The City of Takoma Park's Bus Stop Improvement Plan

Final Report - June 2020

Prepared by the KFH Group for the City of Takoma Park
Through the Metropolitan Washington Council of Government's
Transportation Land-Use Connections Program

CITY OF TAKOMA PARK 1890 MARYLAND

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The New Hampshire Ave. & Devonshire Rd. Bus Stop Features Brightly Painted Porch Rockers & Waste Receptacles

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Introduction & Background

Project Overview

The City of Takoma Park provides passenger amenities and accessibility improvements at its approximately 138 bus stops. The City is served by three public transit providers, including Montgomery County Transit's Ride On, Washington Metropolitan Area Transit Authority's (WMATA) Metrobus, and the University of Maryland's Shuttle (Shuttle-UM).

The City of Takoma Park has requested, through the Metropolitan Washington Council of Government's (COG) Transportation Land-Use Connections Program, the assistance of a consultant to complete a bus stop accessibility inventory and provide recommendations for future bus stop improvements. KFH Group was selected to complete the technical assistance which has resulted in the following plan.

The City of Takoma Park's Bus Stops

Bus stops in the City of Takoma Park have a character that is unique from other stops in the region. Bold and brightly colored wooden Adirondack chairs and porch rockers (shown below) provide a pop of color at many of the bus stops along New Hampshire Avenue. Many bus stops throughout the City also have turnable information tubes, with route maps and information, unique to Takoma Park. These and other distinctive bus stop elements are striking representations of how bus stops can add to the community character and enhance the built environment.

Project Goals

Promoting public transportation is a key element to accomplish the City's sustainability goals. According to the Census Bureau's American Community Survey (2018), approximately 29% of Takoma Park residents take public transit to work. While Takoma Park does not operate public transit service, it does oversee bus stop improvements. Enhancing the accessibility, passenger amenities, and built environment at and around bus stops will provide an attractive street-scape and encourage additional transit ridership.

The goal of this study is to strengthen the transit network, provide more passenger amenities, and develop a holistic approach to improving bus stops within the City of Takoma Park.

Specific study objectives include:

- Determine Americans with Disabilities Act (ADA) compliance for each of the city's bus stops.
- Evaluate multimodal connectivity and existing passenger amenities at each bus stop.
- Develop local bus stop guidelines that set thresholds for enhanced improvements.
- Develop a robust set of improvement alternatives.
- Emphasize the sustainability of public transit and incorporate other local initiatives.

Report Organization

This report is organized into four chapters that outline the bus stop inventory, best practices guide, and improvement guidelines. They are organized as follows:

- **Chapter 1: Bus Stop Accessibility Guidelines** - Overview of ADA Guidelines for bus stop accessibility; including information on boarding and alighting areas, shelters, and related pedestrian elements.

- **Chapter 2: Bus Stop Data Collection & Inventory** - Summary of the data collection process and field survey along with an existing conditions analysis of accessibility and passenger amenities.

- **Chapter 3: Bus Stop Design Factors & Best Practices** - Compilation of common bus stop design considerations and best practices.

- **Chapter 4: Improvement Guidelines** - Proposes City-wide bus stop guidelines, provides background on bus stop improvement approaches and other considerations.

Chapter 1
Bus Stop Accessibility Guidelines

Introduction

The Americans with Disabilities Act of 1991 (ADA) regulates the design of transportation facilities, including bus stops, in the United States. The ratification of the ADA empowered the United States Access Board to draft guidelines to assist in the construction, repair, and renovation of public facilities. As it pertains to bus stops, ADA guidelines can be found in the 2006 ADA Accessibility Guidelines for Transportation Facilities (ADAAG) and the 2011 Pedestrian-Right-Of-Way Accessibility Guidelines (PROWAG).

The United States Access Board is an independent federal agency that supports equality for people with disabilities by developing accessibility guidelines and standards for the built environment, transit vehicles, telecommunications equipment, medical diagnostic equipment, and information technology. The U.S. Access Board also offers technical assistance and training on these requirements and accessible design while continuing to enforce accessibility standards that cover federally funded facilities.

ADA Accessibility Guidelines

After the passage of the ADA, the U.S. Access Board developed, and now routinely updates, the ADAAG that the United States Department of Justice (USDOJ) and the United States Department of Transportation (USDOT) have adopted into enforceable standards. Municipalities are required to comply with the ADAAG when designing, building, and improving elements in the built environment; including bus stops, sidewalks and other pedestrian facilities. The ADAAG includes specific guidelines for various elements of bus stops and other transportation facilities under Section 810. This chapter details those requirements in addition to other referenced pedestrian accessibility guidelines provided throughout the ADAAG and PROWAG.

