development phase.

Bus stop sites must have the following:[7]

- A firm, stable surface;

- A minimum clear length of 96 inches (2,440 millimeters), measured from the curb or vehicle roadway edge and a minimum clear width of 60 inches (1,524 millimeters), measured parallel to the vehicle roadway;

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6 McMillen, Barbara et al. *Designing Sidewalks and Trails for Access: Part I of II: Review of Existing Guidelines and Practices.* 1999.

7 ADA Accessibility Guidelines for Buildings and Facilities (ADAAG), Section 10.

- A maximum slope of 1:50 (2%) for water drainage; and

- Connection to streets, sidewalks or pedestrian paths by an accessible route.

Universal Design

Finding the proper location for a bus stop is challenging. Community Transit in Everett, Washington enlists help from the agency's bus drivers to determine where best to situate a stop. To test the potential locations, temporary markers, such as orange cones with bus stop signs, are installed and maintained while the local public is solicited for input.[8]

The bus stop platform guidelines outlined in this section are not required but are strongly recommended to facilitate accessibility and safety for all users.

- **Bus Stop Area[9]**

  ⌗ Locate street furniture to maintain a minimum clear width of 48 inches (1,219 millimeters) and clear headroom of 80 inches (2,032 millimeters) from the pedestrian pathway to the stop

  ⌗ Clear the bus stop platform of all obstacles (including trees, newspaper boxes, waste and recycling receptacles)

  ⌗ Design the sidewalk adjacent to the bus stop platform to be wide enough to handle the expected levels of pedestrian activity and for two wheelchair users to pass each other traveling in opposite directions when two-way traffic is frequent

- **Bus Stop Area - Door Clearances[10]**

  ⌗ The front and rear door areas of a bus stop should be kept clear of trees, utility poles, wires, hydrants and other infrastructure or street furniture. Because different types and sizes of buses are used, all bus stop platforms should account for the variance in door positions.

- **Types of Bus Stop Areas**

  Various configurations of bus stop areas are available to accommodate passenger waiting, boarding and alighting. Determining the type of platform to use depends on traffic conditions, bus priority, space availability and the number of users at the stop.

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8 Nelson\Nygaard, Interview with Tony Smith, Community Transit, March 31, 2005.
9 Transit Cooperative Research Program (TCRP) Report 19 *Guidelines for the Location and Design of Bus Stops* 1996.
10 Province of Alberta, Transportation & Utilities, 1996.

The parked car leaves little clearance for the bus to pull in flush to the curb.

Picture taken in Oakland, California.
Source: Nelson\Nygaard Consulting Associates

This bus bay in Tucson, Arizona prohibits parking and denotes a wheelchair accessible area.

Source: Nelson\Nygaard Consulting Associates

- **Curbside stop**

  Curbside stops are typically installed on existing sidewalks. In urban areas, the stop is located in the parking lane. The length of the stop's curb may be painted a distinctive color to prevent or discourage parking. In suburban areas, the curbside stop may be located in the travel lane as the street may not incorporate a parking lane.

Advantages of Curbside Stops
• Provides access to bus stops
• Simple in design and inexpensive for transit agency to install

Disadvantages of Curbside Stops
• May present problems for drivers trying to pull in flush to the stop's curb if not enough entering clearance is given due to parked cars *(as shown in the picture to the left)*
• May present problems for bus drivers trying to reenter traffic, especially during periods of high volume traffic

- **Bus Bay[11]**

  Bus bays provide an area for buses to leave the main road to pick up passengers. They often have a shelter and other amenities for the waiting passenger.

Advantages of Bus Bays
• Allows passengers to board and alight out of the travel lane
• Provides a protected area away from traffic for both the stopped bus and patrons
• Minimizes delay to through traffic

Disadvantages of Bus Bays
• May present problems for bus drivers trying to reenter traffic, especially during periods of high volume traffic
• Is expensive to install compared to curbside stops
• Is difficult and expensive to relocate

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11 Transit Cooperative Research Program (TCRP) Report 19, 1996.

- **Bus Bulb**

Advantages of Bus Bulbs
· Allows drivers to pull in flush to the curb
· Results in minimal delay to the bus
· Allows for more waiting room for bus patron separated from the pedestrian flow and space for amenities
Disadvantages of Bus Bulbs
· Can cause traffic to queue up behind the bus, causing traffic delay
· Expensive to install compared to curbside stops
· Difficult and expensive to relocate

- **Amenities**

The bus stop platform can benefit from various amenities and treatments. These are discussed in the Amenities Section.

A bus bulb in San Francisco, California. The bus stop area is extended into the parking lane and incorporates a shelter that does not impede the pedestrian right of way. The bulb allows the bus driver to pull up flush to the curb to facilitate the boarding and alighting of passengers.

Source: Nelson\Nygaard Consulting Associates

Examples of Bus Stop Areas and Landing Pads

The pictures on this page give examples of bus stops with good and poor accessibility.

The lack of a stable and firm landing pad and accessible path makes this stop in British Columbia inaccessible. Rider safety is compromised as the poor drainage and grassy/muddy waiting area create slippery conditions.

Source: BC Transit

This stop in Berkeley, California does not have adequate clearance to deploy a wheelchair ramp. Additionally, the stop lacks identity, being indiscernible from a newspaper vending machine area.

Source: Nelson\Nygaard Consulting Associates

The stop area and landing pad are clear of obstructions in Oakland, California. There is enough room for wheelchair users to maneuver, and the stop is spatially and visually distinct from the pedestrian walkway.

Source: Nelson\Nygaard Consulting Associates

Bus Shelter Design

A bus shelter provides protection from the elements and seating while waiting for a bus. Standardized shelters exist that accommodate various site demands and passenger volumes. Typically, a shelter is constructed of clear side-panels for visibility and safety.

Accessibility and Safety Benefits

The seating and protection provided by shelters benefits bus patrons with mobility impairments. Additionally, a shelter clearly marks a bus stop, supplies an area to post route and timetable information and provides refuge for waiting passengers, separated from the public way. Shelters located in areas with good lighting and visibility from surrounding land uses enhance the safety of the stop.

Minimum ADA Requirements[12]
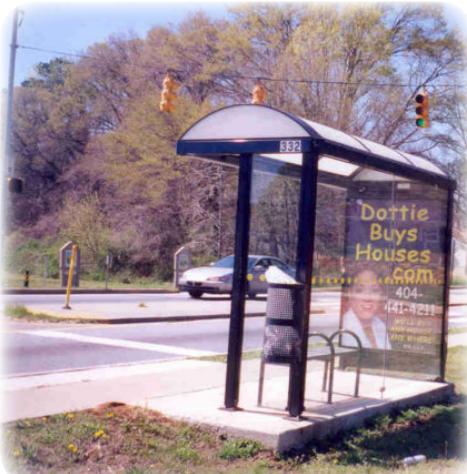
Install new or replace bus shelters to accommodate the following:

- A minimum clear floor area of 30 inches by 48 inches (762 millimeters by 1,219 millimeters), entirely within the perimeter of the shelter; and

- Connected by an accessible route to the bus stop landing pad.

Additionally,

- Bus stop shelters should not be placed on the wheelchair landing pad

- General ADA mobility clearance guidelines should be followed around the shelter and between the shelter and other street furniture

- A clearance of 36 inches (914 millimeters) should be maintained around the shelter and an adjacent sidewalk (more is preferred)

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12 ADA Accessibility Guidelines for Buildings and Facilities (ADAAG), Section 10.

The bus shelter is placed on a concrete block that is level with the sidewalk. It provides a stable surface for wheelchair users and does not impose on the bus landing pad area. *Photo taken in Mableton, Georgia.*

Source: G. Araki www.the-bus-stops-here.org

Universal Design[13]

When to Install a Shelter

The decision to install a shelter is the result of system-wide policy among transit agencies. In most instances, the estimated number of passenger boardings is the most important determinant. Suggested boarding levels by area type used to decide when to install a shelter are as follows (these values represent a composite of prevailing practices):

Location	Minimum Boardings
Rural	10 boardings per day
Suburban	25 boardings per day
Urban	50 to 100 boardings per day

Location

Ideally, the location of a bus stop shelter should enhance the circulation patterns of patrons, reduce the amount of pedestrian congestion at a bus stop, and reduce conflict with nearby pedestrian activities. The following guidelines should be used when placing a bus stop shelter at a stop:

- Permit clear passage of the bus and its side mirror with a minimum distance of 24 inches (610 millimeters) between the back-face of the curb and the roof or panels of the shelter. Greater distances are preferred to separate waiting passengers from nearby vehicular traffic

- Locate the shelter as close as possible to the end of the bus stop zone and provide visibility to approaching buses and passing traffic

- Preserve a 12-inch (305 millimeter) clear space to permit trash removal and cleaning of the shelter when shelters are directly adjacent to a building

Design Considerations

Shelter design is based on criteria related to climate, agency, policies and streetscape context. The following are general design guidelines that assist in providing accessibility and safety:

- Incorporate shelter dimensions that are 9 feet long and 5 feet wide (2.7 meters by 1.5 meters)

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13 Transit Cooperative Research Program (TCRP) Report 19, 1996.

- Design shelters with transparent sides for visibility and security[14]

- Mark glass panels with distinctive pattern such as horizontal contrasting strips or circles, to indicate the presence of the panels

- Include transit route maps, schedules, and seating in shelters. Maps and schedules should be easily readable by persons using wheelchairs and, to the greatest extent possible, persons with visual impairments

- Provide seating, if feasible, with sufficient space to move around

- Provide surfaces to lean against if seating is not provided

- Omit steps between the sidewalk/bus pad and the shelter

- Maintain shelter openings to be a minimum of 36 inches (914 millimeters) clear to allow a wheelchair to pass through

- Consider heated shelters at high ridership stops in cold climates.

Seating

Seats provide comfort to waiting customers and increase the attractiveness of the bus service, especially for those with mobility impairments. Patrons who have difficulty standing will benefit from seating and will more likely use transit services. Seating located in the shelter should leave clear space for patrons with wheelchairs to use the shelter.

Environmental Controls

In orienting and configuring bus shelters, personnel should consider the environmental characteristics of each site. Shelters can be completely open to permit unlimited movement of air in hot climates, or panels can be erected to keep the interior of the bus shelter warm. The following examples provide guidance on the type and placement of shelters for various climates:

- **Cold Climates**

    In areas where winter temperatures are low, installing shelters with wind protection and investing in heated shelters for large bus stops and transfer points may provide incentive for customers to use the transit service.

This shelter in Rochester, New York, provides two openings for entering and exiting, as well as wind protection from the northern climate.

Source: Rochester Genesee Regional Transportation

These two shelters in Toronto, Canada, open onto the sidewalk to provide protection from snow or water splashed by moving cars. The shelter is enclosed except for the entranceway to protect against inclement weather.

Source: SUNY Buffalo

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14 Province of Alberta, Transportation & Utilities, 1996.

This shelter located in Palm Springs, California allows air to circulate. The panels are constructed of perforated metal to allow airflow while maintaining good visibility of the surrounding area.

