



# WSTA Bus Amenity Standards

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Bus Stop Amenity and Design  
Guidelines

July 21, 2022

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Winston-Salem Transit Authority  
with the City of Winston-Salem



WSTA Route  
Study

## Table of Contents

Executive Summary.....	1
Introduction: What are Bus Stop Amenities?.....	3
Why Are Bus Stops Important? .....	3
Purpose: What is the Purpose of Having Bus Stop Amenity and Design Guidelines? .....	3
Project Goals.....	4
Bus Stop Guidelines .....	4
ADA Applicability.....	4
Boarding and Alighting Area .....	4
Bus Stop Shelter .....	5
Bus Stop Signs .....	5
Bus Stop Levels, Amenities & Investment.....	7
Bus Stop Inventory .....	8
Transit Service Type.....	8
Minimum Stop Spacing .....	10
Spacing Optimization for Existing Bus Stops .....	10
Stop Elimination Checklist.....	12
Stop Merger Checklist.....	12
Bus Stop Warrants Program.....	13
Daily Passenger Boardings Counts .....	13
Process to Apply Bus Amenity Guidelines .....	13
Stage 1 .....	13
Stage 2 .....	14
Additional Considerations .....	15
Periodic Evaluation of Program.....	15
Automated Tracking/Inventory Update Process .....	15
Regional Bus Stop Database Maintenance .....	15

**Tables and Figures**

Table 1 Proposed Stop Qualification Criteria ..... 13

Figure 1 Sample Bus Stop Inventory Form ..... 8

Figure 2 Bus Stop Optimization Process ..... 11

Figure 3 Acceptable Driveway Arrangements..... 18

Figure 4 Location of Far Side Bus Stop ..... 19

Figure 5 Location of Mid-Block Bus Stop..... 19

Figure 6 Location of Near-Side Bus Stop..... 20

Figure 7 Minimum Requirements at Transit Stop ..... 21

Figure 8 General Site Layout with Minimum and Suggested Clearances ..... 24

Figure 9 Shelter Placement..... 24

Figure 10 WSTA Bus Stop Sign..... 27

Figure 11 Sign Pole Location ..... 29

Figure 12 Sign Pole with Information Holder ..... 30

Figure 13 Bicycle Rack Styles ..... 33

Figure 14 Bicycle Rack Clearances ..... 34

Figure 15 Desirable Pedestrian Access from Developments ..... 39

Figure 16 Far-Side Bus Pullout ..... 40

Figure 17 Mid-Block Bus Pullout ..... 41

**Appendices**

- Appendix 1 – Bus Stop Design Guidelines
- Appendix 2 – Minimum Requirements Checklist
- Appendix 3 – Weekday Bus Ridership By Stop and Bus Stop Level Groupings

## Executive Summary

Bus stops are one of the first transit features users experience on their commuting journey. Having well-defined bus stop amenities and design guidelines helps WSTA in many different ways, such as route planning, capital planning, fiscal responsibility, and fairness and responsiveness to transit users who request a stop or amenities.

This document defines standard features of an Americans with Disabilities Act (ADA)-compliant bus stop and describes best practices for stop placement and construction.

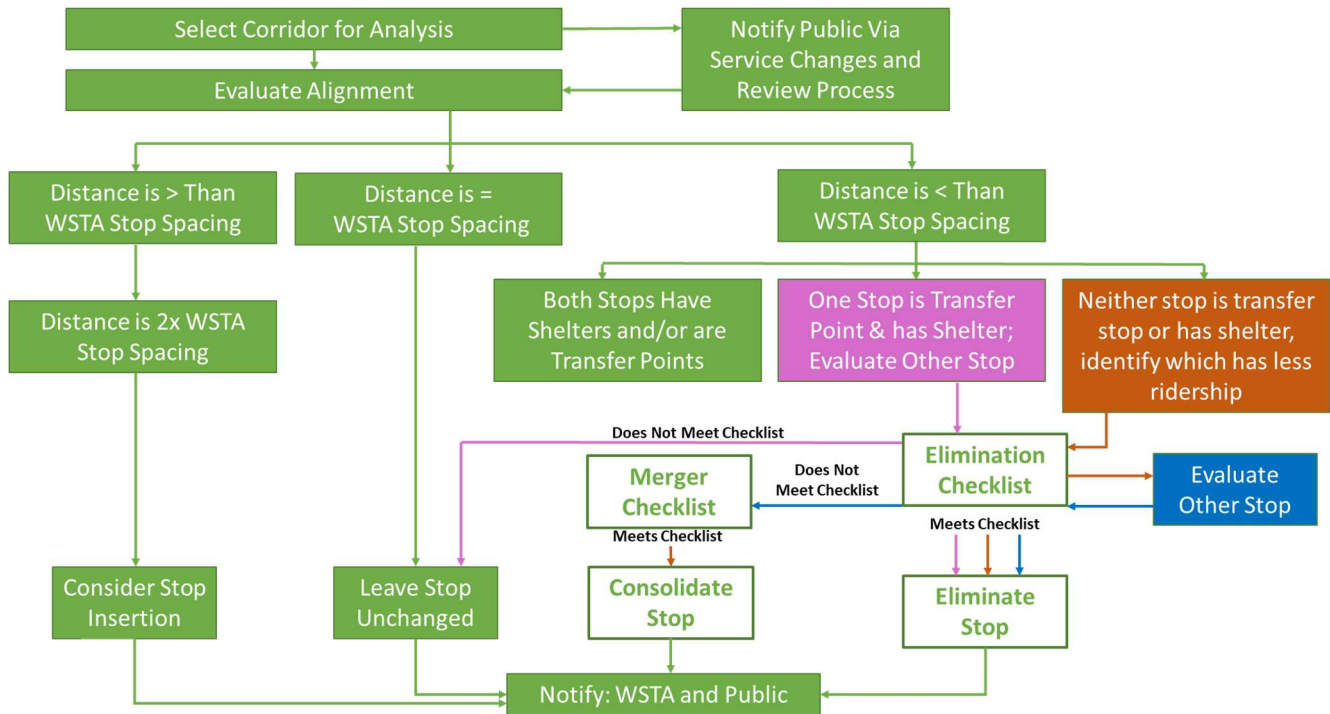
Developing a bus stop database with information on location, amenities, ADA compliance, and ridership for each stop is a critical precursor to identifying which stops should be prioritized for investment, and which ones may be eliminated or consolidated with other stops to speed up bus routes.

Establishing a Bus Stop Warrants program can create a rational investment approach that prescribes the type of improvements made at each stop based on ridership. This document recommends that WSTA establish four levels of bus stop importance, with stops that have over 40 daily boardings receiving the highest level of investment.

	Base Level	Level 1	Level 2	Level 3
<b>Qualification Criteria</b>				
<b>Daily Boardings</b>	None	10 - 19	20 - 39	40+

This document also covers the various types of transit services that would serve each stop, such as local buses and limited stop express service. It defines spacing standards between stops, noting that certain places may require stops to be closer together or further apart.

The document provides guidance on how to refine the total number of existing stops and contains a decision tree to allow staff to review and refine the number of stops. The decision tree takes into consideration elements such as public input, the recommended spacing between stops, the type of bus service, and more; see below.



**Bus Stop Optimization Process**

It concludes with three appendices and proposed steps for implementation. The appendices contain the Bus Stop Design Guidelines, Bus Stop Minimum Requirements Checklist, and a list of WSTA stops ordered by the number of weekday boardings that identifies Level 1, Level 2, and Level 3 stops for prioritized investment.

The most important finding of the initial stop level grouping is that **77% of WSTA boardings occur at only 144 of WSTA’s 1,046 stops**. This means that a program of targeted investment at these stops can quickly elevate the WSTA customer experience.

For implementation, step 1 focuses on a trial run for the initial implementation and refinement of the guidelines, while step 2 focuses on long-term refinement and improvement. The two-step process aims to make this guide a living document that staff can amend as their standards program develops.

## Introduction: What are Bus Stop Amenities?

Bus stops are places where passengers can board or alight from the bus. In their simplest form, bus stops usually are defined as a sign on a pole. Bus stop amenities include elements such as benches, trashcans, shelters, bus route information, emergency callboxes, wayfinding, concrete pads, and more. Each bus stop may have different types of amenities. The evaluation process that identifies what amenity is needed at each stop is called a warrants system. For example, a bus stop that has large crowds waiting at a stop during the day may require shelter and benches.

## Why Are Bus Stops Important?

Bus stops are important because they are one of the first transit elements a user experiences on their commuting journey, and a well-designed bus stop tells the passenger that they are respected by the system. Just as critical as a robust and complete sidewalk network in supporting access to transit, bus stops can not only provide passengers a reprieve from the elements but also can act as a scheduled timepoint for bus operators to stay on schedule. Bus stops can help the transit agency develop a good relationship with its users by providing adequate amenities while waiting for the next bus.

## Purpose: What is the Purpose of Having Bus Stop Amenity and Design Guidelines?

WSTA service has grown throughout the years, and while Sunday service was added in the last decade, WSTA has also seen a decline in bus ridership that has been experienced nationally that has coincided with the expansion of Uber and Lyft ride-hailing services. Through periods of both rising and falling ridership, WSTA regularly receives requests for bus stops and amenities. Currently, the City of Winston-Salem does not have local bus stop design guidelines, although the city has an adopted bus shelter standard.

Installing and maintaining bus stops is essential; however, sometimes, too many stops can slow down bus service by having buses serve tightly clustered stops.

As the WSTA system grows, so will the number of bus stops. Given the expense of building, installing, and maintaining each bus stop, prioritizing where and how much to invest at individual stops is critical. To be fiscally prudent and responsive to community

bus stop requests, clear criteria should be established to ensure that bus stops and amenities are installed at appropriate locations, and commensurate to need.

## Project Goals

The goals of the bus stop and bus stop amenities project are as follows:

- Develop bus stop amenities guidelines
- Develop bus stop refinement criteria to optimize bus stop placement
- Develop criteria to prioritize bus stop amenity placement

## Bus Stop Guidelines

### ADA Applicability

The accessibility of transportation facilities, including bus stops, is regulated by the Americans with Disabilities Act of 1990 (ADA). The ADA empowered the United States Access Board to develop and adopt specific accessibility guidelines. These guidelines pertaining to transportation facilities are recorded in the ADA Accessibility Guidelines (ADAAG) that were adopted in 2006 and the Public Right-of-Way Accessibility Guidelines (PROWAG) proposed in 2011. The guidelines detail requirements under the Americans with Disabilities Act (ADA) – where applicable.

### Boarding and Alighting Area

Bus boarding and alighting area guidelines are detailed under Section 810.2 of the ADAAG; the section includes four specific guidelines:

- **Surface:** Boarding and alighting areas shall have a firm and stable surface
- **Dimension:** Boarding and alighting areas shall extend a minimum of 96 inches deep and 60 inches wide
- **Connection:** Boarding and alighting areas shall be connected to streets, sidewalks, or pedestrian paths by an accessible route



- **Slope:** Parallel to the roadway, the slope shall be the same as the roadway. Perpendicular to the roadway, the slope shall be no steeper than 1:48 (approx. 2%)

### Bus Stop Shelter

Bus stop shelter guidelines are provided in Section 810.3 of the ADAAG; the section includes the following specific guidelines:

- **Connection:** Bus shelters shall be connected by an accessible route such as streets, sidewalks, or pedestrian paths to an accessible boarding and alighting area
- **Ground Space:** Bus shelters shall provide a minimum clear floor or ground space entirely within the shelter
- **Surface:** Floor or ground surfaces shall be firm and stable; changes in level are not permitted
- **Dimension:** Clear floor or ground surfaces shall be a minimum of 96 inches long and 60 inches wide
- **Position:** Floor or ground space shall be positioned to accommodate a forward or parallel approach
- **Maneuvering Clearance:** Where floor or ground space is in an alcove or otherwise confined on all or part of three sides, additional maneuvering clearance shall be provided. Forward Approach: Alcoves shall be a minimum of 60 inches wide where the depth exceeds 24 inches. Parallel Approach: Alcoves shall be a minimum of 60 inches wide where the depth exceeds 15 inches.

### Bus Stop Signs

Bus route identification signs shall comply with ADAAG Sections 703.5.1 through 703.5.4, 703.5.7, and 703.5.8. Additionally, bus route identification signs shall comply with ADAAG Section 703.5.5 to the maximum extent practicable. However, bus schedules, timetables, and maps that are posted at the bus stop or bus bay do not have to comply. ADAAG bus stop sign guidelines are detailed below:

- **Finish:** Characters and their background shall have a non-glare finish and the characters shall contrast with their background
- **Case:** Characters shall be uppercase or lowercase, or a combination of both, and should be sized according to the viewing distance from which they are to be read



- **Style:** Characters shall be conventional in format; characters cannot be italic oblique, script, highly decorative, or of other unusual forms
- **Character Proportions:** Characters shall be selected from fonts where the width of the uppercase letter "O" is 55% min. and 110% max. of the height of the uppercase "I"
- **Stroke Thickness:** Stroke thickness of the uppercase letter "I" shall be 10% min. and 30% max. of the height of the character
- **Character Spacing:** Character spacing shall be measured between the two closest points of adjacent characters, excluding word spaces; spacing between individual characters shall be 10% min. and 35% max. of character height
- **Character Height:** Minimum character height shall comply with Table 703.3.5 in Chapter 7 of the ADAAG; bus stop sign characters generally fall within the 2-inch height category.