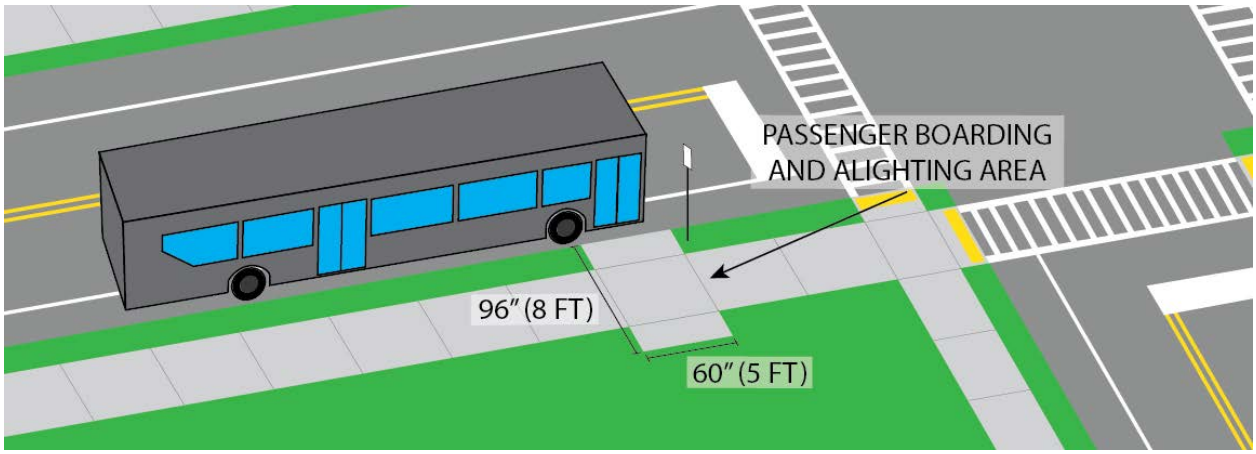
ADAAG Online Resource
United States Access Board's
ADA Standards for Transportation Facilities
www.access-board.gov

Passenger Boarding and Alighting Areas

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%)

Figure 1-1: ADA Compliant Passenger Boarding and Alighting Area

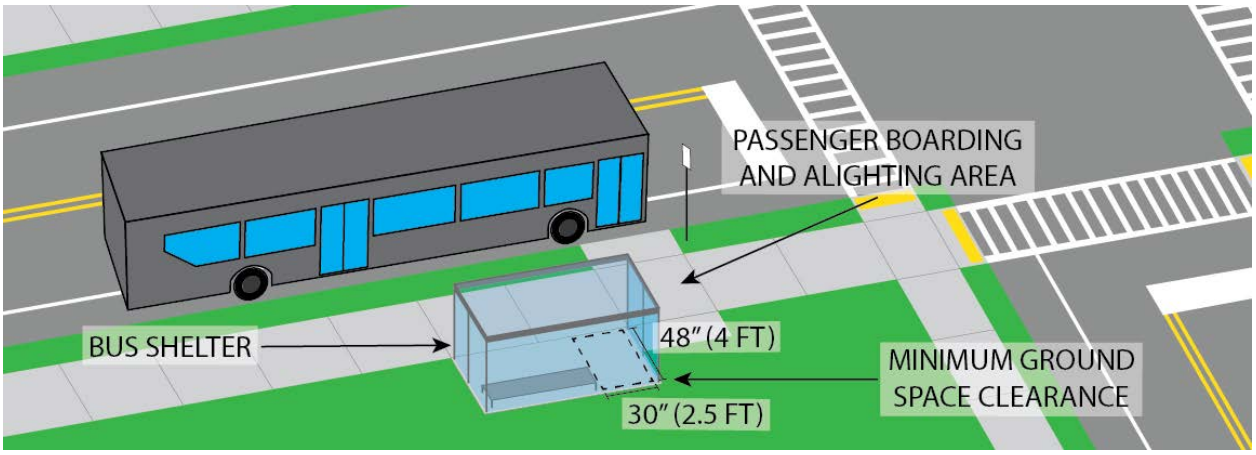


Bus Stop Shelters

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 to an accessible boarding and alighting area
Ground Space Clearance	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 30 inches by 48 inches
Position	Floor or ground space shall be positioned to accommodate a forward or parallel approach
Maneuvering Clearance	Where floor or ground space is located 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

Figure 1-2: ADA Compliant Bus Stop Shelter



Proposed Public Right-of-Way Accessibility Guidelines

The 2011 PROWAG builds upon the 2006 ADAAG and consequently became a part of the currently adopted and enforceable USDOT and USDOJ standards. The proposed guidelines provide detailed guidance on pedestrian facilities in the public right-of-way that are not addressed in ADAAG's Section 402 and in some cases establish or change minimum or maximum measurements for items in the current ADAAG.