Source: Robert Perrone Consulting

Shelter with advertising placed downstream of traffic flow and good visibility in Oakland, California.

Source: Nelson/Nygaard Consulting Associates

- **Hot Climates**

  In southern climates with mild winter temperatures and extreme summer temperatures, shelters can be designed to be completely open to air circulation from all four sides. At sites with wind, rain, or glare problems, standardized shelters can be retrofitted with panels to provide protection and shade. In the Southwestern region of the United States, air temperatures can reach above 110 degrees Fahrenheit on a regular basis during the summer. Transit agencies can induce people to ride the bus in these conditions by providing cool air misters and evaporation cooling towers.

Location of Advertising

Many transit agencies have paid advertising in bus shelters to reduce costs and to provide other benefits. Passenger and pedestrian safety and security are of greater concern at shelters with advertising. The advertising panels may limit views in and around a bus stop, making it difficult for bus drivers to see patrons. The panels can also reduce incidental surveillance from passing traffic. To prevent restricted sight lines, advertising panels should be placed downstream of the traffic flow, to assist an approaching bus driver view the interior of the shelter easily. Indirect surveillance from passing traffic should be preserved through proper placement of the panels.[15]

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15 Transit Cooperative Research Program (TCRP) Report 19, 1996.

Lighting

Lighting affects bus patrons' perception of safety and security at a bus stop, as well as the use of the site by non-bus patrons. Good lighting can enhance a waiting passenger's sense of comfort and security; poor lighting may encourage unintended use of the facility by non-bus patrons, especially after hours. Lighting is particularly important in northern climates where patrons may arrive and return to the stop in darkness during the winter season. [16]

Accessibility Benefits

Bus patrons who have low visibility in dimly lighted areas benefit from good lighting at and around the bus stop. As stated before, lighting benefits all users by increasing the safety and security of the stop.

Minimum ADA Requirements

No specific ADA lighting requirements.

Universal Design

The following are highly recommended to provide a safe waiting environment:
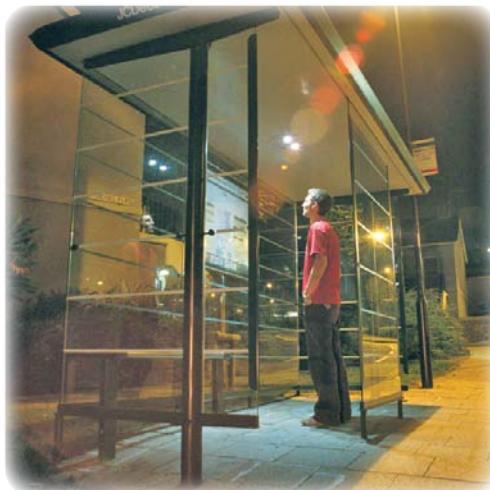
- Installing lighting that provides between 2 to 5 footcandles.[17] A footcandle is a unit of illuminance on a surface that is a uniform point source of light of one candela and equal to one lumen per square foot.[18]

- Illuminating bus patron's faces. Multiple sources of light are more resistant to vandalism and provide illumination that casts fewer intimidating shadows. Lighting that is too bright in bus shelters can also compromise personal safety, creating a fish bowl effect whereby the transit user can easily be seen by others but cannot see outside.[19]

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16 Transit Cooperative Research Program (TCRP) Report 19, 1996.

17 Transit Cooperative Research Program (TCRP) Report 19, 1996.

18 Merriam-Webster Online, http://www.m-w.com/cgi-bin/dictionary?va=foot-candles

19 Vogel, Mary and Pettinari, James L., *Personal Safety and Transit: Paths, Environments, Stops, and Stations* Center for Transportation Studies, University of Minnesotan 2002.

Indirect lighting illuminates the shelter and sidewalk in New York City, New York. The shelter is constructed with glass panels on all four sides, providing good visibility and better security.

The shelter is designed with vandal proof, flexible PV cells with hidden batteries and energy efficient LEDs. Solar electricity is stored during the day to provide security at night. There is no connection to a grid or excavation costs to install electricity.

Source: SUNY Buffalo

- Ensuring light fixtures are vandal-proof but easily maintained. For example, avoid using exposed bulbs or elements that can be easily tampered with or destroyed.[20]

- Locating bus stops near existing streetlights for indirect lighting. When coordinating bus shelter or bench locations with existing streetlights, the minimum clearance guidelines for the wheelchairs should be followed.[21] Several transit agencies have installed shelters with solar panels so that light can be provided "free" even in remote areas.

Security[22]

Passenger security is a major issue in bus stop design and location and can positively or negatively influence a bus patron's perception of the bus stop. From the perspective of security, landscaping, walls, advertising panels, and solid structures can restrict sight lines and provide spaces to hide. Each of these items can be an integral part of the bus stop, either by design or by proximity of existing land uses. Therefore, the transit and public works agencies should carefully review which amenities are to be included at a bus stop and consider any factors that may influence security.

Accessibility Benefits

Security provisions enhance accessibility by increasing visibility of the stop. They reduce the safety concerns of waiting at the stop at all hours, improve visibility from the stop and also provide information that is useful for planning trips and maintaining personal safety.

Minimum ADA Requirements

No specific ADA security requirements.

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20 Transit Cooperative Research Program (TCRP) Report 19, 1996.

21 Ibid.

22 Ibid.

Universal Design

Some guidelines regarding security at bus stops are as follows:

- Constructing the bus shelter of materials that allow clear, unobstructed visibility of and to patrons waiting inside

- Locating bus stops at highly visible sites to permit approaching bus drivers and passing vehicular traffic to see the bus stop clearly. Proximity to stores and businesses also enhance surveillance of the site

- Limiting landscaping elements to low-growing shrubbery, ground cover and deciduous shade trees are preferred at bus stops. Evergreen trees provide a visual barrier and should be avoided

- Coordinating bus stops with existing street lighting to improve visibility.

- Maintaining the cleanliness of the bus stop. A well-maintained stop contributes to the concept of an owned environment. Refer to the Maintenance Section for more information

- Providing a Pay Phone or Police Call Box to allow emergency calls

- Providing accurate route and schedule information

Accessible Path

Walkways or sidewalks are essential links between the origin/destination of the trip and the bus stop. Their proper design and regular maintenance are important to providing a barrier-free travel path for all persons.

Accessibility Benefits

Accessible paths allow all users to reach their destination conveniently and safely. For users of mobility devices, an unobstructed, stable and wide pathway to the bus stop will facilitate use of the bus system. Wheelchair and scooter users require a wider path of travel than ambulatory pedestrians. Additionally, their stability and control can be affected by surfaces with cross-slopes, grades, or rough terrain. Cross-slopes that change very rapidly cause problems for wheelchair users. The rate of change of cross-slope is most problematic when it occurs over a distance of less than 24 feet (610 millimeters), the approximate distance covered by a wheelchair wheelbase.[23]

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23 McMillen, Barbara et al. 1999.

People who use walking aids include those who use canes, crutches, or walkers to ease their ambulation. The limitations of walking-aid users might include the following:[24]

- Difficulty negotiating steep grades
- Difficulty negotiating steep cross-slopes
- Decreased stability
- Slower walking speed
- Reduced endurance
- Inability to react quickly to dangerous situations
- Reduced floor reach

Minimum ADA Requirements[25]

At minimum, an accessible path should accommodate the following:

- A minimum clear passage width of 48 inches (1,219 millimeters) is recommended by the Access Board's guidelines for the public right-of-way. This is especially important next to a curb drop-off;
- An accessible route from public transportation stops to the route for the general public;
- A maximum cross slope of 1:50;
- Stable, firm and slip-resistant ground and floor surfaces; and
- Grating spaces that are no greater than 9 1/2 inches (13 millimeters) wide in one direction.

Objects may not protrude on an accessible route or maneuvering space. Guidelines for protruding objects are below:[26]

- Objects projecting from walls (for example, telephones) with their leading edges between 27 inches and 80 inches (685 millimeters and 2,030 millimeters) above the finished floor shall protrude no more than 4 inches (100 millimeters) into pathway;
- Objects mounted with their leading edges at or below 27 inches (685 millimeters) above the finished floor may protrude any amount;

24 McMillen, Barbara et al. 1999.
25 ADA Accessibility Guidelines for Buildings and Facilities (ADAAG), Section 4.3.
26 Ibid.

- Free-standing objects mounted on posts or pylons may overhang 12 inches (305 millimeters) maximum from 27 inches to 80 inches (685 millimeters to 2,030 millimeters) above the ground or finished floor;

- 80 inches (2,030 millimeters) minimum clear headroom. If vertical clearance of an area adjoining an accessible route is reduced to less than 80 inches (nominal dimension), provide a barrier to warn blind or visually-impaired persons.

Universal Design

- Sidewalks[27]

  ¤ Widen sidewalks to five or more feet to accommodate pedestrian activity in two directions and provide comfortable bus stop waiting area

  ¤ Maintain walkways and bus stop areas to be clear of snow, ice and other debris

  ¤ Provide an accessible travel path that is the shortest distance between the bus stop and the sidewalk or accessible building

  ¤ Distinguish the surface of the bus stop from the surrounding areas to accommodate persons with visual impairments. The use of different textures, such as concrete, paving stone, contrasting colors, tactile strips and curbs help to delineate pathways

- Street Furniture and Other Obstacles in Travel Path

  ¤ Locate street furniture and signage, such as benches, sign posts, newspaper boxes out of the travel path of pedestrians and transit passengers

  ¤ Define pathway junction points and clear them of obstructions

- Curb Ramps

  Grade-level changes are difficult for the elderly and persons with disabilities to negotiate. Any grade-level change without the aid of a curb ramp creates a mobility barrier. Refer to ADAAG Section 4.7 on Curb Ramps for more information.

Example of a curb ramp leading to a bus stop in Buffalo, New York.

Source: SUNY Buffalo

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27 Province of Alberta, Transportation & Utilities, 1996.

Examples of Bus Stops with and without Accessible Paths

Ensuring that there is an unobstructed, stable and slip resistant path to the bus stop is essential to providing access to the bus for people with disabilities. The following examples show a stop that is well connected and others that are inconvenient for all bus patrons.

An accessible path is provided to and from the stop, linking the stop to the surrounding land uses in Eugene, Oregon.

Source: G. Araki www.the-bus-stops-here.org.

The lack of an accessible path makes it difficult for a wheelchair user to use this stop in Red Bluff, California. All users would have to travel on gravel and on the roadway shoulder to use the stop.

Source: G. Araki www.the-bus-stops-here.org.

This bus stop in Buffalo, New York is not accessible, lacking a plowed path to the shelter. Bus patrons with and without disabilities will have difficulty getting to the stop and getting onboard the bus due to the thick layer of snow.

As it is difficult to clear snow from every bus stop, particularly those in residential neighborhoods, an agreement with property managers or residents may help with snow removal (refer to Adopt-a-Stop Program programs). In this case, an agreement between the transit agency and the property manager of the building adjacent to the stop can ensure that the bus stop and a path leading to the stop are cleared of snow when the parking lot is plowed.