### Bus Stop Levels, Amenities & Investment

There are four levels of investment for bus stop amenities. The levels are as follows:

- **Base level stop:** Consists of a bus stop sign and concrete pad
- **Level 1 stop:** Includes seating
- **Level 2 stop:** Includes a shelter
- **Level 3 stop:** Includes an enhanced shelter

The following table describes the various amenities per level of investment.

Amenity	Base	Level 1	Level 2	Level 3
<b>Key Feature</b>	<b>Sign</b>	<b>Seating</b>	<b>Shelter</b>	<b>Enhanced Shelter</b>
Bus stop sign	•	•	•	•
Pad	•	•	•	•
Information display		•	•	•
Shade		•	•	•
Trash bin		•	•	•
Lighting		•	•	•
Seating		•	•	•
Standard bus shelter			•	•
Landscaping/planting			•	•
Safety bollards			•	•
Bike rack			•	•
Larger shelter, or other specialized features				•
Emergency call button				•

## Bus Stop Inventory

To track ridership, amenities, and recommended future investments, another essential element of a bus stop program is the effective storage of bus stop information. A thorough re-inventory of bus stop data is recommended. Data should include the total number of stops, those with and without shelters, and those that have amenities (e.g., trashcan, bench, etc.). It is recommended that the data be maintained and updated quarterly. Proper bus stop data supports effective service planning, General Transit Feed Specification (GTFS), transit route timepoints, and more. Figure 1 shows a sample bus stop inventory form <sup>1</sup>.

### Location

Stop Number: <input type="text"/>	Stop Name: <input type="text"/>	Stop Class: <input type="text" value=""/>
On Street: <input type="text"/>	At Street: <input type="text"/>	
Latitude: <input type="text"/>	Longitude: <input type="text"/>	<input type="button" value="Get GPS"/>
Routes: <input type="text"/>	Time Point: <input type="checkbox"/>	Transfer Point: <input type="checkbox"/>
Placement: <input type="text" value=""/>		
Travel Direction: <input type="text" value=""/>	Municipality: <input type="text" value=""/>	
Status: <input type="text" value=""/>	Landmark: <input type="text" value=""/>	
Location Notes: <input style="width: 100%; height: 40px;" type="text"/>		

## Transit Service Type

To inform bus stop guidelines, it is important to understand the type of service that will be provided at each stop. Transit services are designed to meet specific mobility objectives or serve distinct markets (i.e., serve commuter work trips, connect neighborhoods to local area destinations, provide communities access to urban services, etc.). For example, a route connecting a low-population rural area to urban services would likely require fewer trips to meet community needs and be expected to carry fewer passengers than a route that serves a densely populated low-income area, or a low-auto ownership urban/suburban area.

<sup>1</sup> Source: [https://www.ftis.org/ATSIM\\_User\\_Guide.pdf](https://www.ftis.org/ATSIM_User_Guide.pdf)

Traditionally, WSTA has grouped transit services into a single category of service that could be described as local bus service. However, as the system plans to expand and grow, additional service type definitions will be needed. Proposed service types, along with a brief description and definition of the service, are provided below.

Service Type	Description
<b>Dial-a-Ride (ADA)</b>	A demand-responsive system providing door-to-door transportation to patrons who request service by telephone, either on an ad hoc or subscription basis. As per federal Americans with Disabilities Act (ADA) service requirements, the service span standard, and operating days for Dial-a-Ride (ADA) service must match the region’s local fixed-route and light rail transit service area. However, the service span of the region’s Dial-a-Ride (ADA) service must meet the minimum standards within 0.75 miles of all local fixed-route and light rail transit services. Trans-AID is a local example of this type of service.
<b>Community Circulator</b>	Generally operates in neighborhoods or activity centers (i.e., central business district, historic town center, etc.) providing connectivity to local area resources/amenities, providing area circulation, or connecting to fixed local route service. Routes are typically short in length and may offer circuitous routing to provide direct connections to local area destinations. Passenger stops may be fixed by location or offered on a “flag” or “hail” basis. WSTA Route 81, which serves Hanes Mall and nearby retail employment, is an example of a circulator.
<b>Local Bus</b>	The majority of WSTA’s service is traditional fixed-route transit bus service that generally operates on arterial and local roadways. Except where there is limited development, passenger stops are typically posted at frequent intervals to maximize passenger access. WSTA operates a predominantly hub-and-spoke system that facilitates most transfers downtown at the Clark Transportation Center, with some minor outlying transfer hubs.
<b>Limited Stop</b>	Limited stop peak service generally operates on arterial roadways during peak periods with a limited or infrequent number of passenger stops. The limited stop configuration provides for increased operating speeds. This service type can be operated as an overlay service within a corridor or roadway that is served by one or more other service types. WSTA Route 96 on US 311 or Route 84 on Peters Creek Parkway have geography that may be well-suited to Limited stop service.

## Minimum Stop Spacing

Transit routes that provide local service typically have more frequent stops than limited stop services, where stops are often separated by distances of over ½ of a mile. It is important to note that the stop spacing recommendations (shown in the table below) represent minimum spacing distances, and in many cases are reflective of existing conditions. In this regard minimum refers to an absolute minimum; therefore, on Local Bus routes, the proposed standard is that local bus stops be placed, wherever possible, at a minimum of one-quarter mile intervals, recognizing that street geometry or other built environment characteristics may mean Local Bus stops are spaced just within or just beyond the quarter-mile distance. There is an exception though for key areas such as the downtown core, where demand may warrant stops being spaced at less than one-quarter-mile intervals.

Service Type	Base*
Dial-a-Ride (ADA)	NA
Community/Circulator**	¼ Mile
Local Bus	¼ Mile
Limited Stop	1 Mile

\*There can be stops spaced up to 1/8 of a mile in High-Density Areas

\*\*Some circulators may have flag stops so spacing may vary

## Spacing Optimization for Existing Bus Stops

Optimizing bus stop locations is not only essential for maintaining and improving system accessibility, but also because stop locations have capital maintenance costs and vehicle speed impacts. The stop spacing standards contained within this document categorize stop spacing by transit service type to match stop spacing to the goal of each route.

While the guidelines provide a foundation for identifying new bus stop locations, they lack parameters to optimize existing stops. As a result, a more in-depth process for optimizing bus stop locations is required.

Bus stop optimization involves a careful evaluation of the distance between existing stops and their purpose, their quality, and their effectiveness in meeting the goals of that particular route. If stops are placed too far apart, it reduces the ability of patrons to access the system, and the amount of walking required to access the system can discourage ridership. If stops are too close together, it slows down travel for those

already on the bus. Thus, stop optimization is about finding the balance between access to service and service speed.

In addition to balancing access and speed, safety, current ridership, transfer points, and site conditions are all important factors to consider throughout the optimization process.

The Bus Stop Optimization Process is depicted below in Figure 2. It starts with selecting a corridor for analysis and asking the public for input. The first level of evaluating the alignment looks at the existing stop spacing as compared to the stop spacing standard noted above. For stops that are spaced at a distance greater than twice the standard, a new stop should be inserted between the two. If stops are closer than the recommended spacing standard, stops are evaluated on whether they have a shelter and/or are transfer points. If a stop does not have a shelter and is not a transfer point, it is considered for elimination.

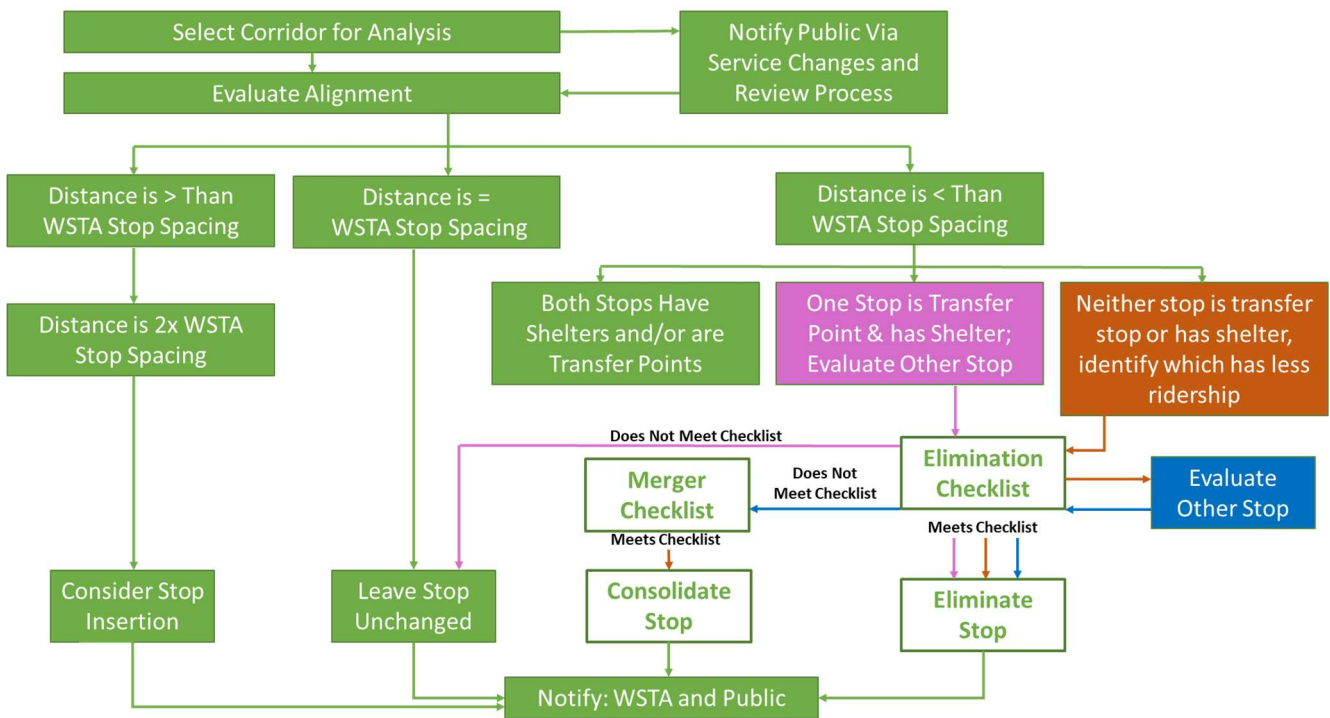


Figure 2 Bus Stop Optimization Process

The checklists on the next page can be used to qualify a stop as a candidate for either being merged with another stop or eliminated.

## Stop Elimination Checklist

A “Yes” answer to all criteria makes a stop eligible for elimination:

### Assessment

Do the remaining/adjacent stops meet spacing guidelines?

Can the remaining/adjacent stops absorb additional ridership?

Does the stop not provide direct access to connecting transit routes, or do adjacent stops provide the same connection to transit routes?

Does the stop not meet ADA guidelines and do the remaining/adjacent stops meet ADA guidelines?

Does the stop serve less than 10% of the route’s daily ridership?

Does the stop not serve key community services such as schools, hospitals, senior centers, and public service offices?

## Stop Merger Checklist

A “Yes” answer to all criteria makes a stop eligible for consolidation with another stop:

### Assessment

Does the new stop location meet ADA guidelines, or can it be reasonably modified to meet ADA guidelines?

Does the new stop location have pedestrian access?

Does the new stop location meet spacing requirements?

Will a transfer opportunity be retained at the new/consolidated stop or an adjacent stop along the line?

Do the stops under consideration for consolidation serve 20% or less of the entire route’s daily ridership?

Does the stop being considered for consolidation not serve key community services such as schools, hospitals, senior centers, and public service offices?

## Bus Stop Warrants Program

Accompanying the bus stop amenities levels of investment are general guidelines for when certain bus stop amenities are appropriate. Given the price tag and maintenance costs of enhanced bus stop amenities, it is prudent to invest in those enhanced features commensurate with demand. Under a warrants program, higher levels of amenities are recommended at stops with higher boardings.

The table below shows a proposed warrant requirement for each WSTA bus stop level.

	Base Level	Level 1	Level 2	Level 3
<b>Qualification Criteria</b>				
<b>Daily Boardings</b>	None	10 - 19	20 - 39	40+

Table 1 Proposed Stop Qualification Criteria

### Daily Passenger Boardings Counts

The bus stop warrants program is dependent on passenger boarding data. Geocoded bus stop boardings must be collected, curated, and stored daily to effectively identify where amenities are needed. Data can be collected from sources such as fareboxes and/or automatic passenger counters. Both the fareboxes and APCs must be able to track the location of the boarding as well as the time of boarding. If these resources are not available, a weeklong in-person on-board counting effort is suggested, with the observations happening during the peak ridership times of the day.

## Applying the Bus Amenity Guidelines

Bus stop amenities help foster good customer service. Ensuring proper care for existing stops and effective planning for future stops will enhance the user experience, as well as retain and potentially attract new riders. The following is a proposed process for how implementing the guidelines, in two stages. Stage 1 is the initial implementation and refinement of the guidelines. Stage 2 is for continuous implementation and refinement.

### Stage 1

1. WSDOT and WSTA staff should perform a thorough bus stop database update. The purpose of the update is to ensure that all stops have been accounted for, that non-existent stops are purged from the system, and that amenities and completeness of ADA compliance for each stop are documented. At a minimum,



the database should yield a new list of active bus stops in the WSTA system, amenities at each stop, X/Y (or latitude and longitude) coordinates, the date most recently inspected, and a Yes/No status for ADA compliance.