Accessible Pedestrian Routes

An accessible pedestrian route provides a continuous and unobstructed path of travel for pedestrians traveling to and from bus stops. Accessibility guidelines draw from numerous sections of the proposed PROWAG including:

- Chapter R2 (R204, R206, R208, R209, R210)
- Chapter R3 (R302, R305, R306)
- Chapter R4 (R402, R403, R404, R406, R407)

Pedestrian access routes summarized in this section apply to sidewalks, pedestrian street crossings, and pedestrian crossing signals.

PROWAG Design Considerations for Pedestrian Pathways

Accessible Widths

In general, a minimum continuous clear width of 4 feet is required for pedestrian pathways

Continuous Width

The continuous clear width of the pedestrian access routes shall be 4 feet, exclusive of the width of the curb

Passing Spaces

On pathways where the clear width of the pedestrian access route is less than 5 feet, passing spaces need to be provided at least every 200 feet; passing spaces must be a minimum of 5 feet by 5 feet and are permitted to overlap pedestrian access routes

Medians and Pedestrian Refuge Islands

The minimum width increases to 5 feet for pathways within medians and pedestrian refuge islands

Accessible Grades

Guidelines for pathway grades will vary based on direction and pathway element

Running Slope

Generally, a pathway's running slope can be no greater than 5% (this includes street crossings)
Exception: where a pathway is alongside a street or highway (e.g. a sidewalk) it is allowed to be the general grade established for the adjacent street or highway but not steeper

Cross Slope

A pathway's cross slope may not exceed 2%
Exception 1: Pedestrian street crossings without a yield or stop control; the cross slope can be up to 5%
Exception 2: Mid-block pedestrian street crossings; the cross slope can equal the street or highway grade

PROWAG Design Considerations for Pedestrian Pathways

Surfaces

Surfaces of pedestrian access routes and their elements must be firm, stable, and slip resistant; they must be generally planar with flush grade breaks and pavement connections

Vertical Surface Discontinuities

Vertical surface discontinuities cannot exceed 0.5 inches in height, and those between 0.25 and 0.5 inches must be beveled with a slope no steeper than 50%

Horizontal Openings

Horizontal openings in gratings and joints can be no wider than 0.5 inches with elongated openings in gratings placed so that the long dimension is perpendicular to the dominant direction of travel.

Flangeway Gaps

Where a pedestrian pathway crosses an at-grade rail line, the pedestrian access route surface must be level and flush, aligned with the top of the rail; flangeway gaps at pedestrian crossings cannot exceed 2.5 inches on non-freight rail track and 3 inches on freight rail track

Protruding Objects

Protrusions (leading edges that encroach upon the walk path) that fall within a height of 27 inches to 80 inches from the walking surface must not protrude more than 4 inches into the vertical clearance of the walk path

Curb Ramps and Blended Transitions

Curb ramps and blended transitions provide grade transition points between sidewalks and the street. These transition points provide a navigable pathway for people with mobility and vision disabilities. Guidelines are provided in Section R304 of the PROWAG.

Curb Ramps

Generally, the components of a curb ramp are the ramp itself, a level landing at the top of the ramp, a landing at the bottom of the ramp, and a detectable warning to alert pedestrians of a transition from sidewalk to street crossing.

Perpendicular curb ramps are perpendicular to the street curb and permit pedestrians to cross the street perpendicular to vehicular traffic. Ideally, they are in line with the path of travel of both the sidewalk and the street crossing, but this is not always possible due to existing conditions. A common distinguishing feature of perpendicular curb ramps is that each ramp generally serves a single street crossing; i.e., at a four-way intersection, two perpendicular ramps are needed at each corner.

Parallel curb ramps typically consist of two ramps connecting to a shared level bottom landing. Ramps are oriented so that pedestrians traveling up or down the ramps travel parallel to vehicle traffic. These ramps are common on narrow sidewalks where there is little area for a top landing. The bottom landing is at street level and does not extend beyond the curb.

Blended Transitions

An alternative approach to curb ramps is a category of treatment referred to as a blended transition. A blended transition is a raised pedestrian street crossing, depressed corner, or similar level connection between the pedestrian pathway and the pedestrian street crossing. Blended transitions are commonly used in locations with high pedestrian activity.