Source: SUNY Buffalo

Route and Timetable Information[28]

Route and passenger information can be displayed in various ways. A flag sign is the most common method used by transit agencies to display information. Schedule holders and route information on the shelters are also commonly used.

Accessibility Benefits

Reducing transit's ambiguity in terms of arrival time and route allows those with cognitive disabilities and general transit riders to use the system more effectively.

Minimum ADA Requirements

Follow ADA requirements on Accessible Path, Signage and Protruding Objects for access to information by individuals with disabilities (see sections on Accessible Path and Transit Signage).

Universal Design

Recommendations for route or patron information displays are as follows:

- Provide updated information when changes are made to routes and schedules

- Consider the quality and appearance of information displays. A visually poor route map conveys a negative impression of the system

- Make information displays permanent. Temporary methods for displaying information (such as tape-mounting) create a cluttered, unsophisticated appearance at the bus stop

- Shelters or stops should be designed to accommodate route and schedule information so it is not added in places that reduce visibility or security

- Use interior panels of shelters for posting route and schedule information. Side panels may be large enough to display the entire system map and can include backlighting for display at night

- Install real time information display boards at key stops to give patrons up to the minute information on bus arrival times and delays. For people with visual impairments, a button may be provided that gives audio information when pressed. A discussion of real time information is included in the Technology and Product Links section.

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28 Transit Cooperative Research Program (TCRP) Report 19, 1996.

Example of good route information and placement in Loveland, Colorado. The information is not cluttered, and is provided in a prominent location, which reduces ambiguity in using the service.

Source: Access Compliance Services

This picture provides a close-up of the timetable information provided in the above figure. The schedule is provided in large, easy to read text.

Source: Access Compliance Services

The bus stop pole in Seattle, Washington displays the routes servicing the stop on a flag and timetables in an information panel. The information panel is at eye level of a wheelchair user.

Source: Sound Transit

Transit Signage

Proper signs at bus stops are an important element of good transit service. Signs serve as a source of information to patrons and operators regarding the location of the bus stop and are excellent marketing tools to promote transit use. Letter styles, sign appearance, and color choice should be unique to the transit system so that passengers can readily identify bus stops.

Accessibility Benefits

Transit signs are usually installed in an accessible position on the bus stop landing pad. For patrons using wheelchairs, the bus stop pole usually indicates where to access the wheelchair lift. To indicate the stop location for a patron who has visual impairments, the sign pole may be stylized to distinguish it from other poles on the path. For example, a perforated square pole uniquely identifies the stop. In Vancouver, British Columbia, a pole collar serves as a tactile marker.

Minimum ADA Requirements[29]

Provide bus stop signage that accommodates the following:

- Letters and numbers to be a width-to-height ratio between 3:5 and 1:1 and a stroke-width-to-height ratio between 1:5 and 1:10;

- Characters and numbers sized according to the viewing distance from which they are to be read;

- Minimum height is measured using an upper case X. Lower case characters are permitted;

- Accompany pictograms with the equivalent verbal description placed directly below, with a border dimension of 6 inches (152 millimeters) minimum in height;

- Characters and background of signs in a non-glare finish, with characters and symbols contrasting from their background; and

- Follow protruding objects requirements (given in the section Accessible Path)

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29 ADA Accessibility Guidelines for Buildings and Facilities (ADAAG), Section 4.30.

Universal Design[30]

Unlike other traffic signs, which conform to national engineering standards, transit signage is typically unique to each individual transit property. Customer information signs should be readily identifiable, legible, clear, and consistent not only for the general public but also for persons with disabilities. The following considerations for signs are recommended:
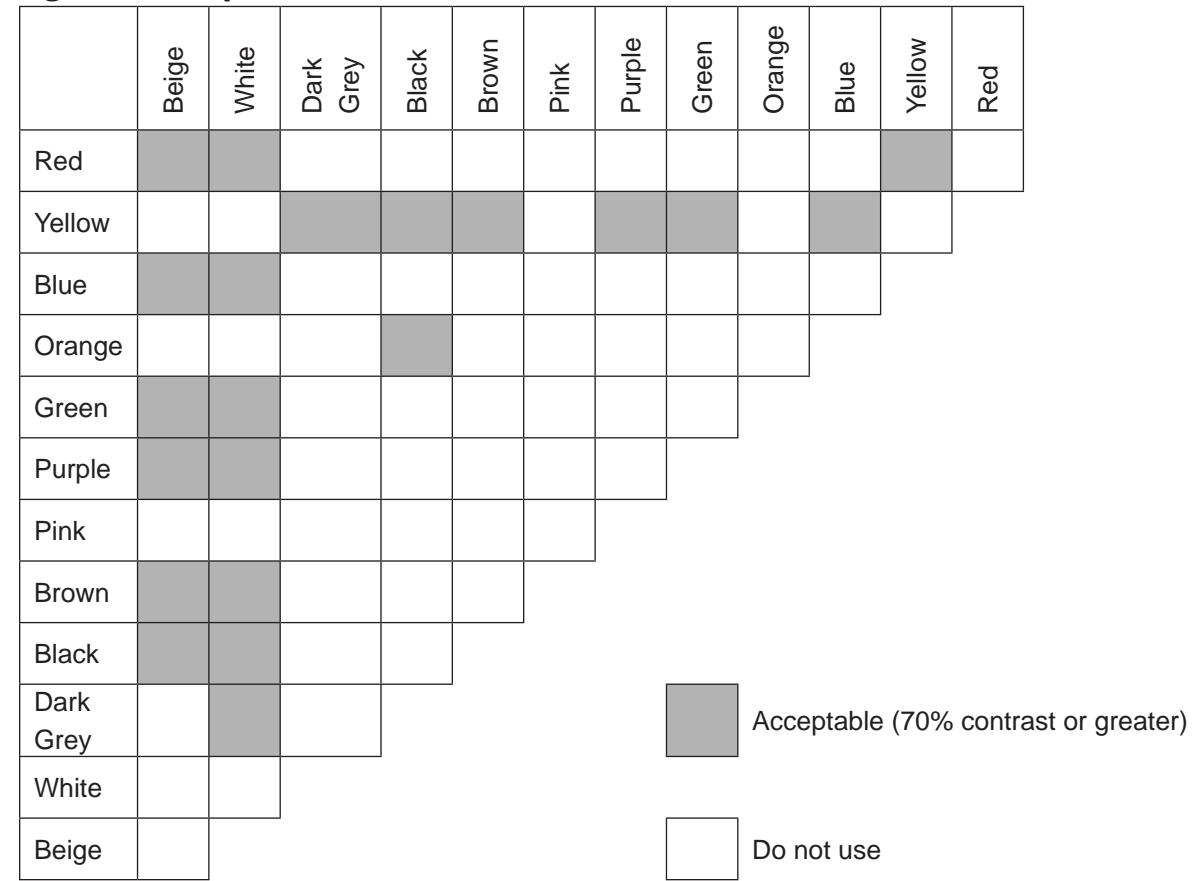
- Providing doublesided signs for visibility from both directions and reflectorized or illuminated signs for nighttime visibility

- Placing bus stop signs at the location where people board the front door of the bus. The bus stop sign marks the area where passengers should stand while waiting for the bus and serves as a guide for the bus operator in positioning the vehicle at the stop. The bottom of the sign should be at least 7 feet (2.1 meters) above ground level and should not be located closer than 2 feet (0.6 meters) from the curb face

- Deciding locations for bus stops and signposts should be coordinated with local and/or state jurisdictions.

- Ensuring that the signs are not obstructed by trees, buildings, or other signs and located away from visual distractions

Refer to Transit Cooperative Research Program (TCRP) Report 12, *Guidelines for Transit Facility Signing and Graphics* (http://gulliver.trb.org/publications/tcrp/tcrp_rpt_12-a.pdf) for detailed information on transit signage. One section of the report, highlighted in Figure 1 below, provides guidance on acceptable color combinations for signs based on contrast. Color contrast is of critical importance to persons with visual impairments. When selecting colors for information/guidance and directional signs, care should be taken to select colors that provide adequate contrast between the background and the characters, images, or pictographs.

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30 Transit Cooperative Research Program (TCRP) Report 19, 1996.

Figure 1. Acceptable Color Combinations Based on Contrast[31]

	Beige	White	Dark Grey	Black	Brown	Pink	Purple	Green	Orange	Blue	Yellow	Red
Red	▨	▨									▨	
Yellow			▨	▨	▨		▨	▨		▨		
Blue	▨	▨										
Orange				▨								
Green	▨	▨										
Purple	▨	▨										
Pink												
Brown	▨	▨										
Black	▨	▨										
Dark Grey		▨										
White												
Beige												

▨ Acceptable (70% contrast or greater)

☐ Do not use

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31 Transit Cooperative Research Program (TCRP) Report 12, *Guidelines for Transit Facility Signing and Graphics* 1996.

Amenities

Amenities benefit all transit patrons, if they do not reduce the minimum clear spaces required by ADAAG. This section outlines the optimal placement of various amenities.

Benches

Accessibility Benefits

Transit users who experience difficulty walking and standing benefit from benches while waiting for the bus. Benches are beneficial when a shelter with seating is not provided and if bus headways are longer than 15 minutes. At stops with high ridership, benches may be provided in addition to shelters to accommodate patrons.

Minimum ADA Requirements[32]

If benches are provided, they should adhere to the following ADA regulations:

- Clear floor or ground space for wheelchairs (complying with ADAAG Section 4.2.4);

- Seat dimensions: 20 inches (510 millimeters) minimum to 24 inches (610 millimeters) maximum in depth and 42 inches (1,065 millimeters) minimum in length;

- Seat height: 17 inches (430 millimeters) minimum to 19 inches (485 millimeters) maximum above the floor or ground;

- Back support: 42 inches (1,065 mm) minimum in length and that extends from a point 2 inches (51 mm) maximum above the seat to a point 18 inches (455 mm) minimum above the seat;

- Structure supporting vertical or horizontal forces of 250 pounds. (1,112 Newtons) applied at any point on the seat, fastener, mounting device, or supporting structure; and

- Exposed benches: slip resistant and designed to shed water

Universal Design[33]

The following recommendations coordinate bench placement with the bus stop environment to enhance safety and accessibility:

- Provide 17-inch (430 millimeter) high benches. Higher benches will be uncomfortable for many users

- Coordinate bench locations with existing shade trees if possible. Otherwise, install landscaping to

Example of a bench-only stop in Boise, Idaho. The bench is not located on the bus landing pad and does not impede access to the stop.

Source: G. Araki www.the-bus-stops-here.org.

The exterior bench at a stop in Greeley, Colorado is poorly placed, obstructing accessibility on the landing pad and into the shelter. The stop would otherwise be accessible, with a path connecting the stop to the sidewalk and a suitable landing pad, if the bench was not placed in its current location.