2. Due to the limited number of automatic passenger counter (APC) equipped vehicles, WSDOT will develop an APC rotation schedule. The APC rotation schedule will be set for the weeks of April and October. During those months, batches of routes will be deployed with 100 percent working APC-equipped vehicles to capture ridership data.
3. Data will be collected and collated by WSTA staff. Average ridership for each stop on weekdays, Saturdays, and Sundays should be appended to the bus stop database.
4. Analysis of bus stop boarding data from 2020 and 2021 shows that in a database of 1,046 stops:
  - a. **50% of WSTA weekday boardings occur at only 18 stops** that have 40 or more daily boardings. (Level 3 Stops)
  - b. **Another 13% of WSTA weekday boardings occur at only 38 stops** that each have 20 to 39 daily boardings. (Level 2 Stops)
  - c. **The next 14% of WSTA weekday boardings occur at 88 stops** that each have 10 to 19 boardings. (Level 1 Stops)
5. Using this data, which can be found in the Appendix, WSDOT staff, can put these 144 stops into an investment program that would ensure that 77% of people boarding WSTA each weekday would have a bench to sit on while they wait for the bus, and that 63% of people boarding would have a shelter as well. A follow-up check of Saturday and Sunday found four other stops that have over 20 daily boardings that can be added to this list for prioritization. They should also be included in the priority list.

## Stage 2

1. With this initial assessment complete, WSDOT and WSTA staff should conduct an ongoing calibration of this priority list and database.

2. WSDOT and WSTA should focus on improving Level 3 and Level 2 stops first to have the maximum impact on the customer experience. As service changes are made to increase ridership, new stops may emerge in Level 1 and Level 2. Conducting the analysis in the Appendix once every six months will ensure that staff detect stops that are rising in use among passengers that can be prioritized for investment.

## Additional Considerations

Throughout the progress of implementing the bus stop warrants and guidelines, the following considerations are recommended.

### **Periodic Evaluation of Program**

The WSTA bus stop program introduces new procedures and requirements. The warrants program and application process should be evaluated after the first round of applications and approvals to assess whether the warrants program and the application procedure meet the needs of Winston-Salem residents effectively and efficiently. Periodic updates to the program are recommended if the program is not meeting the needs of area residents.

### **Automated Tracking/Inventory Update Process**

The application process for bus stop funding will collect a great deal of information about area bus stops and the type of amenities provided at those bus stops. An automated method to import this information into the regional bus stop inventory would provide a valuable means of keeping track of bus stop amenities around the city.

### **Regional Bus Stop Database Maintenance**

The responsibility of maintaining the bus stop inventory database is currently held by the City of Winston-Salem Department of Transportation. Given the growing importance of transit in and around the city, the database should be maintained and augmented frequently, especially with bus stop boarding data.

# Appendix 1 – Bus Stop Design Guidelines

## Bus Stop Design Guidelines

The ideal bus stop design meets the transit users' needs for safe, efficient access to the transit system while acknowledging the context of the adjacent neighborhood. This set of guidelines provides standards for bus stop implementation throughout the City of Winston-Salem. The guidelines address site selection, accessibility requirements, bus stop amenities, information and signage, and other considerations that go into designing a bus stop. The guidelines detail requirements under the Americans with Disabilities Act (ADA) and/or suggest best practices. Best practices are not legal requirements; but, by adopting best practices, WSTA may be able to avoid costly retrofits that result from pursuing only required minimums.

### Site Selection

To provide the greatest convenience and safety for passengers, bus stops are generally located as close to intersections as possible. This minimizes walking distance for transferring passengers and encourages the use of sidewalks for bus stop access.

#### Best Practices

Transit stops are generally located 85 feet, plus or minus 25 feet, from the curb of an unsignalized intersection, measured from the tangent point of the intersection curve, and 120 feet, plus or minus 25 feet, from a signalized intersection. Exceptions may be made for a given location based on right-of-way availability and traffic conditions. The paved passenger loading area should be clear of any obstructions.

- Bus stops should be located such that:
- The bus driver can easily see passengers waiting at the stop.
- Waiting passengers have a clear view of the oncoming bus.
- Driveways are located away from a transit pad. If that is not possible, the pad should be located at least 8 feet behind the face of the curb to allow better site visibility for automobiles using nearby driveways and to enhance the comfort and safety of waiting bus passengers. The figure below shows examples of acceptable driveway arrangements.

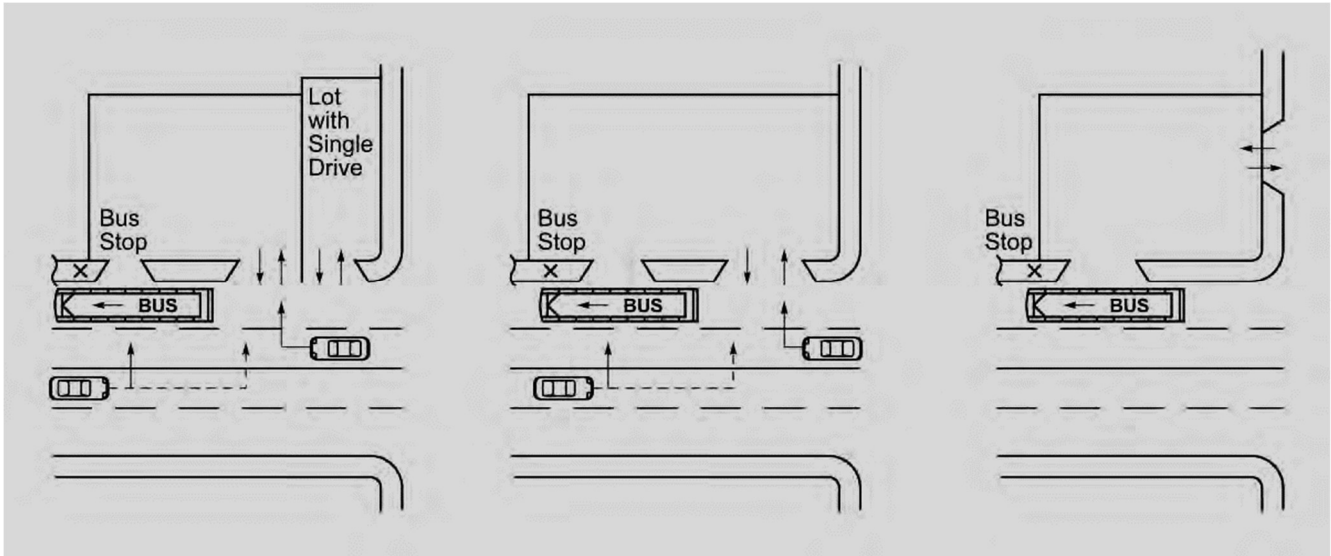


Figure 3 Acceptable Driveway Arrangements

## Additional Considerations

Where possible, transit stops should be located on the far side of a signalized intersection, as shown in the figure below. Benefits to a far-side stop include:

- A stopped bus does not conflict with vehicles turning right from the direction of the bus route.
- The stopped bus does not obscure the sight distance to the left for vehicles entering or crossing from the side street.
- At signalized intersections, buses can easily re-enter traffic.
- The stopped bus does not obscure traffic control devices or pedestrian movements at the intersection.

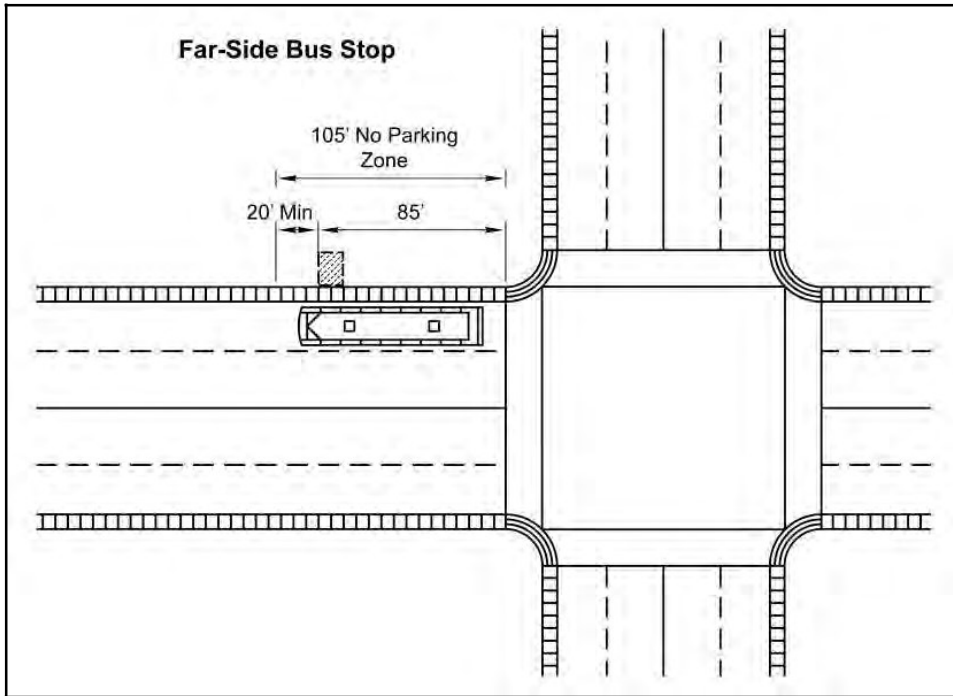


Figure 4 Location of Far Side Bus Stop

While far-side stops are the preferred location for transit stops, mid-block stops, located as shown in the figure below, may be used as necessary to accommodate high-demand locations.

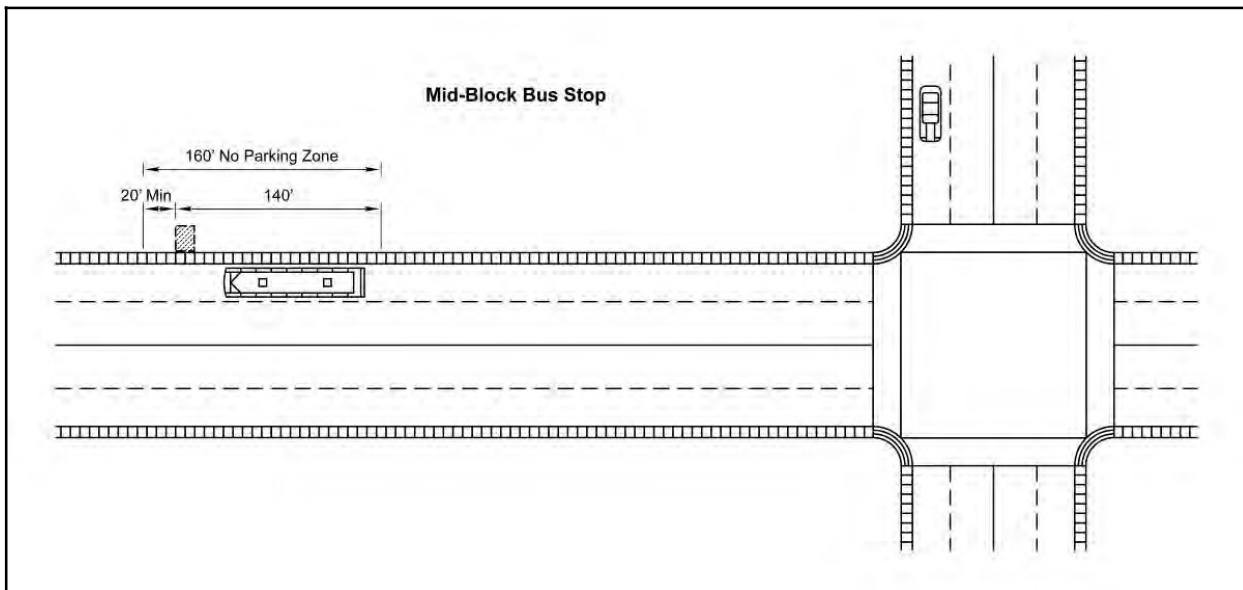


Figure 5 Location of Mid-Block Bus Stop

At intersections where far-side stops are not ideal, near-side stops (see figure below) may be considered if site conditions indicate it to be the preferable option. Near-side stops for alighting only (no seating or shade) should be considered at transfer locations.

The frequency of bus stops is dictated by the distance bus patrons are willing to walk to board a bus, which can vary based on local conditions and land uses. The standard for bus stop locations is at quarter-mile intervals for residential areas and one-eighth-mile intervals for major activity centers. More frequent stops can be located as needed.

Bus stops with heavy transfer activity between routes should be located to minimize the need for passengers to cross a street to transfer to another route. Where this is not possible, the lead agency should work with public works officials on associated pedestrian improvements that will increase accessibility and safety for transit riders transferring from one route to another.