Figure 1-3: Examples of Curb Ramps and Blended Transitions

Perpendicular Curb Ramp | Parallel Curb Ramp | Blended Transition (Depressed Corner)

Table 1-1: PROWAG Curb Ramp Elements

Element	Perpendicular Curb Ramps	Parallel Curb Ramps	Blended Transition
Ramp Run			
Running Slope	5% to 8.3 %	5% to 8.3%	Maximum 5%
Cross Slope	Maximum 2%	Maximum 2%	Maximum 2%
Width	Minimum 4 feet	Minimum 4 feet	Minimum 4 feet
Length	Maximum 15 feet	Maximum 15 feet	-
Flared Sides	Maximum 10%	No flares	Maximum 2%
Top Landing Area			
Dimensions	Minimum 4 feet by 4 feet - where constrained at the back of the sidewalk, a minimum of 5 feet in the direction of the ramp run	As wide as the widest ramp run leading to the landing at least 5 feet long is required at the top and bottom of each ramp run	Minimum 4 feet by 4 feet - where constrained at the back of the sidewalk, a minimum of 5 feet in the direction of the ramp run
Slope	Maximum 2% in any direction	Maximum 2% in any direction	Maximum 2% in any direction
Bottom Landing Area			
Dimensions	Minimum 4 feet by 4 feet - provided within width of pedestrian street crossing.	Minimum 4 feet by 4 feet - where constrained by two or more sides, a minimum of 5 feet in the direction of the street crossing	Minimum 4 feet by 4 feet - provided within width of pedestrian street crossing.
Running Slope	Maximum 5% - "Counter Slope"	Maximum 2%	Maximum 5% - "Counter Slope"
Cross Slope	Maximum 2% - Exceptions: at street crossings without yield or stop control: maximum 5%; at mid-block crossings: equal to street or highway grade	Maximum 2%	Maximum 2% - Exceptions: at street crossings without yield or stop control: maximum 5%; at mid-block crossings: equal to street or highway grade

Detectable Warning Surfaces

Detectable warning surfaces alert pedestrians of the boundary between pedestrian and vehicular routes where there is a flush, rather than curbed, connection. On curb ramps and blended transitions, detectable warning surfaces are required to run the entirety of the leading edge of the ramp and extend two feet in the direction of pedestrian travel.

In addition to curb ramps and blended transitions, detectable warnings are also required for the following locations:

- Pedestrian refuge islands.
- Pedestrian at-grade rail crossings not located within a street or highway.
- Boarding platforms at transit stops for buses and rail vehicles where the edges of the boarding platform are not protected by screens or guards.

Detectable warning surfaces are not required at pedestrian refuge islands that are cut through at the street level and are less than six feet in length in the direction of pedestrian travel.

Figure 1-4: Example of Detectable Warning Surfaces

Pedestrian Street Crossings

Accessibility guidelines are also outlined for pedestrian street crossings. A pedestrian access route shall be provided within pedestrian street crossings, including medians, pedestrian refuge islands, and pedestrian at-grade rail crossings.

The PROWAG calls for accessible pedestrian signals and pedestrian pushbuttons that communicate information about the "walk" and "don't walk" intervals at signalized intersections; non-visual formats should also be used (e.g. audible signals). Pedestrian signals located at pedestrian street crossings must comply with sections 4E.08 through 4E.13 of the Manual of Uniform Traffic Control Devices (MUTCD).

ADA compliance requires a clear space adjacent to the pushbutton and connected to the pedestrian pathway, and the pushbutton must be mounted within a height range (15" to 48" from the surface) to make it reachable for wheelchair users. The clear space must have a firm, stable, and slip resistant surface, with a running slope that is consistent with the grade of the adjacent pedestrian access route and a maximum cross slope of 2%. It must be a minimum of 48 inches by 30 inches and must be positioned to allow either forward or parallel approach to the pushbutton.

Figure 1-5: Example of an ADA Compliant Pedestrian Street Crossing

Chapter 2
Bus Stop Data Collection & Inventory

Introduction

In order to properly assess and plan for future bus stop improvements, a bus stop ADA assessment and inventory was conducted during December 2019 and January 2020. This information provided the foundation for improvements, costing estimates, prioritization, and order of implementation.

Chapter 2 includes a chronological outline of the data collection process. This includes a summary of the steps taken to develop and complete the field survey; including the creation of the field survey guide, survey methodology, pre-survey desk review, and post-survey data analysis.

This chapter also includes the results of the field survey and inventory through an existing conditions analysis. This is a snapshot in time of bus stop ADA compliance and the distribution of bus stop amenities in Takoma Park. It should be noted that since the completion of the field survey, progress has already been made on improving accessibility (and ADA compliance) at bus stops throughout the City, notably on Flower Avenue.

Data Collection

Field Survey Guide

The first element in the data collection process was the development of a field survey guide which outlined the specific data points to be collected for the bus stop inventory. The field survey guide was drafted at the outset of the study and reviewed during the kickoff meeting. The guide is based on other Washington area regional bus stop inventories and has been adapted specifically for the City of Takoma Park's needs and interests.