Source: Access Compliance Services 2005

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32 ADA Accessibility Guidelines for Buildings and Facilities (ADAAG), Section 4.37.
33 Transit Cooperative Research Program (TCRP) Report 19, 1996.

provide protection from the wind and other elements. Uncomfortable bus stop environmental conditions, such as heat or sun, can discourage use of the bench, forcing patrons to find another place to wait for their bus

- Coordinate bench locations with existing streetlights to increase visibility and enhance security at the stop

- Locate benches on a non-slip, properly drained, concrete pad. Avoid locating benches in undeveloped areas of the right-of-way

- Provide grab handles along the bench for patrons to use as support when standing up (refer to the Rochester, New York photo on page 41 for an example of benches inside a shelter with multiple grab handles)

- Locate benches away from driveways to enhance patron safety and comfort

- Maintain a minimum separation of 24 inches (610 millimeters) (preferably 4 feet or 1,219 millimeters) between the bench and the back-face of the curb. As the traffic speed of the adjacent road increases, the distance from the bench to the curb should be increased to ensure patron safety and comfort

- Maintain general ADA mobility clearances between the bench and other street furniture or utilities at a bus stop

- Avoid installing the bench on the wheelchair landing pad.

- Provide additional waiting room near the bench (preferably protected by landscaping) at bench-only stops to encourage bus patrons to wait at the bus stop

- Avoid metal seating surfaces. Such surfaces are very cold in winter and very hot in summer

Vending Machines[34]

Vending machines can provide passengers with reading material while they wait for the bus. However, for local, non-commuter routes, vending machines can be undesirable for the following reasons:

- The machines are often poorly maintained and reduce the amount of room for mobility and waiting; and

- Trash accumulates at bus stops with vending machines. Trash removal is time-consuming and costly.

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34 Transit Cooperative Research Program (TCRP) Report 19, 1996.

Transit agencies have limited regulatory authority concerning the placement of vending machines. Newsprint companies usually seek high-profile sites to locate their machines. Transit agencies should review the need for the installation of vending machines at bus stops or coordinate with their jurisdiction to implement a consolidated vending rack program. The benefits to patrons of having the machines near the stop versus having to maintain trash receptacles and keep the area free of improperly disposed material should be considered.

If vending machines are provided, they should be anchored to the ground to reduce vandalism. ADA mobility guidelines should be followed for improved site circulation. Vending machines, newspaper boxes and other street furniture cannot reduce the minimum clear spaces required by ADAAG.

The consolidated vending racks in Berkeley, California contain various publications, including newspapers and rental magazines.

Source: Nelson/Nygaard Consulting Associates

Bicycle Storage Facilities[35]

Bicycle storage facilities, such as bike racks, may be provided at bus stops for the convenience of bicyclists using transit. Designated storage facilities discourage bicycle riders from locking bikes onto the bus facilities or on an adjacent property. Proper storage of bicycles can reduce the amount of visual clutter and ensure a clear pathway. ADA mobility guidelines should be followed in bicycle storage placement.

Trash Receptacles[36]

Trash receptacles can improve the appearance of a bus stop by providing a place to dispose of trash. The installation of trash receptacles is typically a system-wide decision and the size, shape, and color reflect transit agency or public works department policy. ADA mobility guidelines should be followed in receptacle placement to ensure circulation.

Shopping Cart Storage[37]

Proper storage for shopping carts at bus stops adjacent to commercial shopping centers is needed. Because such bus stops normally do not have storage facilities for shopping carts, carts often litter the area

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35 Transit Cooperative Research Program (TCRP) Report 19, 1996.
36 Ibid.
37 Ibid.

This transit center in Lakewood, Washington, provides an area to store shopping carts to help prevent random placement of carts in and around the center.

Source: Pierce Transit

around the stop and along the sidewalk leading to the stop. The sight of haphazardly placed shopping carts around a bus stop is visually unappealing and can block sidewalk accessibility.

Since shopping carts are generated by the shopping center, agreements should be made between the landowner and the transit agency to remove the carts regularly. One solution is to install a storage facility near the bus stop to prevent random storage in and around the stop. Factors affecting installation of a storage facility include the location of the sidewalk, available right-of-way, utilities, landscaping, terrain, and cost. Any cart storage facility should follow ADA circulation guidelines and remain clear of the sidewalk and wheelchair landing pad area.

Communications

Public telephones

Accessibility & Safety Benefits

Telephones at bus stops offer many potential benefits for bus patrons, including the ability to make personal and emergency calls while waiting for the bus.

Minimum ADA Requirements[38]

Provide telephones that adhere to the following:

- Where public telephones are provided, at least one telephone should be accessible by persons using wheelchairs. It must be located so that the receiver, coin slot and control are no more than 48 inches (1,219 millimeters) above the floor;

- A clear floor or ground space at least 30 inches by 48 inches (762 millimeters by 1,219 millimeters), not impeded by bases, enclosures, and fixed seats, that allows either a forward or parallel approach by a person using a wheelchair;

- The highest operable part of the telephone and telephone books within the reach ranges specified in ADAAG Sections 4.2.5 or 4.2.6;

- Location follows guidelines detailed in the section on Accessible Path;

- Hearing Aid Compatible and Volume Control equipped in Accordance with ADAAG Section 4.1.3; and

- Length of cord a minimum of 29 inches (735 millimeters) long.

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38 ADA Accessibility Guidelines for Buildings and Facilities (ADAAG), Section 4.31.

<u>*Universal Design*</u>[39]

Experience with pay phones at bus stops has given mixed results. For example, inclusion of phones at bus stops can create opportunities for illegal or unintended activities, such as drug dealing and loitering, compromising the safety in and around bus stops. Loitering by non-bus patrons at bus stops appears to increase with the installation of phones; this may discourage bus patrons from using the facility.

When locating a phone at a bus stop, the following guidelines should be considered:

- Separate the phone and the bus stop waiting area by a short distance when possible
- Remove the return phone number attached to the phone
- Limit the phone to outward calls only

Police Call Box

Police call boxes for transit systems are typically placed in rail stations or at large bus terminals. Providing call boxes at bus stops aids in establishing a safe environment, especially at stops that are less patronized or are located in suburban and rural areas.

Call boxes are an alternative to public telephones. They require less maintenance and do not encourage loitering by non-bus patrons. Police response is improved as call boxes may be geographically identified instantly in the event of an emergency.

Call boxes must not obstruct access to the stop and must be suitable for users with hearing impairments and those using a wheelchair.

Example of a police call box.
Source: Greater Cleveland Regional Transit Authority Police,
http://www.gcrta.org/crimepre.asp

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39 Transit Cooperative Research Program (TCRP) Report 19, 1996.

Identifying a Bus Stop by People with Visual Impairments

For people with visual disabilities to distinguish a bus stop from other street furniture, unique features should be incorporated into the design of each bus stop. Stops that have shelters are more readily identifiable due to the unique features of the shelter. However, bus stops that are identified only with a flag pole or that have the flag mounted on a utility pole can be difficult to identify. To address this issue, a pole design that is unique to bus stops should be provided at all locations. For example, the pole may be square with holes running down its length. If a unique pole is provided, the transit agency should educate customers who have visual impairments about this feature.

Maintenance of Bus Stops and Shelters

Maintenance is crucial to establishing and maintaining a barrier free bus stop environment. Trash and broken panel glass can reduce accessibility to a stop by obstructing the path of travel. Additionally, a poorly maintained stop presents an unfavorable image of the agency and may lead to crime. Stops left dirty or shelters left broken create unsafe conditions, sending a message that no one is in control of the stop and is thus open to crime.[40]

Bus stop maintenance can be costly and time-consuming. Working agreements with local businesses or commercial centers can reduce the financial responsibilities of the transit agency or public works department. For stops next to convenience stores, the transit or public works agency should try to obtain a working agreement with the local store or businesses to provide trash removal and general maintenance at the bus stop. This should include snow removal.

Adopt-a-Stop programs are an effective way to maintain bus stops and provide informal community surveillance. King County Metro in Seattle, Washington, administers an Adopt-a-Stop program for maintaining bus stops and shelters. The agency installs the trash can at the stop and provides liners to the local program participant. The individual keeps the stop clean and empties the trash can in exchange for a monthly pass. The program has experienced success with the participation of several hundred individuals.[41]

Tri-Met in Portland, Oregon compensates its Adopt-a-Stop participants with ten bus tickets per month for maintaining their stops. More than 800 bus stops within Tri-Met's service area have been adopted, and litter reduced by 80 percent through the program.[42] Tri-Met outlines their maintenance procedures in their Bus Stop Guidelines 2002, which is reproduced in Appendix B.

Maintenance requirements and resistance to vandalism are important considerations in the selection of an appropriate transit shelter. Most shelters are designed to minimize both of these concerns and

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40 Loukaitou-Sideris, Anastastia, *Hot Spots of Bus Stop Crime: the Importance of Environmental Attributes.*
41 Nelson/Nygaard, Interview with Ross Hudson, King County Metro.
42 Volinski, Joel and Tucker, Lisa E, *Safer Stops for Vulnerable Customers* 2003.

> Adopt-a-Stop programs are an effective way to maintain bus stops and provide informal community surveillance. Participation can be high if incentives are given, such as bus passes.

The glass panels of this bus shelter are raised above the ground to accommodate cleaning, but not so high as to create a problem for white cane users. Picture taken in Toronto, Canada.

Source: SUNY Buffalo

To ensure regular maintenance, a database can be created to track the condition of the facilities.

servicing costs should therefore be minimal.[43] To enhance ventilation and to reduce the clutter that can accumulate inside a shelter, a 6-inch (152 millimeter) clearance between the ground and the bottom of the panels is standard in fully enclosed shelters.[44]

To ensure regular maintenance, a database containing maintenance schedules can be created to track the condition of the facilities, including pavement surface conditions; age of the facilities; history of damage; and condition of shelter, benches, or other transit amenities. This information can be collected during the bus stop assessment. The maintenance database can be linked as a subsection of the bus stop inventory database.

Although snow has been removed from the entrance to the shelter and the bus landing pad, this bus stop in Toronto, Canada appears to be the collection area for the plowed snow. This conveys a poor message about the value of the bus stop and shelter. Additionally, the restaurant sign obstructs the site lines of a wheelchair user.

Source: SUNY Buffalo

43 British Columbia Transit Municipal Systems Program.
44 Transit Cooperative Research Program (TCRP) Report 19, 1996.

KEY PLAYERS AND AGENCY COORDINATION

Since bus stops are located on public property, several players are involved in construction, improvements and maintenance. Therefore, partnerships between the transit agency, the public and municipal departments are valuable in providing accessible and safe bus stops.

Generally, transit agencies can benefit from partnerships with the following for bus stop improvements:

- Public Works departments
- City/Municipal offices
- Disability, paratransit offices and advocacy groups
- Businesses and developers
- General public

Partnerships with the public are helpful in maintaining stop accessibility. Through programs such as the previously mentioned Adopt-a-Stop, the public can assist in the maintenance of the bus stop by agreeing to pick up litter, clean the stop amenities and report any items needing repair. Tri-Met in Portland, Oregon, compensates individuals in their Adopt-a-Stop program with gloves, cleaning supplies and a steady supply of bus tickets. These types of partnerships are also successful with businesses and developers.[45]

Examples of interagency coordination are provided in Appendix C.

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45 Tri-Met, *Bus Stop Guidelines* 2002.