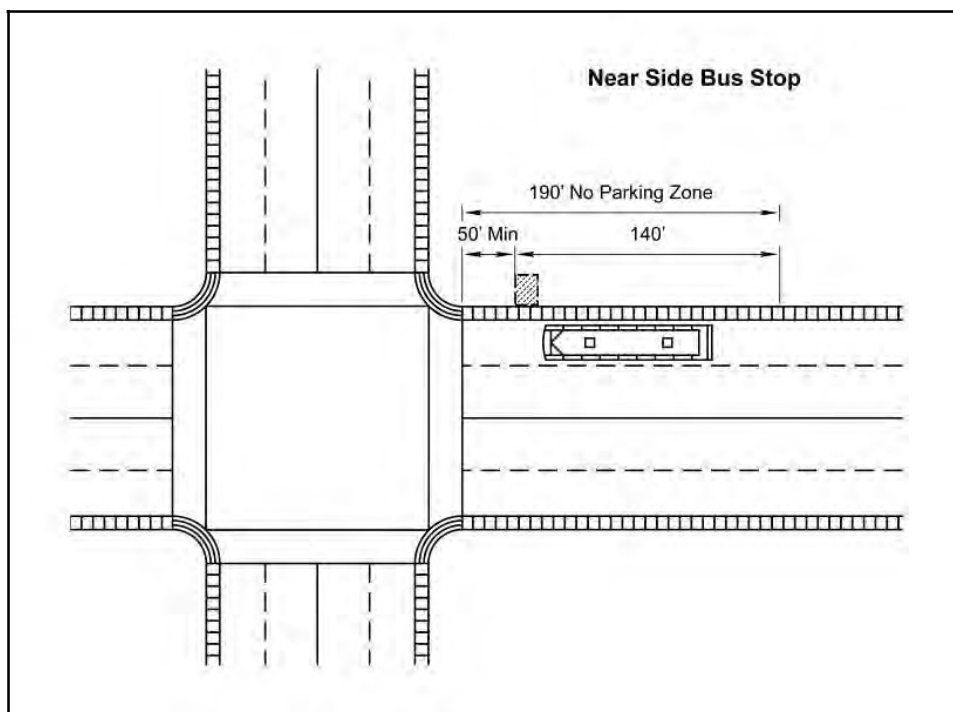


Figure 6 Location of Near-Side Bus Stop

## Accessibility

All transit facilities constructed after June 1992 must comply with the applicable provisions of the Americans with Disabilities Act (ADA). Improvements to existing bus stops are not required to meet ADA standards, but wherever possible, upgrading to ADA standards should be pursued.

Fully ADA-compliant stops meet the minimum requirements detailed in these guidelines. Non-accessible stops are those that breach major components of the accessibility

criteria, especially concerning roadside conditions or the waiting pad. The city may place a basic sign/post until ADA requirements can be met.

In addition to meeting ADA requirements, good accessibility includes consideration of connectivity between adjacent neighborhoods and the transit stop. Pedestrian access paths should link developments directly to the bus stop. Walled developments should provide convenient and direct pedestrian access to adjacent bus stops.

### Minimum Requirements

ADA requirements dictate a minimum sidewalk width of 5 feet for any location. A minimum horizontal clearance of 36 inches is to be maintained between bus stop components to allow wheelchairs to maneuver. A minimum clear length of 96 inches (measured parallel to the roadway) shall be provided at transit locations where a lift or ramp is to be deployed. The figure below shows these minimum requirements and the circulation within the stop.

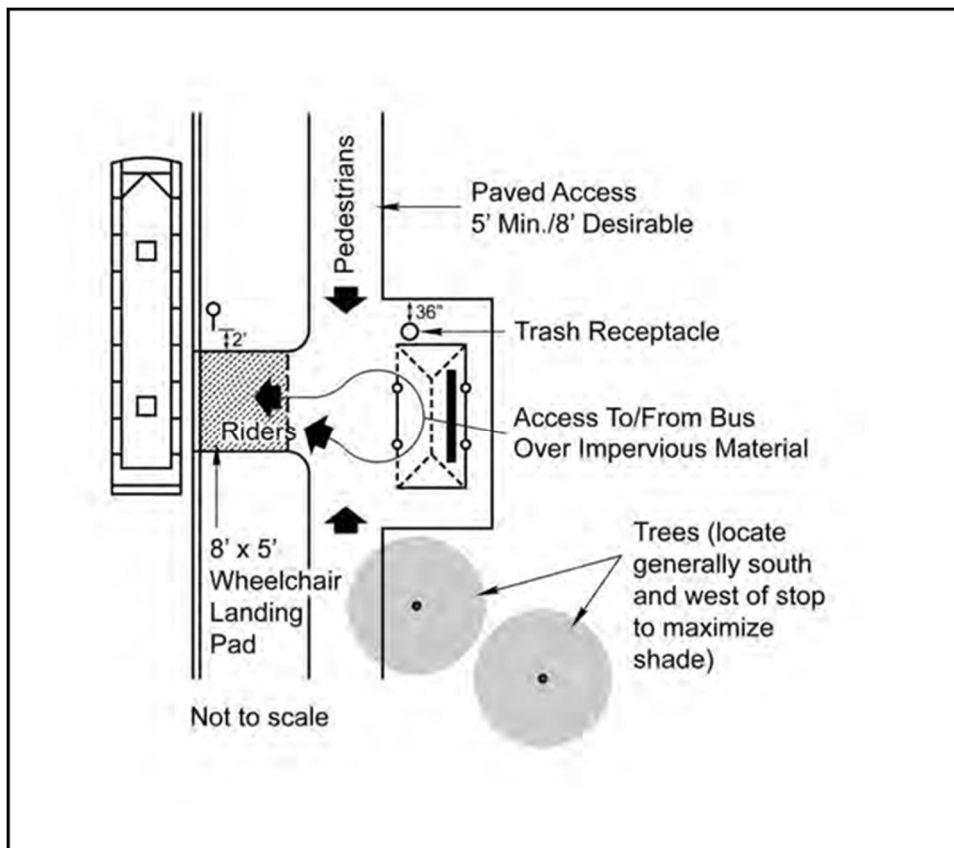


Figure 7 Minimum Requirements at Transit Stop



## Best Practices and Additional Considerations

Although ADA requirements dictate a minimum sidewalk width of 5 feet, an 8-foot wide sidewalk is desirable. Bus stops should ideally be located near existing crosswalks to encourage safe pedestrian crossings and located so that a stopped bus will neither block a crosswalk nor obstruct pedestrian visibility of oncoming traffic and vice-versa.

## Bus Stop Pad

Transit passengers should have a continuous, unobstructed area contiguous to the curb for boarding and alighting from a bus. This area is called the “landing area” or “pad.” The dimensions of a bus stop pad are critical in providing proper ADA accessibility.

### Minimum Requirements

The minimum clear area per ADA requirements is 8 feet (measured from the curb) by 5 feet (measured parallel to the curb). Abrupt changes in grade should be avoided. Any drop greater than 0.5-inch or surface grade steeper than 1:20 requires an ADA-compliant ramp.

### Best Practices and Additional Considerations

While ADA requirements stipulate an 8-foot by 5-foot pad, WSTA recommends that the pad be eight-by-eight to allow a bus operator to more easily position a wheelchair ramp. It is recommended, although not required, that bus stops in areas with sidewalks less than 8 feet wide or with sidewalks separated from the curb be upgraded to meet the minimum clear area per city standard where possible.

Since different bus designs have doors that open to different places on the pad, the size of the pad can vary depending on the type of bus that serves the stop. Vehicle size and configuration of both existing buses in the fleet as well as accommodations for future buses must be taken into consideration to ensure safe and efficient access for passengers. To provide for rear-door alighting from larger buses, the landing area should be at least 30 feet long for stops served by 40-foot buses.

Surfaces should be stable, firm, and slip resistant. Such provisions are beneficial for all transit users, but especially for those who have disabilities. Tactile surface treatments are suggested as needed to help visually impaired riders navigate the bus stop.

## Seating

Seating provided at a transit stop should be commensurate with the level of use at a stop (as determined by the local jurisdiction), located in such a way to meet all ADA requirements, and made from durable, climate-appropriate materials.

### Minimum Requirements

There must be 36 inches of clearance between bus stop amenities and switch boxes, mailboxes, utility boxes, light poles, and other obstructions to allow access and maintenance.

### Best Practices

If possible, bus stop furniture must be placed outside the standard 5-foot sidewalk or clear area. An 8-foot clear area, free from other site furnishings, is preferred.

Benches should have a depth between 20 and 24 inches, be at least 42 inches in length, and have back support of at least 42 inches beginning at a height between 2 inches and 18 inches above the seat. Back support may be achieved through locating benches adjacent to walls or by other designs that will meet the minimum dimensions specified.

Bench seats should be between 17 and 19 inches above the ground.

For ease of cleaning and to prevent debris from collecting, it is recommended that all furniture be 36 inches or greater from the face of a building or wall.

Armrests on benches are recommended. The structural strength of the benches should be such that they can support at a minimum a vertical or horizontal point load at any given point on the surface, fastener, or mounting device.

Transit stop furniture over 2.5 feet high should be located to provide clear visibility of the street for automobile drivers in nearby driveways. The figures below show general site layouts with minimum and desirable clearances.

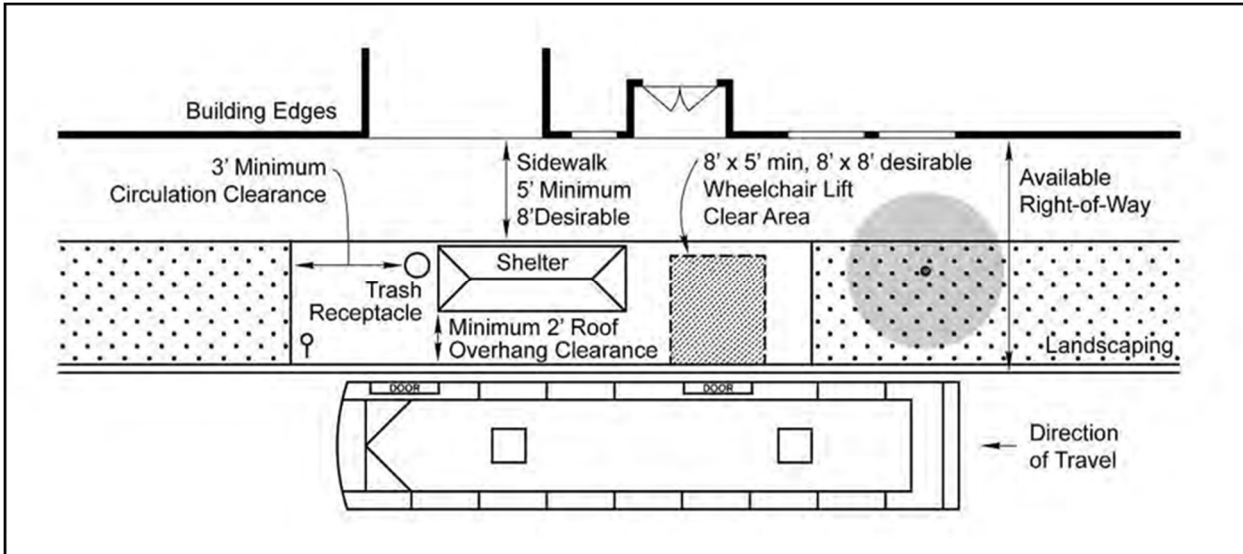


Figure 8 General Site Layout with Minimum and Suggested Clearances

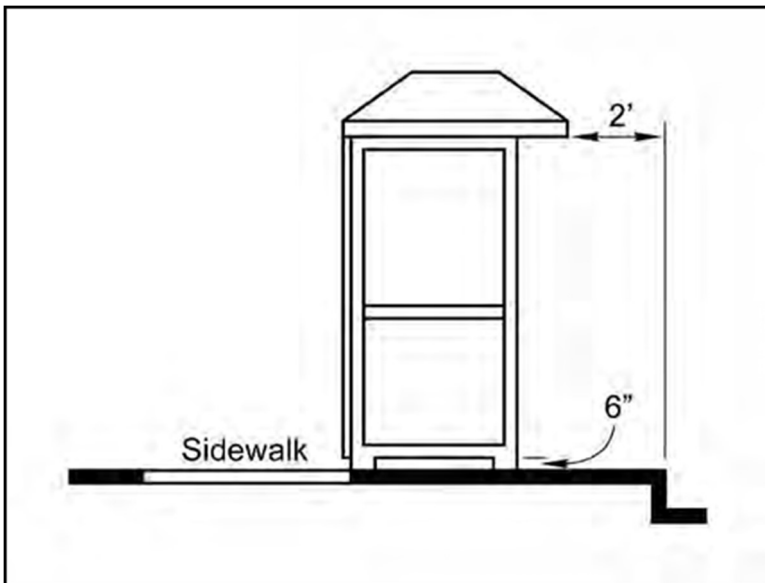


Figure 9 Shelter Placement

### Additional Considerations

Factors that should be considered include the following:

- Materials and structure should be chosen for strength, durability, ease of maintenance, and resistance to weather conditions, graffiti, cutting, fire, and other forms of vandalism.
- Materials should allow air circulation and avoid retention of hot air. Materials should be finished to prevent overheating. (Possibilities include the use of

perforated metal and special coating/paint finishes to prevent surfaces from becoming hot.)

- Design and colors should respond to the architectural character of transit furniture in the area and adjacent development.
- Furniture should be readily replaceable and constructed for easy relocation to allow for bus route changes, street improvement projects, etc. Furniture should be anchored to prevent theft or other unauthorized movement.

## Shelter and Shade

Protection from the summer sun is a high priority in designing transit furniture and its associated landscaping. Transit shelters that provide weather protection and benches work best in conjunction with landscaping or vertical panels for shade. East- and west-facing shelters benefit when seating can be located on both sides of a shade element. The shelter provides overhead protection from weather conditions.

Shelters should be oriented to allow the bus driver to view waiting riders so that waiting passengers can see oncoming transit vehicles. In addition, waiting passengers feel safer when they can easily see their surrounding environment, including other pedestrians. Ideally, the final 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.