The survey guide is broken into six distinct categories including:

- Location Information and General Characteristics
- Bus Stop Poles and Signs
- Boarding and Alighting Areas/Landing Pads
- Pedestrian and Bicycle Accessibility
- Bus Stop Parking Zones
- Shelters, Seating, and Other Amenities

The Field Survey Guide is included as Appendix A of this report.

Desk Review

A preliminary desk review of available GIS bus stop data, including data from the City of Takoma Park (illustrated in Figure 2-1) and MD iMap Maryland's Mapping and GIS Data Portal, was used to prepare for the field survey. Online maps and stop lists for Shuttle-UM were used to identify stops for Route 111.

A spatial analysis of the available data identified approximately 142 unique bus stop locations within the City of Takoma Park (138 active bus stops were located during the field survey). Fifty-six of the City's bus stops are used by more than one transit provider.

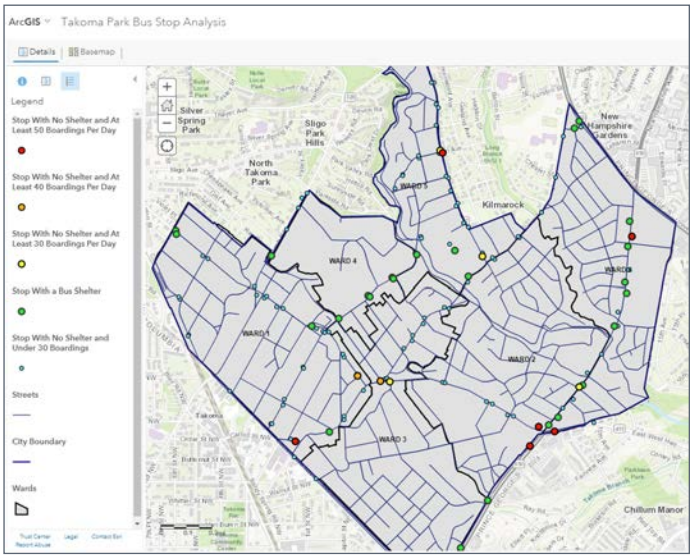


Figure 2-1: City of Takoma Park's Bus Stop GIS

Survey Assignment Zones

Based on the results of the desk review, the survey team created daily survey assignments to help field surveyors develop their daily work-plan and to provide a quick reference on bus stop locations and other key details while in the field. The survey assignments consist of three elements; a study area overview map (see Figure 2-2), a zone map with bus stop identification numbers, and an associated data table with applicable reference data.

Given favorable weather conditions, five survey days were planned to complete the inventory. Based on this time-frame, five survey assignment zones were created to complete the survey.

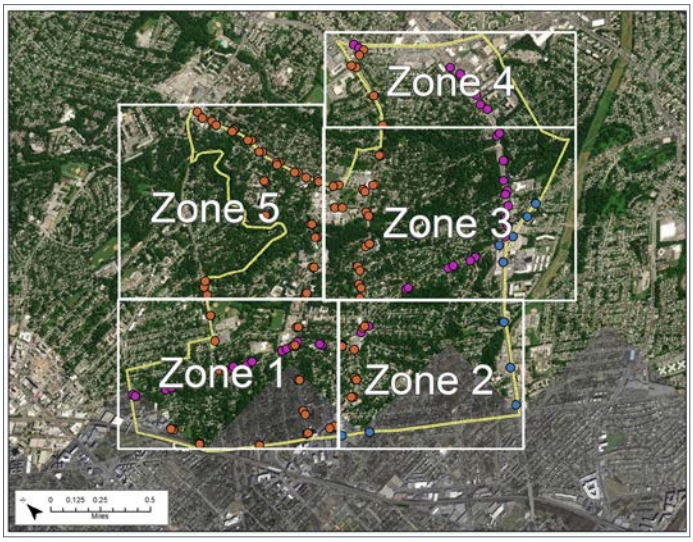


Figure 2-2: Overview of Survey Assignments

Survey Tools & Equipment

Proper tools and equipment are necessary to determine accessible clearances and slopes, and to accurately record the data being collected. Survey instruments used during the inventory and assessment (shown in Figure 2-3) included:

- Trimble Juno 3B GPS Device
- 6.5" Inclometer
- 24" Inclometer
- 25' Heavy Duty Tape Measure
- High Visibility Safety Vest

Figure 2-3: Bus Stop Survey Tools

Beta Test & Database Creation

When conducting field surveys, consistency is key to ensure conditions are reported comparably across the study area. To deliver a high level of consistency, the project team conducted beta testing within the City of Takoma Park. This allowed the survey team to test the data dictionary in a real-world environment to ensure that all bus stop characteristics would be captured in the inventory. The beta test also allowed the survey team an opportunity to develop a standardized approach for each bus stop survey, reducing the need for lengthy data reconciliation efforts.