Interdepartmental Collaboration

In addition to cooperating with municipal offices and agencies, implementing bus stop improvements is better facilitated by strong organization within the transit agency. An effective example from Tri-Met is provided in Appendix C.

Bus operators are often well-informed about safe locations for pulling over a bus, and should be consulted by planners responsible for bus stop design and location. Bus operators could then pull the bus over easily and serve customers with disabilities more effectively.

DRIVER TRAINING AND SUPPORT

Effective driver training can go a long way in providing accessible and safe service. Training programs may include: [46]

- Sensitivity and awareness training for all transit personnel who come into contact with the public

- Discussion of different causes and characteristics of mobility, hearing, visual and cognitive disabilities

- Demonstration and hands-on experience with any technologies used, such as wheelchairs, hearing aids, white canes, guide dogs and assistive listening devices. Driver sensitivity classes can include the use of opaque glasses to help increase driver awareness and sensitivity towards people with visual impairments

- Training on the fundamentals of communication with persons with hearing impairments and some basic sign language

- Training on orientating visually impaired persons. The operator needs to give explicit directions when people with visual impairments are looking for a vacant seat or departing the vehicle

- Training on safety concerns related to loading and unloading wheeled mobility device users at bus stops

Reducing Bus Operator Tasks

Bus operators are responsible for many tasks besides driving. The introduction of new technology can help free up time for bus drivers to help patrons with disabilities. According to the ADA, drivers are required to announce major intersections and other specific bus stops, operate wheelchair lifts, assist passengers boarding the lift or ramp and secure wheelchairs and scooters. As part of their operator responsibilities, they must give schedule information, handle any difficult passenger situations and monitor the fare box. These responsibilities are in addition to negotiating traffic, making transfers, staying on schedule, and changing destination signs. Some of the tasks mentioned above could be replaced by technology, such as automatic changing of destination signs and automated intersection announcements. [47]

> **The ADA requires drivers to announce major intersections and other specific bus stops, operate wheelchair lifts, assist passengers boarding the lift or ramp and secure wheelchairs and scooters.**

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46 Hunter-Zaworski, Katharine M. and Hron, Martha, *Improving Bus Accessibility Systems for Persons with Sensory and Cognitive Impairments* 1993.

47 Ibid.

This photo illustrates how guidance lines can be incorporated at a stop (*note: in this U.K. example, the bus travels on the other side of the street, but the guidance line principle can be applied in a U.S. context*).

Source: University College London.
http://www.cts.ucl.ac.uk/arg/projects/excalib1.htm

Cooperation Between Drivers and Bus Stop Planners

Pulling flush to the curb at a bus stop can be a challenging task for bus drivers. One option to assist drivers in pulling to the curb is painting a guidance line in the roadway to help the driver maintain the proper approach angle to position the bus parallel to the curb. The EXCALIBUR Project in London experiments with guidance lines at a prototype bus stop. The picture on the left shows an EXCALIBUR bus stop with guidance lines and bus cage that are color separated from the rest of the road.[48]

Automated docking systems are another form of technology that can be used to help the driver pull in parallel at a bus stop to better assist boarding and alighting. Automated precision bus docking allows a bus to consistently pull up to a bus stop at precisely the desired distance to the curb, using a magnetic marker or laser guidance system. A discussion of these technologies can be found in the Technology Section.

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48 Tyler, Nick, Caiaffa Martha, *Design of Fully Accessible Bus Stops Infrastructure Elements for Buses and Drivers* Centre for Transport Studies, University College London.

TECHNOLOGY AND PRODUCT LINKS

Innovations in transit and wayfinding technology provide improved accessibility and safety for all users of bus systems. These include:

- Talking Signs
- Automated Docking Systems
- Side Collision Warning Systems
- NextBus
- i-Stop

Talking Signs® Technology

Remote infrared audible signs, or RIAS, allow people who are print disabled to directly know what and where objects are located. Unlike Braille, raised letters, or voice signs which passively label a location or give instructions to a specific goal, the remote signage technology developed at the Smith-Kettlewell Eye Research Institute (Talking Signs®) provides a repeating, directionally selective voice message which originates at the sign and is transmitted by infrared light to a hand-held receiver some distance away. To learn more about the technology, visit the Smith-Kettlewell Eye Research Institute website located at http://www.ski.org/Rehab/WCrandall/introts.html. The website contains reports detailing Talking Signs® research and tests.

Automated Docking Systems

Automated precision bus docking allows a bus to consistently pull up to a bus stop at precisely the desired distance to the curb, using a magnetic marker or laser guidance system.

The California Partners for Advanced Transit and Highways (PATH) at the University of California, Berkeley tested their automated precision bus docking system at Houston Metro. Their technology utilized magnetic markers onto which the bus could automatically latch and perform either fully automated or semi-automated docking. Their demonstration showed that automated docking exceeded human performance in precision and consistency. Potential applications of the PATH magnetic marker guidance system for bus operations include docking, automated bus daily maintenance, and "Bus Rapid Transit."[49]

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49 Partners for Advanced Transit and Highways (PATH). *Precision Docking System Demonstration at Houston.* Intellimotion, Vol. 7, No. 3. 1998.

Carnegie Mellon University in association with Université Blaise-Pascal developed a multiple sensor fusion for detecting the location of curbs, walls, and barriers. The researchers utilized a laser line striper, a vehicle state estimator, a video camera, and a laser scanner to detect the object at one location, track it alongside the vehicle, and search for it in front of the vehicle. The study showed that data from a laser line striper fused with vehicle state estimation, video image, and object detection gave reliable measurements of continuous objects alongside the vehicle. These systems can provide the driver with a higher degree of control and can prevent collisions.[50]

For more information on both the systems, refer to the following websites:

- PATH: http://www.path.berkeley.edu/PATH/Intellimotion/intel73.pdf
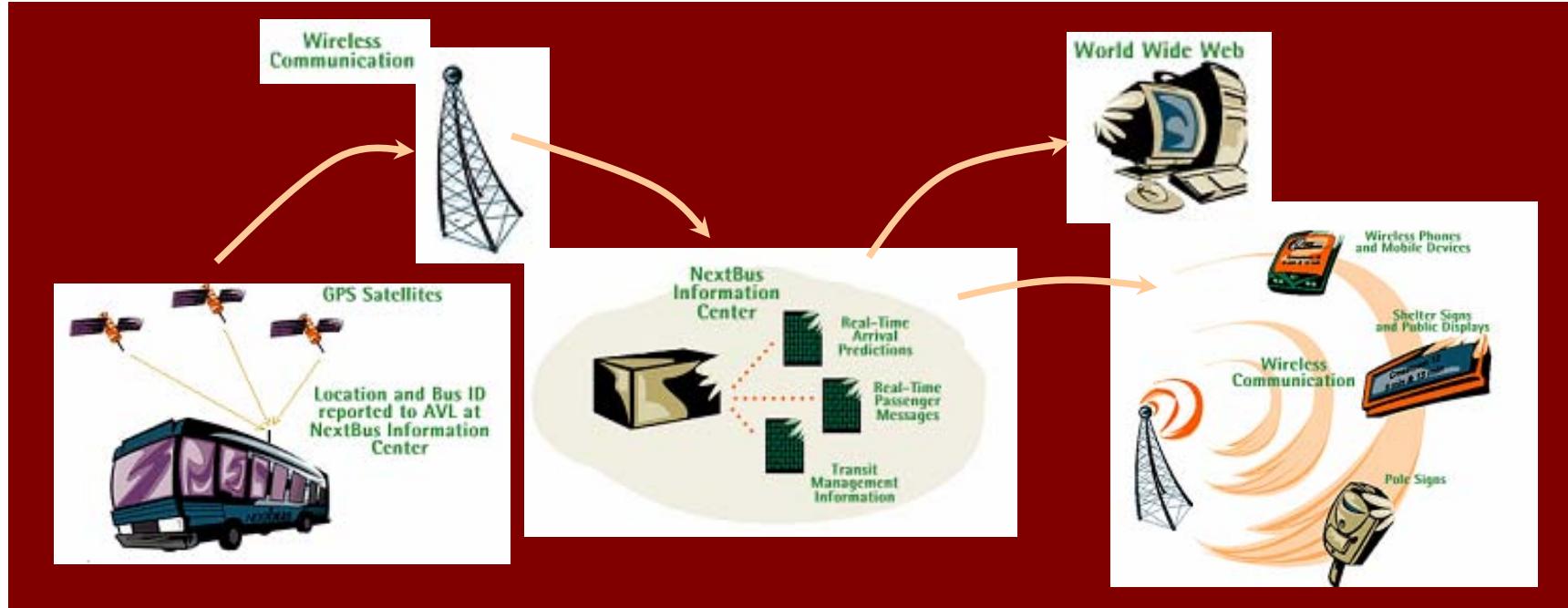
- Robotics Institute: http://www.ri.cmu.edu/pub_files/pub3/aufrere_romuald_2003_1/aufrere_romuald_2003_1.pdf

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50 Aufrère, Romuald, Mertz, Christoph, and Thorpe, Charles. Multiple Sensor Fusion for Detecting Location of Curbs, Walls, and Barriers. Proceedings of the IEEE Intelligent Vehicles Symposium (IV2003). 2003.

NextBus

NextBus uses Global Positioning System (GPS) tracking satellites to provide vehicle arrival information and real-time maps, not just bus schedules, to passengers and managers of public transit, shuttles, and trains. The flow of information is diagrammed in Figure 2.

Figure 2. NextBus Information Flow

Source: AC Transit

NextBus information provides actual arrival information, updated at regular intervals to account for traffic variations, breakdowns, and other day-to-day problems faced by any transit provider. The information displays can be installed in bus stop shelters as shown in Figure 3.

Figure 3. Bus Information Display

Source: AC Transit

Technology is now available that provides information to passengers through an audio broadcast, which may provide route or "next-bus" information. This information may be accessed by all passengers by pushing a button on the stop ID pole or may be limited to passengers holding a coded transmitter. This technology should also be combined with a visual display of route information to be accessible to all transit users.

For more information refer to the following website: www.nextbus.com.

i-Stops

i-Stops are solar-powered bus-stop illumination systems featuring a flashing beacon that notifies bus drivers of a stop request, overhead security lighting and an illuminated transit timetable. The i-Stops are self-contained with solar-charging during the day, and are activated by bus patrons after dark with touch switches. i-STOPS are commonly utilized at stops located in less developed areas with minimal lighting or fast moving traffic, mainly located in suburban and rural areas. Options to activate i-Stops with sensors instead of touch switches provide a better alternative for people with visual impairments.

For more information refer to the following website: http://transitlights.com.

Bus Stop Shelter Product Links

A variety of transit shelter types are readily available. The following are some of the companies that specialize in bus stop furniture and shelters:

- **JCDecaux**
  - ¤ Products: Street furniture including benches, bus shelters and advertising panels.
  - ¤ Website: http://www.jcdecaux.co.uk/city/design
- **Cemusa**
  - ¤ Products: Street furniture including benches, bus shelters, kiosks and trash receptacles.
  - ¤ Website: http://www.cemusa.com
- **Tolar Manufacturing Company Inc**
  - ¤ Products: Benches, bus shelters and kiosks and trash receptacles.
  - ¤ Website: http://www.tolarmfg.com/product.htm
- **Daytech MFG. LTD.**
  - ¤ Products: Benches, bus shelters, kiosks and map and schedule frames.
  - ¤ Website: http://www.daytechlimited.com

Example of an i-Stop.