### Minimum Requirements

ADA regulations require a clear space of 30 inches by 48 inches within the shelter for people in wheelchairs.

### Best Practices

Shelter materials and design should:

- Be waterproof with provisions for drainage away from transit passengers and bus loading area.
- Be insulated so as not to collect and radiate heat.
- Allow maximum security for passengers.
- Keep a minimum 6-inch vertical clearance from the sidewalk to avoid the collection of trash and debris.
- Display a 24-hour telephone number for emergency repairs.

The location of the curb and sidewalk and the amount of available right-of-way can be determining factors for locating a bus stop shelter.

- Bus stop shelters should not be placed on the wheelchair landing pad.
- General ADA mobility clearance guidelines should be followed throughout the shelter and between the shelter and other street furniture.
- Shelters located directly on the sidewalk or overhanging a sidewalk should be avoided because they may block or restrict general pedestrian traffic.
- To permit clear passage of the bus and its side mirror, a minimum distance of 2 feet should be maintained between the back of curb and the roof or panels of the shelter. Greater distances are preferred to separate waiting passengers from nearby vehicular traffic.
- The shelter should be located as close as possible to the far end of the bus stop zone, so it is highly visible to approaching buses and passing traffic, and to minimize the walking distance from the shelter to the bus.
- Locating bus stop shelters in front of store windows should be avoided when possible, so as not to interfere with advertisements and displays.
- When shelters are directly adjacent to a building, a 12-inch clear space should be preserved to permit trash removal or cleaning of the shelter.

## 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 should provide illumination of pedestrian walkways and eliminate shadow areas to increase the transit user's sense of safety. To address security concerns directly, call boxes may be installed (see Section 11).

### Best Practices

For passenger comfort and convenience, a minimum lighting level of two foot-candles is desired throughout the bus stop area, including the shelter.

Where feasible, bus stops should be located so they will be illuminated by existing streetlights. Where there are no existing streetlights, stops can be lit by backlighting

from advertising installed at bus shelters as well as “stop call” lighting, which is activated by a waiting passenger and serves as a signal to approaching buses that a passenger is waiting. Interior lighting is recommended for shelters. When new lighting is to be installed, solar technology should be explored as an alternative to hardwiring.

## Information and Signage

The placement of bus stop signs is an important tool for transit systems to enhance passenger convenience, operations, and marketing. Bus stop signs are positioned to notify passengers that the bus will stop at that specific location. They serve as a reference for bus operators and as a point of identity for the transit system. WSTA branding elements should be included at all stops and will be identified in project agreement forms.

A WSTA bus stop sign, shown in the figure below, is currently in use throughout Winston-Salem. The sign is ## inches wide by ## inches high, reflectorized for nighttime visibility, it has various ways to obtain traveler information, reach customer service, and the routes serving that stop.



Figure 10 WSTA Bus Stop Sign

## Best Practices

### Bus Stop Sign Placement

Bus stop signs must be placed near where passengers board at the front of the bus.

The header sign is the point at which the front of the bus should be aligned when the bus is servicing passengers and thus should be placed approximately 1 foot beyond the far side of the landing area for stops served by front-lift buses.

A sign should be installed with a signpost, at an angle perpendicular to the street. A non-wood light pole may be used if it is at the proper stop location and if the sign face is visible from both sides. Signs are not to be placed on wooden utility poles as they pose a hazard to linemen who climb the poles.

Bus stop signs should be placed independently of all other signs to maintain the importance and uniformity of the bus stop identity. The sign must be easily visible to the approaching bus driver, ideally within 4 feet of the edge of the street. The bus stop sign should neither block nor be blocked by other jurisdictional signs.

To prevent the sign from being struck by the bus mirrors, it must be positioned no closer than 2 feet from the back of the curb, as shown in the figure below. The bottom edge of the sign should be positioned at a height of at least 7 feet from the ground.

A signed no parking zone of 105 feet from the intersection should be maintained, and no parking is permitted at the bus stop itself. The no-parking zone may be extended from the stop at the discretion of the jurisdiction.

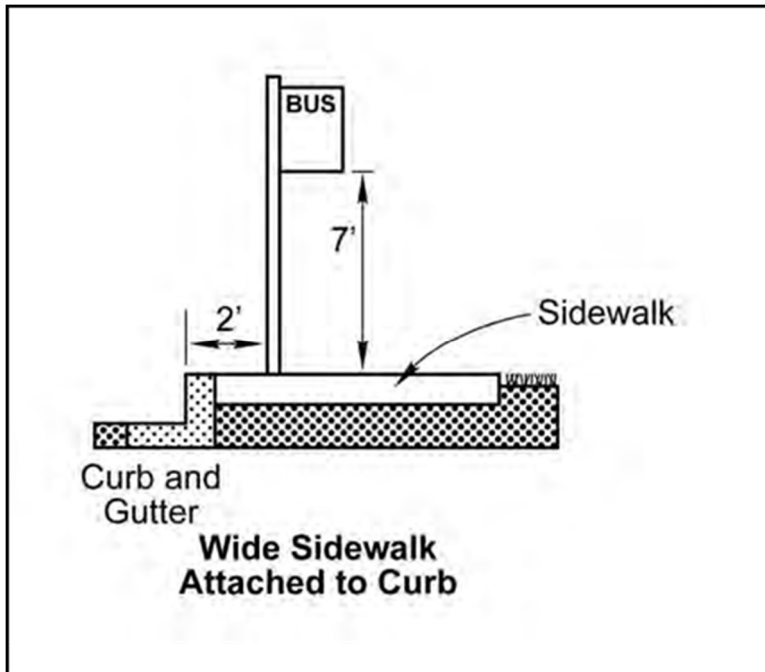


Figure 11 Sign Pole Location

### Design

A sign pole should include standard regional bus stop graphics visible from two directions. The sign pole may also include a transit information holder. (A standardized size will allow information sheets to be produced economically.) An information holder is not required, but if one is placed it must meet ADA placement standards. The figure below shows the possible sign and pole configurations to place an ADA-compliant information holder; bus stop signs should maintain a seven-foot clearance from the ground.

### Information display

Interior panels of shelters also can be used 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. Shelters that lack side panels can display route and schedule information on the interior roof of the shelter.

Some recommendations for route or patron information display 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.
- Follow ADA clearance, mobility, and visual guidelines for access to information by individuals with impairments.

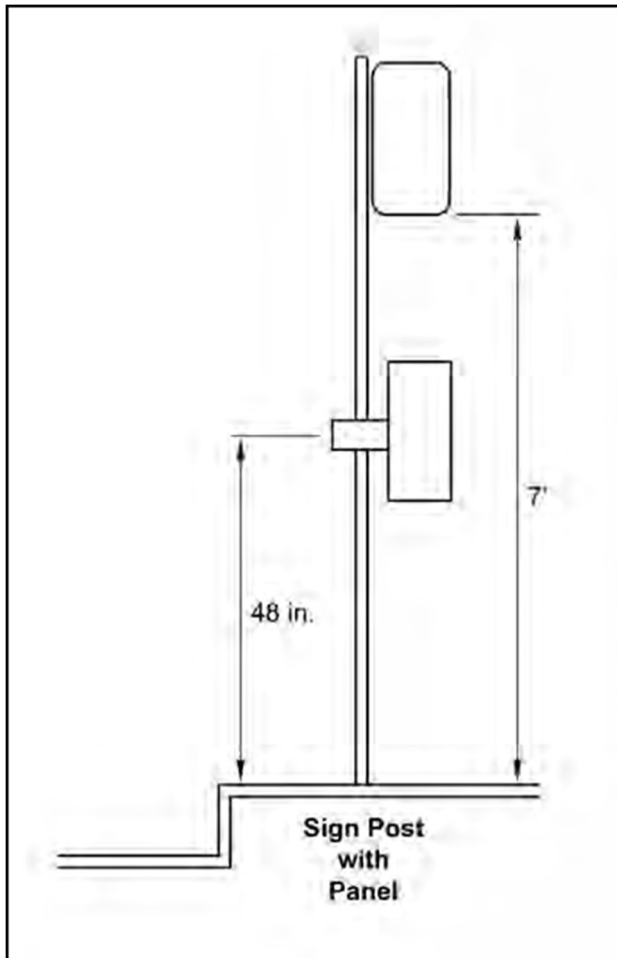


Figure 12 Sign Pole with Information Holder

## Trash Receptacle

Trash receptacles can improve the appearance of a bus stop by providing a place to dispose of trash. Low user volumes may not justify the inclusion of this amenity at a bus stop; however, an ongoing litter problem at a bus stop may warrant the provision of a trash receptacle at an otherwise low-volume location.

Trash cans should be positioned to encourage use by waiting for passengers without blocking wheelchair or pedestrian access to the landing pad, bus, shelter, sidewalk, or information case. It is recommended that the trash receptacle be placed near the

boarding area of the bus to encourage patrons to dispose of trash as they board. At bus stops where shelters are installed, the trash receptacle should ideally be positioned to the immediate right or left of the shelter (although sidewalk conditions and right-of-way limitations may prevent this).

## Best Practices

The trash receptacle should have:

- A minimum capacity of 30 gallons
- Fixed components to prevent unauthorized removal
- Materials that allow for air circulation and avoid containment of hot air
- Materials that are finished to prevent overheating

When installing a trash receptacle:

- Anchor the receptacle securely to the ground to reduce unauthorized movement.
- Locate the receptacle away from wheelchair landing pad areas and allow for at least a 3-foot separation from other street furniture. If recycling is also placed adjacent to the trash receptacle, the same circulation requirements apply.
- Locate the receptacle at least 2 feet from the back of the curb.
- Ensure that the receptacle, when adjacent to the roadway, does not visually obstruct nearby driveways or land uses.
- Avoid installing receptacles that have ledges or other design features that permit liquids to pool or remain near the receptacle—this may attract insects.
- Avoid locating the receptacle in direct sunlight.

## Landscaping

Landscaping can enhance the level of passenger comfort and attractiveness of transit but should be positioned and maintained such that safety, visibility, and accessibility are not compromised by encroaching bushes, uneven grass surfaces, etc.

A landscape plan should incorporate shade trees for bus stops, maximizing shading for summer morning and afternoon hours. Any landscaping provided should be located so as not to obstruct the shelter canopy or visibility of the bus stop.

## Best Practices

Shade trees and other protective landscaping should be provided wherever possible within the bus stop easement. This landscaping could be considered part of the development's frontage landscape and could count toward any landscaping requirements that may apply. Considerations for selection and location of landscaping include:

- Mature trees with adequate canopy to shade the seating area
- Low-water consumption trees and shrubs
- Tree location should consider the solar orientation of the transit stop. (Priority should be given to shading afternoon summer sun.)
- Transit landscaping should be compatible with other frontage landscaping.

Tree branches that extend into the roadway below 11 feet should be trimmed back at least 2 feet from the curb otherwise they become an obstacle that the bus driver may not be able to avoid. Grass should not be planted between the sidewalk and the curb at bus boarding and alighting areas (to meet ADA requirements, at least 8 feet parallel to the street and 5 feet perpendicular to the street must be hard surface).

## Bicycle Accommodation

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 to bus facilities or on an adjacent property. Proper storage of bicycles can reduce the amount of visual clutter at a stop by confining bikes to one area. The provision of bicycle facilities is discretionary. WSTA must evaluate bicycle usage at each location, as well as user requests.

## Best Practices

Bicycle riders need security, damage prevention, and convenience. Bicycle racks and lockers at bus stops must also have a compact design and ease of maintenance.

- Good bicycle storage facilities will do the following:
- Provide the ability to lock the frame and at least one wheel. Devices that lock the front wheel only cause security problems for bicycles with "quick release" wheels.
- Support the bicycle without pinching or bending the wheel.
- Avoid scratching the paint on the bicycle frame.

- Provide a place to lean a bicycle while locking it.
- Provide a quick, easy-to-identify locking procedure.

Inverted “U” rack elements mounted in a row should be placed on 30-inch centers. This allows enough room for two bicycles to be secured to each rack element. Normally, the handlebar and seat heights will allow two bicycles to line up side-by-side if one of them is reversed. When there is a conflict, the bikes can be placed slightly offset from one another as shown. If the elements are placed too close together, it becomes difficult to attach two bikes to the same element.

Wave style racks are not recommended. Bicyclists commonly use a “wave” rack as if it were a single inverted “U.” This limits the actual capacity of the rack to two bikes regardless of the potential or stated capacity. Bicycles parked perpendicular to a wave rack (as intended by the manufacturer) are not supported in two places and are more likely to fall over in the rack. The advertised capacity of a wave rack is usually much higher than the practical capacity.

Potential types of bicycle racks are shown in the figure below.