Field Survey

Following the completion of survey preparations, the field survey was conducted over five non-consecutive days from December 23, 2019 to January 6, 2020. Surveying during the winter months presented slight challenges including inclement weather and slippery conditions. Since safety is the top priority when surveying, all surveyors underwent field safety training for working in the public right-of-way. This training ensured that each surveyor was familiar with field safety practices, emergency response and reporting, familiarity and use of safety equipment, and methods to reduce personal hazards and risks during the field survey.

Quality Assurance & Quality Control Measures

The final process of the data collection effort was reconciling and quality checking the information collected. This process ensured that the bus stop data is accurate and all stops were accounted for. The quality control process found that some bus stops were not properly located in publicly available GIS resources. At the conclusion of the quality assurance process, four bus stops were eliminated from the inventory because they were either not found or located slightly outside of the City's boundaries.

Bus Stop Inventory

At the conclusion of the field survey a total of **138 Bus Stops** were located, inventoried and assessed for ADA compliance within Takoma Park's City Limits. This number is four less than the original number of stops identified during the desk review. Three of the previously identified stops were located outside of the city limits and one stop, East West Hwy. & Red Top Rd. (WMATA ID 2000057), was not found during the inventory.

Bus service and bus stops are well-dispersed across the City of Takoma Park. Metrobus operates on the City's major arterials, including Eastern Ave., Ethan Allen Ave., New Hampshire Ave., Philadelphia Ave., and University Blvd. Ride On provides similar service, but also operates on Carroll Ave., Flower Ave., Maple Ave., and Piney Branch Rd. Shuttle-UM service between College Park and Silver Spring operates on Carroll Ave. and Flower Ave. A map of bus stops by service provider is included on the following page as Figure 2-5.

Figure 2-4: Metrobus and Ride On Bus Stop on Philadelphia Ave. at Cedar Ave.

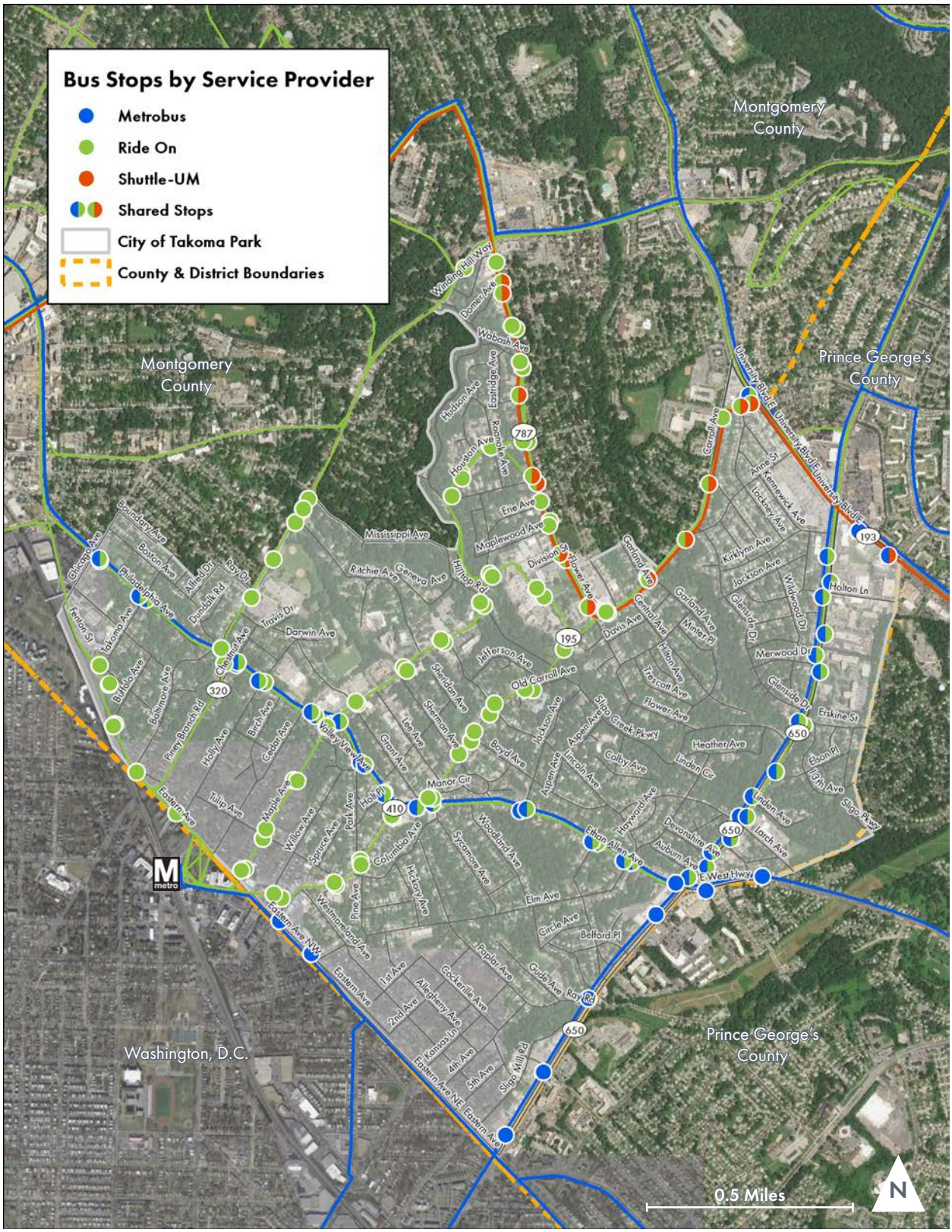
With 127 bus stops, Ride On is the dominant public transit provider in the City. Metrobus provides service at 51 bus stops while Shuttle-UM operates at 16. Table 2-1 provides a breakdown of the number of bus stops and service providers. Bus stop ownership is determined by the tallest head-sign at the bus stop; in Figure 2-4, for example, the stop is owned by Metrobus. Metrobus owns each of their 51 stops while Ride On owns 78 and shares service at 49 other bus stops.