Source: Carmanah, http://www.transitlights.com/content/products/i-STOP/default.aspx

- **Carmanah**
  - ⌁ Products: Solar powered bus shelter, solar powered bus stop and bus signaling device.
  - ⌁ Website: http://www.transitlights.com/content/products/Default.aspx
- **Simme LLC**
  - ⌁ Products: Bus stop seatingI
  - ⌁ Website: http://simmeseat.com
- **Sepco Plc**
  - ⌁ Products: Solar powered bus shelters, stops, flags and advertising
  - ⌁ Website: http://www.sepcoplc.com

URBAN AND RURAL BUS STOPS[51]

The design and accessibility of urban and rural bus stops should reflect differences in demographics, density, and land use. Urban areas[52] are more likely to have continuous sidewalks and high transit ridership compared to rural areas.[53] Since rural areas and urban clusters[54] have proportions of people with disabilities that are comparable to urbanized areas (refer to Figure 4), ensuring that the bus stop is accessible and safe even if continuous sidewalks are not available, is equally important.

Population with Disabilities in Urban and Rural Areas

Census data show that the percentage difference between populations with disabilities living in urban, suburban or rural areas is minimal. Applying accessibility improvements to bus stops is therefore equally valuable in rural areas as it is in suburban and urban areas. Refer to the Creating Accessible and Safe Bus Stops section for rural bus stop design guidelines.

Figure 4 shows the 2000 Census distribution of people in urban and rural areas. Approximately 10.9 million (20 percent) of the almost 55 million rural Americans aged five or older have a disability, while urban clusters have the highest proportion of the population with a disability, over 21 percent. These two categories are often combined by transportation authorities into a broader definition of rural. In this regard, there are about 89 million residents living in rural transportation areas, 16.5 million (20 percent) of whom have a disability.

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51 Research and Training Center on Disability in Rural Communities, the University of Montana Rural Institute, *Update on the Demography of Rural Disability Part One: Rural and Urban* 2005.

52 Urban: Territory, population and housing units located within urbanized areas and urban clusters.

53 Rural areas: Territory, population, and housing units located outside of urbanized areas or urban clusters. Rural areas have fewer than 2,500 people or areas where people live in open country.

54 Urban Cluster: A densely settled area with a census population of 2,500 to 49,999.

A rural bus stop in Willows, California situated on an unpaved area. The stop is located a considerable distance away from the road, requiring either the patron to walk to the road's edge or the bus to pull off the road.

Source: G. Araki www.the-bus-stops-here.org.

This bus stop in Missoula, Montana is not accessible. It lacks a bus landing pad and accessible path, forcing riders to wait on the road. Additionally, the slope of wheelchair ramp from the bus to the ground will be too steep for wheelchair users to board the bus. Furthermore, placing the bus stop pole in landscaping off the side of the road makes it difficult for a user with visual impairments to locate the stop.

Source: Alexandra Enders, University of Montana

Figure 4. Disability Demographics in Urban and Rural America

	Total population (millions)	Civilian, non-institutionalized population, 5 years and older		
		Total number	Number with a disability	Percent with a disability
United States	281.5	257.2	49.7	19.3%
Urban	222.3	202.5	38.9	19.2%
Urbanized areas*	192.3	175.8	33.2	18.9%
Urban clusters	30.0	26.7	5.7	21.3%
Rural	59.0	54.6	10.9	19.9%
Rural Transit (Rural + Urban Clusters)	89.0	81.3	16.5	20.3%

* Urbanized area: A densely-settled area with a Census population of at least 50,000. A typical urbanized area has more than 500 people per square mile and consists of all or part of one or more incorporated places, such as towns.

Rural Bus Stops[55]

In rural and isolated suburban areas, it is not uncommon to have paved roads with open ditches along the sides to channel storm water. Some of these areas have sidewalks, but most do not, and pedestrians are required to walk on the shoulder of the road. The shoulder often has a steep slope and is comprised of loose material such as gravel and dirt.

Municipalities typically have capital works programs to replace the open ditches with storm sewers. Given the capital cost of such an upgrading, the elimination of ditches and the provision of sidewalks will be a long-term objective in many instances. Transit riders, in the interim, have to board buses without the benefit of a curb to lift them closer to the first step of the bus. Additionally, transit passengers have to get on and off a bus on a gravel or dirt surface. This boarding and unloading situation is very difficult for older adults and especially for those using wheelchairs or other mobility devices.

To best accommodate rural and suburban transit users with disabilities, installing a concrete or asphalt pad on the shoulder of the road is a possible solution to create an accessible bus stop. The pad must be elevated 6 inches (150 millimeters) above road grade for both safety and accessibility purposes. The curb cut between the pad and the road grade must follow the ADA guidelines. Although the elevated pad creates grade changes, it is a preferred scenario to differentiate between vehicle and pedestrian rights-of-way, increasing pedestrian safety. The pad must follow regulations given in the Bus Stop Platforms and Bus Landing Pads section.

55 BC Transit Municipal Systems Program, *Design Guidelines for Accessible Bus Stops.*

APPENDICES

APPENDIX A. QUICK BUS STOP CHECKLIST

QUICK BUS STOP CHECKLIST

Route Name:	Location:	Weather Conditions:	Stop No.:

	PART A: IDENTIFICATION/LOCATION		
A1	Street Name:		
A2	Nearest Cross Street (street name or landmark if mid-block):		
A3	Bus Route Direction:		

North Bound	☐	South Bound	☐	More than one direction	☐
East Bound	☐	West Bound	☐		

A4	Where is the bus stop positioned in relation to the nearest intersection?	
	Nearside (Before the bus crosses the intersection)	☐
	Far Side (After the bus crosses the intersection)	☐
	Mid-block or not near an intersection	☐
	Freeway bus pad	☐
	N/A	☐

A5	Distance from bus stop pole to curb in feet:
A6	Adjacent property address or name of business (only if readily visible):

Date	Time:	Surveyor:

QUICK BUS STOP CHECKLIST

Route Name:	*Location:*	*Weather Conditions:*	*Stop No.:*

PART B: Landing Area Assessment

		Yes No
B1	Is there a landing area at least 5 feet wide and 8 feet deep adjacent to the curb/street?	☐ ☐

B2	Where is the landing area positioned in relation to the curb/street?				
	Below street level (low ground or shoulder) ☐	Shoulder ☐	Other (specify): ☐
		Adjacent ☐	
	Sidewalk ☐	Bus Bulb ☐	Off-Road/No sidewalk ☐

B3	What is the material of the landing area?					
	Asphalt ☐	Dirt ☐	Gravel ☐	Other (specify): ☐
	Concrete ☐	Grass ☐	Pavers ☐	

B4	Are there problems with the landing area surface?			Yes No ☐ ☐

If YES, rank resulting accessibility potential:

	Not Accessible	Minimally Accessible	Accessible
Uneven	☐	☐	☐
Slopes up from the street	☐	☐	☐
Slopes down from the street	☐	☐	☐
Requires stepping over drain inlet	☐	☐	☐
Other (Specify)	☐	☐	☐

B5	Are there any obstacles that would limit the mobility of a wheelchair (trash receptacle, newspaper boxes, landscaping, other?	Yes No ☐ ☐

If YES, describe obstruction:

Date	*Time:*	*Surveyor:*

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Route Name:	Location:	Weather Conditions:	Stop No.:

B6	Additional landing area comments:		

PART C: PEDESTRIAN COMFORT AMENITIES			
Section C-1: Shelters (move to Section C-2 if there is no shelter)			

C1	What are the approximate dimensions (width, height and depth in feet) of the interior standing area?			
	Width:			
	Height:			
	Depth:			

		Yes	No
C2	Could a person using a wheelchair maneuver into the shelter?	☐	☐
C3	Could a person using a wheelchair fit completely under the shelter (minimum space of a common mobility device is 30 in. by 48 in. (760 mm by 1200mm))?	☐	☐

C4	What is the distance of the front of the shelter from the curb in feet?										
	0 - 2'	☐	2' - 4'	☐	4' - 6'	☐	6' - 8'	☐	8' - 10'	☐	>10' ☐

C5	Additional shelter comments:

Section C-2: Seating Assessment (move to Part D if there is no seating)		
C6	What is the type of seating available?	
	Bench inside shelter – ***skip to question C8***	☐
	Freestanding bench	☐
	Fold down bench	☐
	Leaning bench	☐
	Other (specify):	☐

Date	Time:	Surveyor:

QUICK BUS STOP CHECKLIST

Route Name:	Location:	Weather Conditions:	Stop No.:

C7	If not inside shelter, what is the distance of the seating from the curb in feet?					
	0 - 2' □	2' - 4' □	4' - 6' □	6' - 8' □	8' - 10' □	>10' □
C8	Rank the condition of the seating:					
	1 □	2 □	3 □	4 □	5 □	
	1=hazardous – broken, someone could get hurt from normal use *2=in poor shape though not hazardous* *3=fair – needs repainting, needs cosmetic attention,, protruding but not hazardous bolts* *4=good – not perfect but no immediate repair need* *5=cosmetically excellent; new*					
C9	Additional seating comments:					

PART D: Information Features

		Yes	No
D1	Is there a bus stop sign?	□	□
	If NO, move to question D5.		
		Yes	No
D2	Are bus routes indicated on the bus stop sign?	□	□
	If YES, what routes?		
D3	How is the sign installed?		
	On its own pole		□
	On a building		□
	On a utility pole		□
	On a shelter		□
	Other (specify):		□

Date	Time:	Surveyor:

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QUICK BUS STOP CHECKLIST

Route Name:	Location:	Weather Conditions:	Stop No.:

			Yes	No
D4	Are there problems with the signage?		☐	☐
	If YES, check all that apply:			
	Sign in poor condition		☐	
	Pole in poor condition		☐	
	Sign position hazardous to pedestrians		☐	
	Sign not permanently mounted		☐	
	Lighting on sign is poor		☐	
	Other (specify):		☐	

			Yes	No
D5	Is there route/schedule/map (circle as appropriate) information posted?		☐	☐
	If NO, skip to Question D8			
D6	Where is the route/schedule/map (circle as appropriate) information posted?			
	On pole under bus stop sign		☐	
	On its own pole		☐	
	On a building		☐	
	On a utility pole		☐	
	On a shelter		☐	
	In a shelter		☐	
	Other (specify):		☐	

			Yes	No
D7	Is the information at eye level of a wheelchair user?		☐	☐
D8	Additional signage & information comments:			

Date	Time:	Surveyor:

Toolkit for the Assessment of Bus Stop Accessibility and Safety • Easter Seals Project ACTION

QUICK BUS STOP CHECKLIST

Route Name:	Location:	Weather Conditions:	Stop No.:

PART E: Other Amenities

E1	What other amenities are at the bus stop?	
	Trash receptacle	☐
	Telephone or police call box	☐
	Newspaper boxes	☐
	No other amenities	☐
	Other (specify):	☐

		Yes No
E2	Do any of these amenities block wheelchair access?	☐ ☐
	If YES, specify what the amenity is blocking access to:	
	Bus shelter	☐
	Wheelchair seating area	☐
	Bus ingress or egress	☐
	Bus stop information	☐
	Other (specify):	☐

PART F: Traffic and Pedestrian Safety Issues
Section F-1: Traffic and Pedestrian Issues

F1	Where is the bus stop area located?	
	In travel lane	☐
	Bus lane/pull off area	☐
	Paved shoulder	☐
	In right turn only lane	☐
	Unpaved shoulder	☐
	Off street	☐
	"No Parking" portion of street parking lane	☐
	Other (specify):	☐

Date	Time:	Surveyor:

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QUICK BUS STOP CHECKLIST

Route Name:	Location:	Weather Conditions:	Stop No.:

		Yes	No
F2	Is the bus stop zone designated as a no parking zone?	☐	☐
	If YES, indicated by:		
	One "No Parking" sign		☐
	2 or more "No Parking" signs		☐
	"Bus Only" sign		☐
	Painted curb		☐
	Painted street		☐

		Yes	No
F3	Are cars parked between the landing area and the bus stopping area?	☐	☐

		Not posted	
F4	What is the posted speed limit in MPH?		☐

F5	What are the traffic controls at the nearest intersection for the street?		
	Traffic signals		☐
	Flashing lights		☐
	Stop/Yield sign		☐
	None		☐
	Other (specify):		☐

F6	How many total lanes are on both sides of the road?								
	1 ☐	2 ☐	3 ☐	4 ☐	Other (specify): ☐	N/A ☐

		Yes	No
F7	Are there potential traffic hazards?	☐	☐
	Yes, check all that apply:		
	The bus stop is just over the crest of a hill		☐
	The bus stop is just after a curve in the road		☐
	The bus stop is near an at-grade railroad crossing		☐
	Waiting passengers are hidden from view of approaching bus		☐
	A stopped bus straddles the crosswalk		☐
	Bus stop just before crosswalk		☐
	High speed traffic		☐

Date	Time:	Surveyor:

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Route Name:	Location:	Weather Conditions:	Stop No.:

	No crosswalk	☐
	Other (specify)	☐
F8	Additional traffic safety comments / recommendations:	

Section F-2: Lighting Assessment (assessment preferably taken in the evening or at night)
Go to Part G if no lighting

F9	What type of lighting is available?	
	Street light	☐
	Shelter lighting	☐
	Outside light on adjacent building	☐
	Other (specify):	☐
F10	Additional comments:	

PART G: Getting to the Bus Stop

G1	How wide is the sidewalk?								
	No sidewalk	☐	less than 3'	☐	3'-5'	☐	5' or greater	☐	N/A ☐

G2	Rank the condition of the sidewalk:								
	1	☐	2	☐	3	☐	4	☐	5 ☐

1=hazardous – large breaks, cracks, root uplifting, someone could get hurt from normal use or use of a wheelchair would be difficult
2=in poor shape though not hazardous – very rough, some root uplifting, cracks, breaks
3=fair – minor root uplifting, minor cracks or breaks
4=good – not perfect but no immediate repair
5=cosmetically excellent; new

Date	Time:	Surveyor:

QUICK BUS STOP CHECKLIST

Route Name:	Location:	Weather Conditions:	Stop No.:

		Yes	No
G3	Are there physical barriers that constrict the width of the sidewalk within the block on which the bus stop is located?	☐	☐

If YES, what is the narrowest useable width:			
Less than 3'	☐	3' or greater	☐

		Yes	No
G4	Does the landing pad connect to the sidewalk?	☐	☐

G5	Where is the nearest street crossing opportunity?			
	The nearest intersection	☐	Mid-block crosswalk	☐

G6	What pedestrian amenities are at the nearest intersection (or other crossing opportunity)?					
	Curb cuts all corners/ both sides	☐	Pedestrian crossing signal	☐	Traffic light	☐
	Visible crosswalk	☐	Audible crosswalk signal	☐	Crossing guard assistance	☐
	Curb cuts at some corners/one side	☐	Accessible Pedestrian Signal (APS)	☐	Tactile warning strip on curb cut	☐
	Other (specify):					☐

Date	Time:	Surveyor:

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Tri-Met in Portland, Oregon, provides guidelines on maintenance activities in their Bus Stop Guidelines 2002 manual. The agency defines a clean stop as free from:

- Debris, including cigarette butts, cups and newspapers

- Foreign substances, including gum, spills and food

- Insects and weeds

- Graffiti (written or etched)

- Unauthorized stickers or posters

Well-maintained stops reflect the following elements:

- Overall passenger facilities are in good repair

- Areas and improvements are in good condition and all repairs are current

- All amenities (shelters, benches, trash receptacles) are properly installed to meet the requirements of city ordinances and Americans with Disabilities Act (ADA)

- Furniture surfaces are in good condition, including no rust, marring or scratches

- Signage, walls, seating and kiosks are in good condition

- Lighting in good working order at all times

- Free from overhanging trees or brush

Tri-Met's guidelines for repair, maintenance and cleaning are detailed below:

- Repairs are performed by both in-house employees and contractors

- Pick up trash and debris within a 15 feet radius of bus stops (blowers shall not be used)

- Remove graffiti, stickers and unauthorized signs and posters

- Power wash all amenities with water. Using a ladder, clean the shelter roof inside and outside with a soft bristled brush until all dirt has been removed. Clean and flush gutters and drain holes of all debris. Clean the shelter frame, bench and windows (inside and outside) until all dirt has been removed using a soft bristled brush and pressure washer. Dry windows with a squeegee so that no smears or

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56 Tri-Met, 2002.

streaks remain visible. Wipe benches completely dry after cleaning or graffiti removal to allow immediate customer use and to prevent claims for damaged clothing

- Emergency cleaning – all emergency cleanings shall be completed within four hours of notification, except broken glass, which shall be replaced within two hours notification

Tri-Met operates several public-private partnerships in an effort to keep their stops clear of litter and graffiti. Whenever possible, Tri-Met seeks sponsors to assist with the growing trash problem. In most cases, Tri-Met provides the trash receptacle at a particular shelter. The sponsor collects and disposes of the trash as needed. A plaque on the trash can denotes the sponsor's name. Tri-Met maintains the trash can by providing the liner insert, and repairs and repaints (due to graffiti) on an as-needed basis. In addition, they operate their waste disposal routine.

For locations without sponsors, Tri-Met has its own in-house trash collection crew. The crew follows a regular route schedule and also assists in emergency trash pick-up as needed. When a sponsor neglects a trash can due to moving, vacation, etc., the crew assists until another sponsor is found.

Tri-Met partners with Stop Oregon Litter and Vandalism (SOLV) to provide anti-litter and graffiti programs in addition to the regular maintenance routines described above. The SOLV program consists of three major components:

- **Adopt-a-Stop:** A customer agrees to pick up litter, clean the stop amenities and report any items needing repair in exchange for gloves, cleaning supplies and a steady supply of bus tickets.

- **Keep-a-Can:** If a trash can needs to be cleaned at a particular stop, customers or local businesses can sponsor a trash can. Under the program, volunteers agree to empty and provide service for a trash can. In return, Tri-Met will provide an attractive, industrial strength can, liner and soda can recycling container for the stop.

- **First Step Youth Program:** During the summer, SOLV and Tri-Met organize groups of at-risk students to clean up street litter and graffiti, focusing on Tri-Met transit corridors. Tri-Met provides group payment, supervision and transportation.

Tri-Met's bus stop amenities are monitored and have an established shelf life for replacement as a result of accidents, vandalism or general wear over time. Regular maintenance will extend the life of bus shelters and other bus stop features, but their replacement is eventually required. The Capital Improvement (CIP) identifies the following criteria for the replacement of bus stop shelters:

- Condition compromises customer safety

- Exceeds a 15 year life cycle

- Customer security is in some way compromised

- Parts for repair and maintenance are no longer available

- The shelter is not in compliance with ADA

Bus stop signs are similarly replaced if they pose a safety concern for bus riders; they have been damaged or vandalized; they impede movement with ADA guidelines or exceed an 8-year life cycle. Bus stop features may be in good condition beyond their expected life in which case replacement would be deferred. Signs, shelters and other amenities may be upgraded or moved to reflect changes in bus stop use or coordination with other development projects.

APPENDIX C. CASE STUDIES/EXAMPLES OF AGENCY COORDINATION

City of Winnipeg Transit System's Organizational Support for Bus Stops[57]

The City of Winnipeg Transit System in Canada, provides an example of partnerships that have helped implement bus stop improvements and projects. In 1992, the Mayor of Winnipeg established a Task Force to review the status of the paratransit service (referred to as Handi-Transit) and assess emerging technologies to make the fixed-route bus system accessible. Winnipeg Transit decided to convert their fleet to low floor buses - the first three low-floor buses procured were dedicated to Route 10. Improvements were implemented at the bus stops along the route through the following process:

1. The agency enlisted the support of local area city councilors of cities affected by the route

2. Citizens, accompanied by their city councilors, made safety and accessibility assessments along the route

3. With citizen input, the agency developed guidelines for the Route 10 bus stops which became the blueprint for all bus stops in the system

4. The agency continued the audit internally of all 4,500 stops, based on the input obtained through the Route 10 outreach and accessibility improvements. The guidelines serve as an example to staff and private contractors who are implementing the bus stop improvements

Winnipeg City departments have interdepartmental meetings to coordinate future projects. Construction projects are circulated to all the departments (including Transit and Fire) to obtain feedback. The feedback is then incorporated into the project plan. Bus stop improvements and considerations are therefore incorporated into the project before construction begins. The agency has cultivated a good working relationship with Public Works and Planning Departments and is apprised of sidewalk construction projects at least a year in advance.

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57 Nelson\Nygaard, Interview with Alex Regiec, City of Winnipeg Transit System, February 28, 2005.

Tri-Met Organizational Support for Bus Stop Management[58]

Tri-Met in Portland, Oregon uses a comprehensive coordinated plan to ensure bus stop accessibility. Many of the elements of this plan could be replicated at other agencies that may not have placed as much focus on bus stop accessibility.

Public-Private Partnerships

An agreement between Tri-Met and the City of Portland has simplified the siting and permitting process for bus shelters and amenities to allow for quicker installation. Tri-Met encourages developing Intergovernmental Agreements and Memoranda of Understanding with municipal departments as they have improved Tri-Met's ability to provide bus stop accessibility and amenity improvements.

Piggybacking on development projects helps in the implementation of bus stop improvements. Depending on the size and nature of the development, Tri-Met may request improvements to adjacent bus stops. If frontage improvements are planned, Tri-Met will request the addition of an ADA landing pad and a rear door landing pad at stops that lack them. If ridership potential exists, the agency may request the developer provide a bus shelter, a bench or other bus stop amenities as warranted. Developers are also required to maintain the stop free of litter and vandalism.