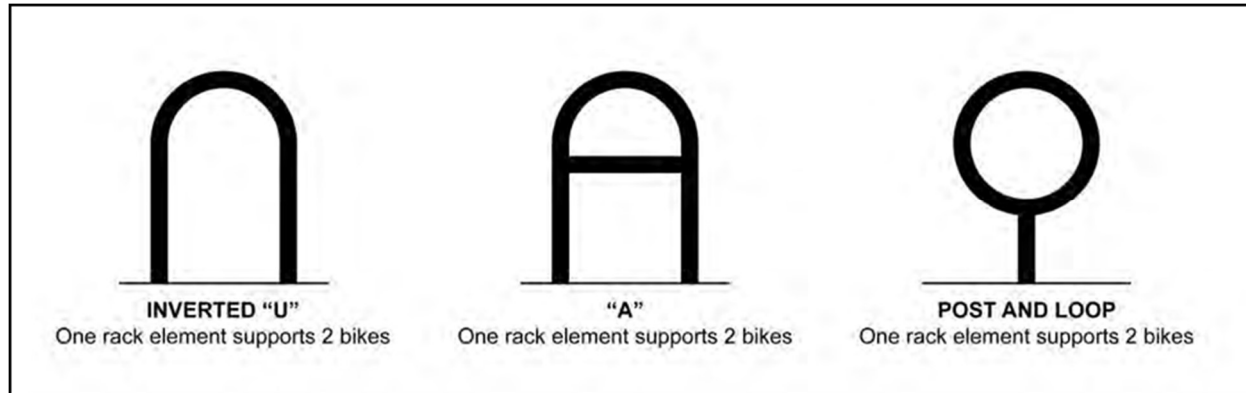


Figure 13 Bicycle Rack Styles

## Placement and Site Layout

Placement of bicycle facilities is important to meet ADA requirements and to provide a facility that bicyclists will use. If it is too inconvenient and time-consuming to squeeze a bike into the space and attach a lock, a cyclist will look for an alternative place to park or use one rack element per bike and reduce the projected parking capacity. If the space is too narrow, a mountain bicycle will not fit. At the same time, minimal space usage can be critical in the limited right of way available at bus stops.

The following should be kept in mind when integrating bicycle facilities at bus stops:

- Bicycle racks may not block pedestrian access to the bus boarding and alighting area.
- Maintain minimum 36-inch clearance between rack and other stop furniture per ADA standards.
- Provide at least 30-inch spacing between bicycle parking spaces.
- Allow at least 72 inches perpendicular to the bike rack for the bike, and at least 48 inches around the bike for access and circulation, as shown in the figure below.
- Coordinate the location of the storage area with existing on-site lighting.
- Do not locate the storage area where views into the area are restricted by the shelter, landscaping, or existing site elements, such as walls.

The figure below shows proper bicycle parking facility spacing.

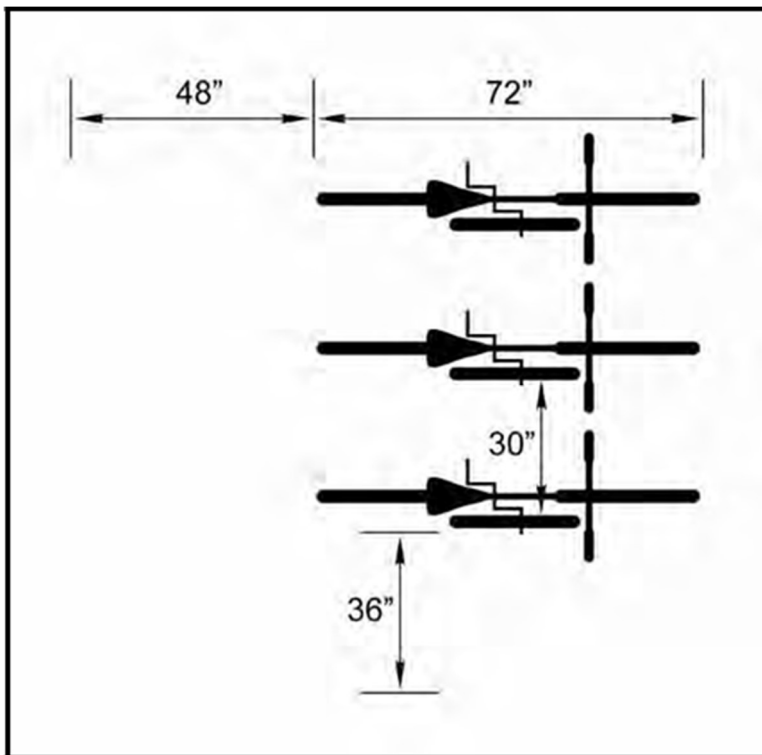


Figure 14 Bicycle Rack Clearances

### Additional Considerations

Other considerations regarding bicycle facilities include the following:

- Bicycle rack design should not trap debris.
- Design and placement should complement other transit furniture at the bus stop.
- Finishes should be graffiti resistant. Where applicable, the device should be coated to eliminate scratching of the bicycle frame.

- A bicycle rack should be easy to install but difficult to steal.
- Artistic bike racks can be used if they meet all minimum requirements.
- To the extent feasible, bus stops should be located so they do not block bicycle travel lanes.

## Call Boxes

Call boxes link the transit user to emergency personnel and increase the user's sense of safety at an isolated stop.

### Best Practices

Call boxes should be provided at stops where safety concerns have been raised, or where there is high nighttime usage. They must be kept in working order, even if they are rarely used, and must be accessible to persons with disabilities.

### Additional Considerations

Potential partnering opportunities exist where stops are located on college and office campuses where the college or firm may have a call box/panic button system in place. The bus stop location could be tied into the existing system.

## Advertising

WSTA currently sells advertising opportunities on the outside and inside of its vehicles through a partnership with Streetlevel Media. If WSTA chose to initiate an advertising program within its shelters, a private company might agree to purchase, install, light, clean, and maintain shelters. The company would lease advertising space in these shelters. Some shelter advertising programs also return a portion of the advertising revenue to the local community. As shelter advertising programs are not common at North Carolina transit agencies, WSDOT should consider putting out a Request For Information (RFI) to discern what level of interest private advertising companies may have in bus shelter advertising in Winston-Salem.

## Artistic Elements

Artistic and aesthetic elements may be incorporated into transit furniture design as part of a streetscape effort to enhance the urban environment. Customized or artistically designed bus stops can make waiting for a bus more pleasant. Innovative designs may also help provide a covered shelter or seating (e.g., flip-seats or awnings) for passengers

at locations that do not have sufficient space. However, custom-designed passenger waiting areas should not obscure the identification of the bus stop. Transit agency bus stop signs and schedule displays should be available at these types of bus stops. The functionality of the stop should not be compromised in the name of art—the stop should provide as much patron comfort, safety, and security as possible. Artist-designed stops must meet all applicable standards. WSTA does not provide funding for the additional cost of artistic stops.

Neighborhood or business interests may also want the shelters and bus stop signs to reflect the character of the district. One method is to develop a distinct color or logo for each neighborhood or route group. This can be implemented by the transit agency with appropriate coordination and participation from the neighborhoods.

## Maintenance

Well-maintained bus stops are crucial to the image of the transit system. Damaged furniture should be repaired and trash build-up tended to immediately to maintain a respectful waiting environment for transit patrons and the general public.

A routine maintenance schedule is to be determined by WSTA and can include:

- Full wash-down of shelter and accessories
- Removal of all dirt, graffiti, and pasted material
- Squeegee wipe-down of glass surfaces
- Removing and replacing trash bag
- Litter pick-up around stop or shelter/accessories to a distance of 10 feet
- Manual or chemical weeding
- Pruning obstructed tree growth
- Touching up paint scratches

Items that pose a safety problem should be repaired promptly or at least within 24 business hours of being reported. Repairs that do not pose safety problems should be completed within three days. Occasional night illumination checks are recommended to verify lighting levels and replace bulbs and ballasts.

## Adopt-a-Stop

WSTA may consider a program by which bus stops may be “adopted” by individuals or organizations, much in the same way highways are adopted. The adoptive entity is then

publicly recognized through an identification nameplate or signage affixed to the shelter or bus stop sign pole. An example of suggested wording for this plate or sign is “City of Winston-Salem Bus Stop #154, Adopted by John Doe Associates.”

“Adopted” bus stops are cleaned by the adoptive entity or funded by the adoptive entity while still cleaned by the city. Stops with or without shelters may be adopted.

## Integrating Bus Stop Facilities and Development

Land development and re-development provide an opportunity for enhancing transit infrastructure. Good development practices include providing bus stop right-of-way and/or amenities and creating good pedestrian to and from bus stops. Having discussions about bus stop access early in the development approval process will ensure that bus stop infrastructure and connectivity are considered at a time when changes can still be incorporated into site plans. To ensure optimum bus stop placement, coordination between WSTA, the City’s land use planning staff, and the developer should occur during the planning and development phase.

### Bus Stop Infrastructure

When development is constructed adjacent to an existing or planned bus stop location, if provided for in local zoning regulations, the developer should be responsible for providing all or part of WSTA-designated passenger amenities conforming to these Design Guidelines. Generally speaking, if the value of a development is \$500,000 or more, the developer should provide a shelter in addition to the general site design requirement. Developers are encouraged to place shelters that conform to local standards for passenger recognition and ease of maintenance.

### Pedestrian Access

Sidewalk placement that is coordinated with land use and bus stop locations is critical to encouraging transit use, enhancing safety, and reducing walking time. Ideally, transit patrons should not have to travel more than ¼-mile to reach a bus stop. This ideal distance, which equates to a walk of roughly ten minutes, can be achieved by connecting destinations with well-constructed walkways and/or by designing site layouts with pedestrian access in mind. As with any pedestrian improvement, strict adherence to



mobility clearances, widths, and slopes should be followed to improve access for persons with disabilities.

## Pathway Design

Pedestrian improvements include defined or designated walkways through parking lots and openings or gates through walls. Access ways can be as elaborate as a landscaped sidewalk through the parking lot or as simple as painted walkways that caution drivers and orient pedestrians. New residential developments should consider constructing breaks in walls between properties to allow pedestrian passageway to bus stops. Alternatively, in place of open breaks, development may have locked pedestrian gates for which every resident has a key.

## Site Layout

Another strategy to improve pedestrian access at or to bus stops is to orient the site layout with the explicit goal of minimizing distances to bus stops. Pedestrian and transit user access to buildings is encouraged by locating buildings at the minimum setback at arterial-to-arterial intersections and arterial-to-collector intersections, or where transit service is provided or planned (all arterial and collector streets). Main entrances to commercial buildings should face the street, with pedestrian bus stop access pathways protected from automobile traffic. Ideally, pedestrians should be able to access the street without crossing a large parking lot. Another solution is to “flip” the traditional commercial layout, so that buildings are closer to sidewalks and parking is placed in the rear and sides. Driveways should not be located within a bus stop and/or pullout area.

When a bus stop is located adjacent to a shopping center, collaboration with WSTA is encouraged to locate shopping cart storage near the bus stop, thus providing a convenient place for customers using transit to return their carts. (The storage location would be installed and maintained by the shopping center.)

The figure below shows an example of desirable access to an adjacent development.

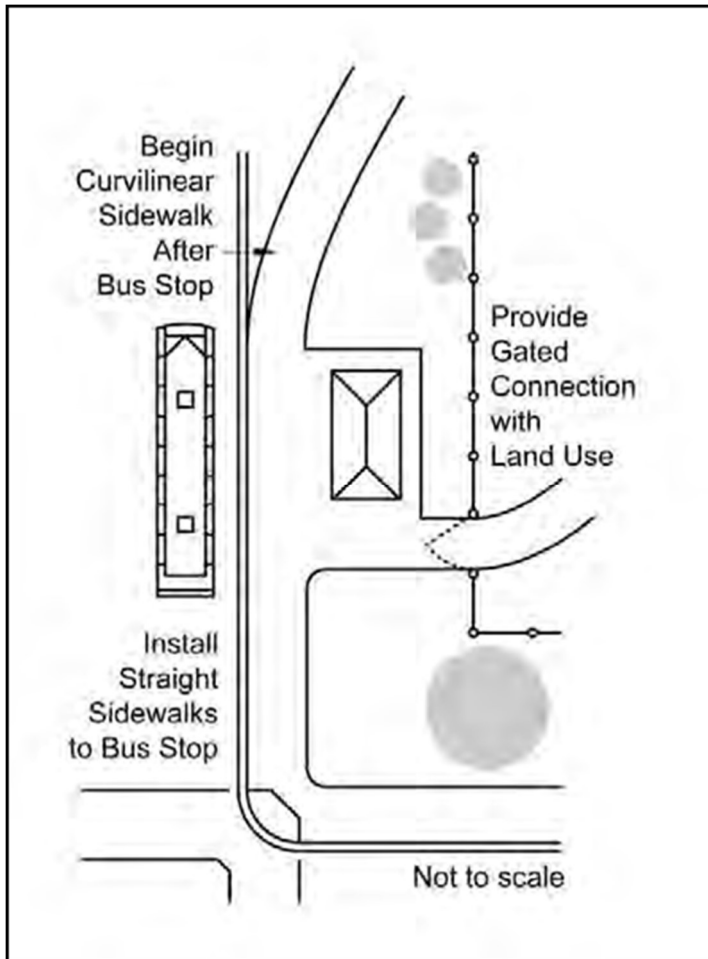


Figure 15 Desirable Pedestrian Access from Developments

## Bus Pullout

Bus pullouts provide an area for buses to stop outside of the traffic lane. Although they may be helpful for overall roadway operations, bus pullouts can cause delays for transit passengers because the bus must exit and re-enter the traffic stream. They may also increase the average person-delay for motorists using the street.

Bus pullouts are desirable where street traffic speeds are 40 mph or more and one of the following conditions exists:

- Peak period boarding average exceeds five people per bus
- Average peak period dwell time exceeds 30 seconds per bus
- A high frequency of accidents involving buses occurred within the past year
- Two traffic lanes or less exist in one direction of travel

OR

Bus pullouts may be desirable where buses are expected to layover at the end of a trip.