Table 2-1: Surveyed Bus Stops by Service Provider

Service Provider	Metrobus	Ride On	Shuttle-UM
Total Bus Stops Served	51	127	16
Bus Stops Owned*	51	78	9
Shared with Metrobus	-	0	0
Shared with Ride On	40	-	9
Shared with Shuttle-UM	1	6	-

*Bus stop ownership is determined by the tallest head-sign at the bus stop.

Figure 2-5: City of Takoma Park Bus Stops by Service Provider



Bus Stop ADA Compliance

Based on the results of the field survey, each bus stop was categorized as either ADA compliant or ADA non-compliant based on the accessibility guidelines outlined in Chapter 1. These compliance categories are defined as:

- **ADA Compliant -** Bus stop meets all ADA Guidelines
- **ADA Non-compliant -** Bus stop does not meet one or more ADA Guidelines

Table 2-2 shows the distribution of bus stops by compliance category and service provider. Overall, 54 stops (39%) were determined to be ADA compliant and 84 stops (61%) were determined to be ADA non-compliant. Just over half of the Metrobus stops were compliant; but the majority of Ride On and Shuttle-UM bus stops were non-compliant.

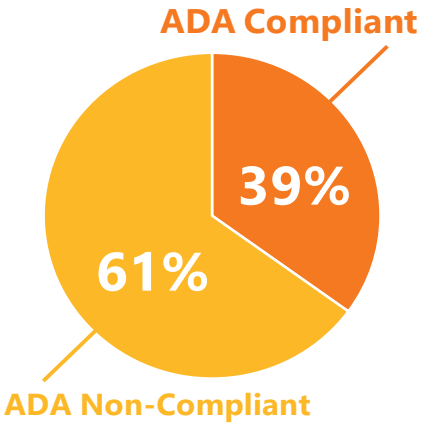


Figure 2-6: Bus Stop ADA Compliance

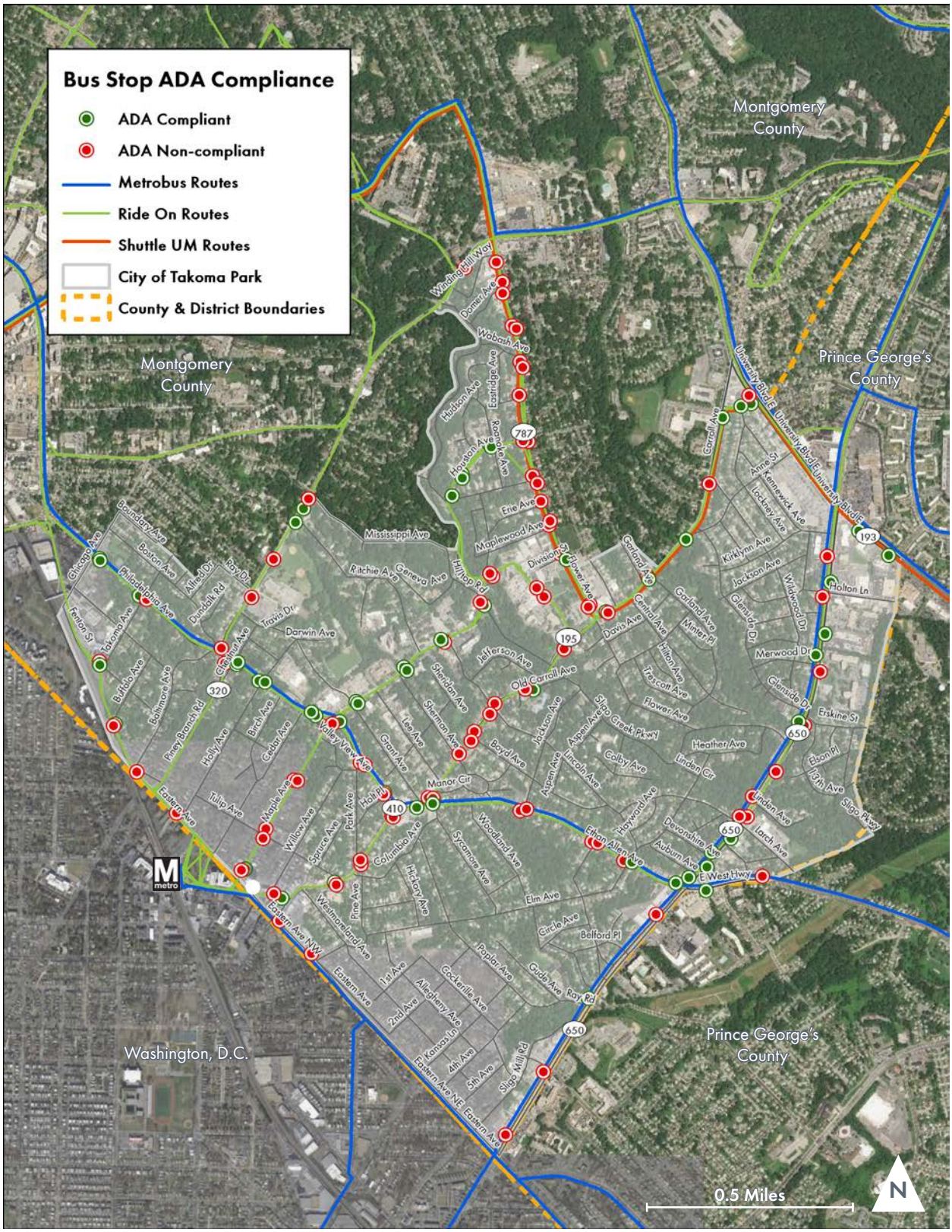
Table 2-2: Surveyed Bus Stops by Provider and Compliance Category