Interdepartmental Coordination

In addition to cooperating with municipal offices and agencies, implementing bus stop improvements is better facilitated by strong organization within the transit agency. *Tri-Met's Bus Stop Guidelines 2002* provides a good description of the responsibilities of each position and department in implementing bus stop improvements.

Tri-Met developed a carriage walk agreement between the Project Planning Department, which oversees bus stop placement and design, and the Bureau of Maintenance. The Agreement coordinates bus stop accessibility improvements (including ADA landing pads and curb ramps), with the city's efforts to upgrade pedestrian infrastructure (such as curb ramps and accessible sidewalks).

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58 Tri-Met, 2002.

Capital Projects Management Section of the Project Planning Department is responsible for the design and placement of bus stops, including shelter and amenity placement. The section works closely with other Tri-Met departments to provide for the regular maintenance and management of bus stops as well as implementation of bus stop development programs. The following is a brief description of the Section's positions and their responsibilities:

- **Programs Manager:** Responsible for developing and implementing a 5-year Bus Stops Management and Development Plan, which includes negotiating agreements with each major jurisdiction. The Manager is also responsible for coordinating programs and managing the department and program budgets and contracts. The Capital Programs Management Section, including positions matrixed from other departments, report directly to the Programs Manager for bus stop program related activities.

- **Project Planner:** Provides support for field checks and sign placement. Works with the Programs Manager to develop and update the 5-year Bus Stops Management and Development Plan. Provides the lead support for development and coordination of the Streamline Bus Improvement Program and other agency initiatives. Prepares conceptual designs for bus stop improvements and identifies right-of-way permit requirements for new or modified stops.

- **Maintenance Supervisor:** Assesses and manages the cleaning and repair needs and contracts and is responsible for quality control for these efforts.

- **Engineer:** Works closely with all members of the section but also reports to the Project Implementation Department within the Capital Project and Facilities Division. Using Tri-Met and jurisdiction standards, the Engineer prepares design and construction drawings for all bus stop improvements. The Engineer orders utility checks, works with jurisdictions regarding joint construction or traffic managements issues, establishers specifications for procurement contracts of bus stop shelters, signs and other amenities and oversees their installation.

- **Adopt-a-Stop Program Coordinator:** This person monitors partnership agreements for the servicing of bus stops, shelters and trash receptacles and is a contract employee of Stop Oregon Litter and Vandalism (SOLV).

- **Planner/Analyst:** Responsible for building and maintaining Tri-Met's central bus stops database. This position is a significant resource for the planning, analysis and GIS mapping of bus stops and supporting information. The Planner/Analyst uses a Global Positioning System locator device to accurately locate bus stops within the geographic information system files. This person also prepares status and performance reports to track cleaning, repair, response to complaints and work orders.

- **Community Relations Specialist:** Serves as a central point of contact for all external and internal communications pertaining to bus stop related inquires. This person prepares mailings and notices for bus stop changes and sets up community meetings pertaining to bus stop programs.

The overall responsibility for bus stops management resides with the Bus Stops Section. However, some issues require review and input from a broad cross-section of Tri-Met divisions.

- The **Service Planning Department**, in concert with the **Scheduling Department**, determines routes and the type of services to be provided along the routes. These have direct bearing on the location and design of bus stops.

- The **Field Operations Supervisors** are in the best position to identify bus stop problems and operational concerns that influence bus stop placement. Road Supervisors request bus stop changes based on field observations and as required to accommodate construction projects or events that cause the realignment of service. They also temporarily reroute service when bus stops are affected by construction activities. Road Supervisors also receive customer comments in the course of their surveillance activities. Similarly, Bus Operators also pass on issues that they identify or comments from their bus riders.

- **Maintenance Technicians** in the Facilities Management Department repair and maintain stops and shelters. Maintenance technicians also receive customer comments in the course of their activities, which are managed within their group or passed to the Bus Stops Section.

- The **Information Development Department** of the Marketing and Customer Service Division prepares specifications for signage and information displays and determines locations for other customer information. The **Marketing Department** manages the shelter and bench advertising programs. Individual requests and needs for bus stop changes funnel through the **Customer Service Department** and are recorded in a Customer Service Inquiry database, which is assessed by the Bus Stops Management Section for research and response. Employer outreach efforts conducted by the Marketing Department provide input for program development.

- Tri-Met's **Committee on Accessible Transportation** (CAT) provides a very important consultative role in the management of bus stops. This committee comments on bus stop design guidelines and the development of standard bus stop features (e.g., bus stop shelter design). This perspective helps to assure compliance with the ADA and helps set priorities for bus stop development programs.

- The **Public Art Program** also provides input for integrating art into bus stop design and in identifying opportunities for unique art projects associated with bus stops.

- Other groups are linked through the internal coordination plan and include **Safety, Training** and **Real Property**.

APPENDIX D: SAMPLE AGREEMENT FOR PRIVATE ROAD BUS STOP PLACEMENT[59]

Pierce Transit in Tacoma, Washington signs a Private Road Bus Stop Placement Use Agreement with owners of private property on which they would like to locate a stop. The agreement is provided below.

PRIVATE ROAD BUS STOP PLACEMENT USE AGREEMENT

THIS USE AGREEMENT, made and entered into in triplicate, this   day of   2005, by and between PIERCE COUNTY PUBLIC TRANSPORTATION BENEFIT AREA CORPORATION, a municipal corporation hereinafter called "Pierce Transit" and   which represents the ownership and maintenance of a private road, hereinafter called the "Owner".

WITNESSETH:

WHEREAS, Owner represents the ownership and maintenance of a private road physically located at   and further depicted on attached Exhibit "A"; and

WHEREAS, the Owner has requested that Pierce Transit place a bus stop adjacent to the private road and in a location agreed to by the adjacent property owner, and in accordance with the provisions of this agreement; and,

WHEREAS, the parties herein desire to enter into a general use agreement to allow Pierce Transit access to the described private road and allow placement and use of a bus stop by the public to access public transportations services offered from the described location; and,

WHEREAS, Pierce Transit agrees to provide transportation services to this location in consideration of this access and agreement subject to Pierce Transit's operating requirements; and,

WHEREAS, this agreement does not guarantee the delivery of any public transportation services to the property.

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59 Nelson\Nygaard, Interview with Tim Renfro, Pierce Transit, March 28, 2005.

NOW, THEREFORE, in consideration of the covenants and agreements the parties hereinafter set forth, Owner does hereby grant unconditional access and use of the private roadway described above including the placement of a bus stop on Owner's property.

1. Premises. The Owner grants to Pierce Transit the right to use that portion of the Owner's premises shown (called the "Premises") for a public bus stop.

2. Usage Rights Granted. Pierce Transit, at its expense, may install signs, paint markings, and other traffic control devices and make other improvements. All other changes shall require the consent of the Owner.

3. Owner's Rights. The Owner reserves the right to make other uses of the Premises that do not interfere with Pierce Transit's use.

4. Term. The term of this Agreement shall be ongoing commencing on this ___ day of _____ 2005. At any time, either Party may terminate this Agreement by giving two (2) months' notice to the other party of its intent to terminate.

5. Access. Pierce Transit may authorize the use of the Owner's driveways, walkways and improved surfaces surrounding the Premises for vehicular and pedestrian access to the Premises.

6. Maintenance. Pierce Transit shall only be responsible for maintenance of markings and improvements that it installs and will not be responsible for any roadway maintenance and repairs at the Premises location. Owner agrees that they have inspected the location of the bus stop and the adjacent roadway and have determined that the location of the bus stop is a safe location and that the roadway is adequate to accommodate public transit vehicles. Further, Owner will hold Pierce Transit harmless from any damage, claims, actions or losses to the roadway connection with the use of the Premises unless a result of Pierce Transit's sole negligence and to the extent permitted by law.

7. Towing of Vehicles. Pierce Transit may order vehicles to be towed away at its own expense and risk. Special consideration, however, shall be provided for vehicles displaying a government-issued "handicapped" license plate or decal.

8. Insurance. Pierce Transit will procure and maintain, for the duration of the Agreement, insurance and/or self-insurance against claims for injuries to persons or damage to property that may arise from or in connection with the use of the Premises.

9. Indemnification/Hold Harmless. Pierce Transit will defend, indemnify and hold harmless the Owner, its officers, officials, employees, and volunteers from and against any and all claims, suits, actions or liabilities for injury or death of any person, or for loss or damage to property, which arises out of the use of Premises or from any activity, work or things done, permitted or suffered by Pierce Transit in or about the Premises, except only such injury or damage as shall have been occasioned by the sole negligence of Owner.

10. Governmental Charges. Pierce Transit shall not be responsible for any taxes, assessments, or governmental charges of any kind that may be levied against the Premises.

11. Termination. Pierce Transit will discontinue its use of the Premises on termination of this Agreement; will remove all signs and structures placed on the Premises by Pierce Transit; will repair any damage to the Premises caused by the removal; and will restore the Premises to as good a condition, less reasonable wear and tear, as existed prior to the execution of this Agreement.

12. Accommodation. The parties agree to make reasonable accommodations with and to work together to resolve problems that may arise from time to time. Upon reasonable advance notice to Pierce Transit and its users, the Owner may secure the Premises on a limited number of dates to allow for construction on surrounding property or special events. The Owner agrees to provide special consideration for vehicles displaying a government-issued "handicapped" license plate or decal.

13. Entire Agreement. This document contains the entire agreement between the parties and supersedes all other statements or understandings between the parties.

APPENDIX E. FIELD TEST LOCATIONS

The Bus Stop Checklist was tested in the field with the following transit agencies:

- **AC Transit in Oakland, California**
  Robert Del Rosario
  Transportation Planner
  AC Transit
  1600 Franklin Street
  Oakland, California 94612

- **Fairfax County Department of Transportation in Fairfax, Virginia**
  Denis P. Paddeu
  Senior Transportation Specialist
  Fairfax County Department of Transportation/Fairfax Connector
  12055 Government Center Parkway, Suite 1034
  Fairfax, Virginia 22035-5515

- **Marin County Transit District in Marin, California**
  Amy Van Doren
  Transit Manager
  Marin County Transit District
  Marin County Civic Center
  Room 304
  San Rafael, California 94913-4186

- **Niagara Frontier Transportation Authority in Buffalo, New York**
  Christopher Cronin
  Traffic Data Administrator
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APPENDIX F. USEFUL RESOURCES

- ADA Accessibility Guidelines for Buildings and Facilities (ADAAG): http://www.access-board.gov/adaag/html/adaag.htm

- Center for People with Disabilities: To determine the accessibility barriers to using bus stops in the City of Boulder for people with disabilities, consumer volunteers researched the reported problems and documented the barriers they found. The barriers found may be applicable to transit systems throughout the U.S. The findings are detailed on their website: http://ww.cpwd-ilc.org/cpwd/ilp/survey05/.

- Universal Design: IDEA Center, State University of New York at Buffalo; Global Universal Design Educator's Network, http://www.udeducation.org/. This site supports educators and students in their teaching and study of universal design. Provides information on universal design and links to resources.