Note: Installing a bus pullout for a layover/recovery point may or may not be a good choice. Layover/recovery locations often change as funding becomes available for more frequent service and/or routes are extended.

Guidelines for bus pullouts are the following:

- Pullout should be placed at signal-controlled intersections where the signal can create gaps in traffic.
- Far side intersection placement is desirable (may vary based on site conditions).
- An 11-foot width is desirable to reduce sideswipe accidents.

A severe physical obstruction may require a mid-block bus pullout, but this design should only be used when the standard far-side bus pullout is infeasible. A far-side pullout design is superior to the mid-block design because it reduces walking distances for bus transfers, encourages patrons to use the intersection crosswalk, and reduces right-of-way acquisition. The figures below depict bus pullout designs.

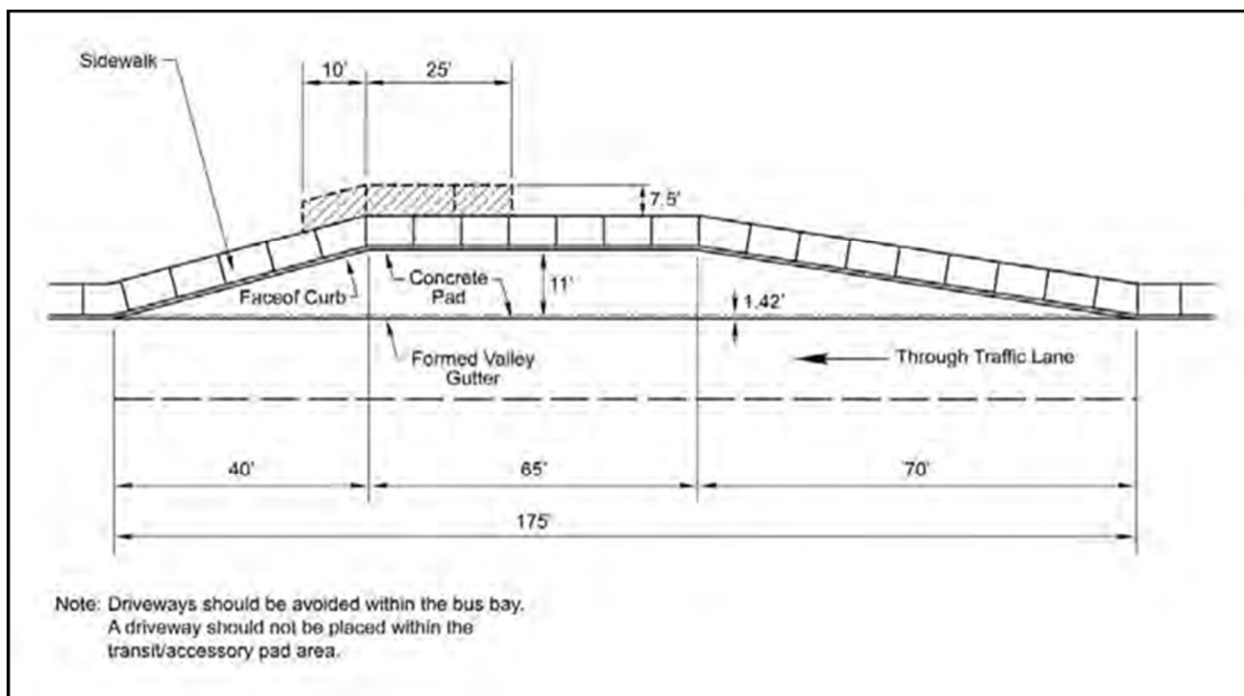


Figure 16 Far-Side Bus Pullout

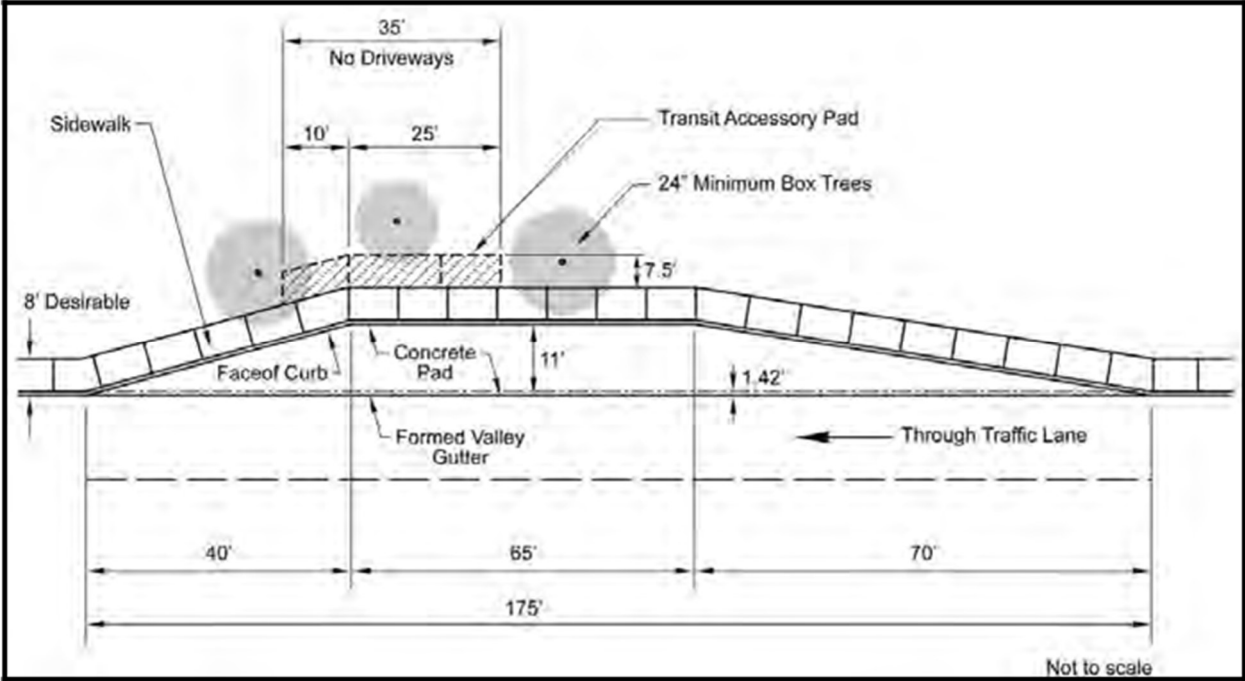


Figure 17 Mid-Block Bus Pullout

## Appendix 2 – Minimum Requirements Checklist

# Minimum Requirements Checklist

## Site Selection

- Distance from unsignalized intersection: 85 feet ( $\pm 25$  feet) from the curb point of tangency
- Distance from signalized intersection: 120 feet ( $\pm 25$  feet) from the curb point of tangency
- Paved loading area clear of any obstructions
- Driveways located away from transit pad or pad located at least 8 feet behind the face of curb

## Accessibility

- 36-inch clearance between bus stop components
- 96-inch clear length parallel to the roadway where wheelchair lift/ramp is to be deployed
- 8-foot sidewalk in the vicinity of transit accessory pad on arterial streets
- 5-foot sidewalk minimum at all other locations

## Bus Stop Pad

- 8-foot by 5-foot clear area on the concrete pad
- Stops serving 40-foot buses: 30-foot-long landing area
- Stops serving 60-foot buses: 40-foot-long landing area
- All surfaces are stable, firm, and slip-resistant
- No abrupt changes in grade
- If the sidewalk is separated from the curb, a concrete clear area connects the sidewalk to the boarding/alighting area

## Furniture

- All transit stop furniture is placed outside the standard 5-foot sidewalk
- 36-inch horizontal clearance between all amenities and switchboxes, mailboxes, utility boxes, and light poles
- Furniture should be 36 inches or greater from the face of a building or wall

## Shelter and Shade

- Overhead canopy of 65 square feet with a minimum width of 5.5 feet
- 7-foot clearance between the underside of the roof and sidewalk surface
- Minimum 2-foot clearance between shelter and curb
- Minimum of 10 linear feet of seating with 5 feet located under the shelter
- Minimum 36 inches by 48 inches clear space within the shelter
- Shelters should not be placed within the 8-foot by 5-foot wheelchair landing pad
- A minimum of 3 feet should be maintained around the shelter

## Appendix 3 – Weekday Bus Ridership By Stop and Bus Stop Level Groupings for Investment



# Winston-Salem Transit Authority (WSTA)

## Weekday Ridership By Stop

September 2020 - October 2021

Stop_ID	Stop_Name	Daily Boardings	Latitude	Longitude	Weekday Boarding Rank	Individual % Of All Ridership	Cumulative % Of All Ridership
<b>STOP LEVEL 3</b>							
10154	TRANSIT CENTER - EOL	2757	36.099573	-80.245576	1	33.8%	33.8%
10231	HANES MALL	159	36.070719	-80.299107	2	1.9%	35.8%
47507	WAUGHTOWN STREET & BROAD - EOL	143	36.076483	-80.178156	3	1.8%	37.5%
13737	HANES MALL BOULEVARD AT S	142	36.070830	-80.298750	4	1.7%	39.3%
13713	WALMART AT PETERS CREEK P	123	36.029065	-80.262272	5	1.5%	40.8%
47253	STURMER PARK	81	36.171962	-80.278272	6	1.0%	41.8%
47191	5TH STREET & CLEVELAND AV	71	36.100442	-80.230661	7	0.9%	42.6%
10137	WALMART AT HANES MILL ROA	70	36.189768	-80.274748	8	0.9%	43.5%
47249	INDUSTRIES FOR THE BLIND	68	36.151710	-80.284010	9	0.8%	44.3%
11018	TRADE STREET & NORTHWEST	66	36.110144	-80.246363	10	0.8%	45.1%
47242	PATTERSON AVENUE AT AUTO	65	36.134119	-80.242201	11	0.8%	45.9%
47473	SOUTH HAWTHORNE ROAD	61	36.090052	-80.265447	12	0.7%	46.7%
47265	UNIVERSITY PARKWAY AT GOO	60	36.125041	-80.258536	13	0.7%	47.4%
10874	STURMER PARK	57	36.172561	-80.277215	14	0.7%	48.1%
47189	WAUGHTOWN STREET & MLK JR	56	36.069277	-80.220449	15	0.7%	48.8%
13723	CLOVERDALE AVENUE & MELRO	44	36.090029	-80.275721	16	0.5%	49.4%
47487	MARTA ROAD & TEAGUE ROAD	43	36.037470	-80.215726	17	0.5%	49.9%
47964	STAFFORD VILLAGE BOULEVAR	41	36.029399	-80.261701	18	0.5%	50.4%

From September 2020 through October 2021, over 50% of all WSTA boardings occurred at the 18 high-activity bus stops shown above.

### STOP LEVEL 2

47846	ACADEMY STREET & PETERS C	39	36.084707	-80.256716	19	0.5%	50.9%
47735	FORSYTH HOSPITAL - SECOND	36	36.076418	-80.298244	20	0.4%	51.3%
47232	2ND & SHADY LANE	35	36.095538	-80.250876	21	0.4%	51.7%
10979	HAMPTON HAITH BUILDING	34	36.107829	-80.246537	22	0.4%	52.1%
47192	5TH STREET & MLK JR DRIVE	33	36.100065	-80.229263	23	0.4%	52.5%
11276	PATTERSON AVENUE & GLENN	32	36.118251	-80.241955	24	0.4%	52.9%
47664	NEW WALKERTOWN ROAD AT SA	32	36.115980	-80.209280	25	0.4%	53.3%
11542	OAK GROVE ROAD & MARTIN S	31	36.066727	-80.274784	26	0.4%	53.7%
11484	FILE STREET & MLK JR DRIV	31	36.104179	-80.230065	27	0.4%	54.1%

Stop_ID	Stop_Name	Daily Boardings	Latitude	Longitude	Weekday Boarding Rank	Individual % Of All Ridership	Cumulative % Of All Ridership
<b>STOP LEVEL 2, Continued</b>							
13726	PATTERSON AVENUE & NORTHW	31	36.110787	-80.242275	28	0.4%	54.5%
47518	MLK JR DRIVE & WILLIAMSON	31	36.080654	-80.222826	29	0.4%	54.8%
11488	HIGHLAND AVENUE & CARL RU	30	36.101913	-80.233580	30	0.4%	55.2%
47842	PETERS CREEK & PARKWAY PL	30	36.067365	-80.257966	31	0.4%	55.6%
11529	PETERS CREEK PARKWAY & LI	29	36.074277	-80.258635	32	0.4%	55.9%
12238	OLD GREENSBORO ROAD & 5TH	29	36.100182	-80.218952	33	0.4%	56.3%
10134	HANES MILL ROAD & K&W	28	36.187661	-80.268423	34	0.3%	56.6%
13199	PETERS CREEK PARKWAY HERO	27	36.075726	-80.258422	35	0.3%	56.9%
47618	OLD VINEYARD ROAD AT HEAL	27	36.076982	-80.312732	36	0.3%	57.3%
13730	5TH STREET & CHURCH STREE	26	36.099985	-80.243546	37	0.3%	57.6%
11270	PATTERSON AVENUE & 30TH S	26	36.128498	-80.242080	38	0.3%	57.9%
47367	UNIVERSITY PARKWAY AT HAN	26	36.188199	-80.276338	39	0.3%	58.3%
12262	NEW WALKERTOWN ROAD & MLK	26	36.102085	-80.227765	40	0.3%	58.6%
47349	NEW WALKERTOWN ROAD AT DU	25	36.102297	-80.226591	41	0.3%	58.9%
47262	NORTH POINT BOULEVARD AT	24	36.150932	-80.276355	42	0.3%	59.2%
47520	25TH STREET & BOWEN STREE	24	36.122001	-80.222503	43	0.3%	59.5%
13637	EAST FORSYTH HIGH SCHOOL	24	36.119179	-80.151062	44	0.3%	59.8%
47272	INDIANA AVENUE & CHERRY S	23	36.151555	-80.263847	45	0.3%	60.0%
47870	JOHNSON CONTROLS DRIVE	23	36.115981	-80.159772	46	0.3%	60.3%
47204	5TH STREET & RESEARCH PAR	22	36.100287	-80.238360	47	0.3%	60.6%
13175	SALEM CREST APARTMENT	22	36.060668	-80.273664	48	0.3%	60.9%
47686	LOUISE ROAD & THOMASVILLE	22	36.055996	-80.210777	49	0.3%	61.1%
47421	WAUGHTOWN STREET & SOUTHE	21	36.076829	-80.179078	50	0.3%	61.4%
47353	BETHABARA PARK BOULEVARD	21	36.161003	-80.278384	51	0.3%	61.6%
47747	WESTGATE CENTER DRIVE & H	21	36.065031	-80.312633	52	0.3%	61.9%
47884	HAWTHORNE ROAD & KNOLLWOO	20	36.078133	-80.286279	53	0.2%	62.1%
47244	BROWNSBORO ROAD AT ENCLAV	20	36.147213	-80.270723	54	0.2%	62.4%
47296	OLD GREENSBORO ROAD & ATK	20	36.108336	-80.195838	55	0.2%	62.6%
47587	MARTA ROAD & OLD LEXINGTO	20	36.037765	-80.215816	56	0.2%	62.9%

The 38 stops above this line had more than 20 daily boardings, and carried another 13% of daily riders.

Stop_ID	Stop_Name	Daily Boardings	Latitude	Longitude	Weekday Boarding Rank	Individual % Of All Ridership	Cumulative % Of All Ridership
<b>STOP LEVEL 1</b>							
47814	UNIVERSITY PARKWAY & STOR	19	36.127192	-80.260563	57	0.2%	63.1%
47163	BUCHANAN STREET & SPRAGUE	19	36.068342	-80.252388	58	0.2%	63.4%
12942	OAK RIDGE DRIVE & BUTTERF	19	36.144704	-80.202051	59	0.2%	63.6%
10244	FORSYTH TECH MAIN CAMPUS	19	36.067985	-80.273507	60	0.2%	63.8%
47734	PATTERSON AVENUE &10TH ST	19	36.106537	-80.242365	61	0.2%	64.1%
12566	HANES MALL BOULEVARD AT S	19	36.072787	-80.296999	62	0.2%	64.3%
47310	CLEVELAND AVENUE & 25TH S	19	36.122163	-80.230446	63	0.2%	64.5%
47298	5TH STREET & HIGHLAND AVE	18	36.100388	-80.233302	64	0.2%	64.7%
47652	WAL-MART KESTER MILL ROAD	18	36.069293	-80.335188	65	0.2%	65.0%
11285	PATTERSON AVENUE & 10TH S	17	36.106455	-80.241914	66	0.2%	65.2%
47202	MLK JR DRIVE & 3RD STREET	17	36.098607	-80.228902	67	0.2%	65.4%
47509	REYNOLDS PARK & TERRY ROA	17	36.079836	-80.186839	68	0.2%	65.6%
11507	ACADEMY STREET & PETERS C	17	36.083780	-80.257627	69	0.2%	65.8%
47388	PATTERSON AVENUE & NORTH S	17	36.135828	-80.242502	70	0.2%	66.0%
47854	BROWNSBORO ROAD & LINN ST	16	36.148889	-80.273851	71	0.2%	66.2%
13389	THOMASVILLE ROAD & CLEMMO	16	36.062309	-80.216638	72	0.2%	66.4%
12887	BUCHANAN STREET & SPRAGUE	16	36.068057	-80.252011	73	0.2%	66.6%
13207	PETERS CREEK PARKWAY - SH	16	36.085455	-80.257437	74	0.2%	66.8%
47288	OLD GREENSBORO ROAD - CRE	16	36.100285	-80.217447	75	0.2%	67.0%
47165	PETERS CREEK PARKWAY & 4T	16	36.086073	-80.257541	76	0.2%	67.2%
47198	EASTON ROAD & CHARLES DRI	16	36.055706	-80.213531	77	0.2%	67.4%
12573	HAWTHORNE ROAD & BOLTON R	15	36.077989	-80.289476	78	0.2%	67.6%
10945	6TH STREET & POPLAR STREE	14	36.100803	-80.250022	79	0.2%	67.7%
13381	THOMASVILLE ROAD & SPRAGU	14	36.068106	-80.219824	80	0.2%	67.9%
46988	PETERS CREEK & SILAS CREE	14	36.066549	-80.258309	81	0.2%	68.1%
11256	BROWNSBORO ROAD & CHERRY	14	36.144821	-80.265470	82	0.2%	68.3%
47238	COLISEUM DRIVE & GEORGETO	14	36.124168	-80.260473	83	0.2%	68.4%
10289	UNIVERSITY PARKWAY & DEAC	14	36.128449	-80.261076	84	0.2%	68.6%
47307	CLEVELAND AVENUE & NEW HO	13	36.116163	-80.230639	85	0.2%	68.8%
47839	OLD GREENSBORO ROAD & FLA	13	36.100527	-80.213767	86	0.2%	68.9%
11274	PATTERSON AVENUE & 25TH S	13	36.121985	-80.241951	87	0.2%	69.1%
46954	NEW WALKERTOWN ROAD & FER	13	36.104934	-80.219789	88	0.2%	69.2%
47258	UNIVERSITY PARKWAY & THUR	13	36.123381	-80.258320	89	0.2%	69.4%
47688	MLK JR DRIVE & SUCCESS WA	13	36.089015	-80.226539	90	0.2%	69.6%
11192	1ST STREET & I-40 RAMP	13	36.092698	-80.264236	91	0.2%	69.7%

Stop_ID	Stop_Name	Daily Boardings	Latitude	Longitude	Weekday Boarding Rank	Individual % Of All Ridership	Cumulative % Of All Ridership
<b>STOP LEVEL 1, Continued</b>							
47190	5TH STREET & HIGHLAND AVE	13	36.100495	-80.233763	92	0.2%	69.9%
47171	PETERS CREEK PARKWAY & BR	13	36.056574	-80.259113	93	0.2%	70.0%
16971	PLEASANT STREET & HILL LA	13	36.075504	-80.208765	94	0.2%	70.2%
11040	PATTERSON AVENUE & NORTH S	13	36.134468	-80.242116	95	0.2%	70.4%
47691	FOOD LION AT WAUGHTOWN ST	13	36.069204	-80.219091	96	0.2%	70.5%
47665	DEPARTMENT OF SOCIAL SERV	13	36.103705	-80.233330	97	0.2%	70.7%
47886	UNIVERSITY PARKWAY AT CIT	12	36.160514	-80.277972	98	0.2%	70.8%
48018	TIMLIC AVENUE 3	12	36.078477	-80.227188	99	0.2%	71.0%
47763	5TH STREET & CAMERON AVEN	12	36.100332	-80.223995	100	0.2%	71.1%
47173	PETERS CREEK PARKWAY AT S	12	36.043686	-80.259757	101	0.2%	71.3%
47738	DEPARTMENT OF SOCIAL SERV	12	36.103746	-80.233509	102	0.2%	71.4%
47699	OLD LEXINGTON ROAD & BARN	12	36.054485	-80.225716	103	0.2%	71.6%
12328	CARVER SCHOOL ROAD & FORS	12	36.150282	-80.211443	104	0.2%	71.7%
11605	STRATFORD ROAD & OAKWOOD	12	36.090925	-80.282464	105	0.2%	71.9%
47237	CHERRY STREET & 25TH STRE	12	36.122618	-80.256243	106	0.1%	72.0%
10940	THURMOND STREET & HAYWOOD	12	36.106776	-80.256421	107	0.1%	72.2%
47719	QUEEN STREET AT MEADS HAL	12	36.088025	-80.268202	108	0.1%	72.3%
47825	HANES MILL ROAD AT HANES	12	36.189520	-80.272828	109	0.1%	72.5%
47918	HANES MALL AT SILAS CREEK	12	36.071316	-80.298344	110	0.1%	72.6%
12233	OLD GREENSBORO ROAD & MOU	12	36.102160	-80.206390	111	0.1%	72.7%
47329	5TH STREET & CLEVELAND AV	12	36.100319	-80.231166	112	0.1%	72.9%
11414	HIGHLAND AVENUE & CARL RU	12	36.102079	-80.233412	113	0.1%	73.0%
47255	REYNOLDA ROAD & FAIRLAWN	12	36.142768	-80.298375	114	0.1%	73.2%
47158	ACADEMY STREET & GRANVILL	11	36.085529	-80.252412	115	0.1%	73.3%
47482	OLD LEXINGTON ROAD & BARN	11	36.054492	-80.225488	116	0.1%	73.5%
13576	OLD GREENSBORO ROAD & HAR	11	36.112562	-80.189745	117	0.1%	73.6%
11463	HAWTHORNE ROAD & 1ST STRE	11	36.092346	-80.264687	118	0.1%	73.7%
47230	BROAD STREET & BANNER AVE	11	36.072602	-80.243433	119	0.1%	73.9%
47364	BETHANIA STATION & GRASSY	11	36.176591	-80.286129	120	0.1%	74.0%
47303	HIGHLAND AVENUE & 14TH ST	11	36.112293	-80.232913	121	0.1%	74.1%
46978	PATTERSON AVENUE & 15TH S	11	36.113460	-80.241983	122	0.1%	74.3%
47833	WAKE FOREST UNIVERSITY	11	36.137541	-80.274475	123	0.1%	74.4%
11732	THOMASVILLE ROAD & CLEMMO	11	36.062219	-80.216286	124	0.1%	74.5%
10111	MOCK STREET & ALDER STREE	11	36.080364	-80.237761	125	0.1%	74.7%
47279	CHERRY STREET & POLO ROAD	11	36.141526	-80.264840	126	0.1%	74.8%

Stop_ID	Stop_Name	Daily Boardings	Latitude	Longitude	Weekday Boarding Rank	Individual % Of All Ridership	Cumulative % Of All Ridership
<b>STOP LEVEL 1, Continued</b>							
47220	UNIVERSITY PARKWAY & SUMM	11	36.184297	-80.274293	127	0.1%	74.9%
47463	STRATFORD ROAD & WESTBROO	10	36.069607	-80.304618	128	0.1%	75.1%
47637	OLD RURAL HALL ROAD & MOT	10	36.158557	-80.228159	129	0.1%	75.2%
47971	TIMIC AVENUE & WILLIAMSON	10	36.080310	-80.227331	130	0.1%	75.3%
47040	PETERS CREEK PARKWAY & HU	10	36.070662	-80.257981	131	0.1%	75.4%
11118	PATTERSON AVENUE & 13TH S	10	36.111392	-80.241931	132	0.1%	75.6%
10757	HIGHLAND AVENUE & MLK JR	10	36.105543	-80.233470	133	0.1%	75.7%
47542	UNIVERSITY PARKWAY AT GOO	10	36.126434	-80.258952	134	0.1%	75.8%
47674	MILLER STREET AT FORSYTH	10	36.068428	-80.273705	135	0.1%	75.9%
47285	5TH STREET & DUNLEITH AVE	10	36.100310	-80.226880	136	0.1%	76.1%
47212	BROAD STREET AT SALVATION	10	36.079584	-80.245446	137	0.1%	76.2%
10480	CHERRY STREET & 23RD STRE	10	36.119472	-80.254870	138	0.1%	76.3%
12507	SHATTALON DRIVE & BRADFOR	10	36.170430	-80.322763	139	0.1%	76.4%
11189	CLOVERDALE AVENUE & MILLE	10	36.090140	-80.273580	140	0.1%	76.6%
12237	OLD GREENSBORO ROAD & KIN	10	36.100417	-80.215699	141	0.1%	76.7%
12501	BETHABARA PARK & REYNOLDA	10	36.156412	-80.314885	142	0.1%	76.8%
47292	OLD GREENSBORO ROAD & PET	10	36.111966	-80.190702	143	0.1%	76.9%
13847	MOCK STREET & FREE STREET	10	36.079208	-80.232999	144	0.1%	77.0%

The 88 stops directly above combined to carry another 14% of ridership. Above this line are only 13% of WSTA's stops, but 77% of WSTA ridership.

Stops With Over 20 Daily Boardings On Weekends	Daily Boardings	Latitude	Longitude	Day with 20+ Boardings
<b>Additional STOP LEVEL 2 stops based on weekend service counts</b>				
12262	NEW WALKERTOWN ROAD & MLK	36.102226	-80.227699	Saturday
47237	CHERRY STREET & 25TH STRE	36.123326	-80.256980	Saturday
11040	PATTERSON AVENUE & NORTH S	36.134417	-80.242128	Saturday
47542	UNIVERSITY PARKWAY AT GOO	36.125336	-80.258614	Sunday