Compliance	Metrobus	Ride On	Shuttle-UM	Total	Percentage
Total Bus Stops	51	78	9	138	100%
ADA Compliant	27	24	3	54	39%
ADA Non-compliant	24	54	6	84	61%

Non-compliant bus stops were located across the City, but relatively large concentrations were found along Carroll Ave., Flower Ave., and Maple Ave. As seen in Figure 2-7 on Carroll Ave., many of these corridors feature narrow sidewalks that lack the required clearance for bus stop landing pads. The major intersections along Ethan Allen Ave., New Hampshire Ave., and Philadelphia Ave. were more likely to be ADA compliant than other areas of the City. A map showing ADA compliant and non-compliant stops is provided on the following page in Figure 2-8.

Figure 2-7: Narrow Sidewalks are a Leading Cause of ADA Non-compliance

Figure 2-8: Overview of Bus Stop ADA Compliance



Reasons for ADA Non-Compliance

The ADA Guidelines relating to bus stops primarily focus on boarding and alighting areas (landing pads), pathways, and passenger shelters. Other bus stop elements (e.g. bus stop sign, waste receptacle, etc.) can become obstructions or protrusions, but non-compliance results from encroachment into an area that should be clear and accessible.

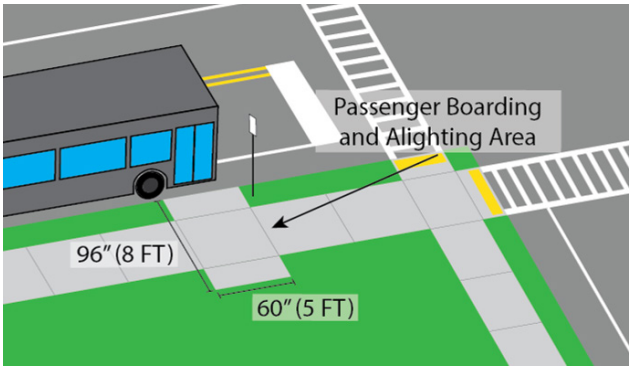
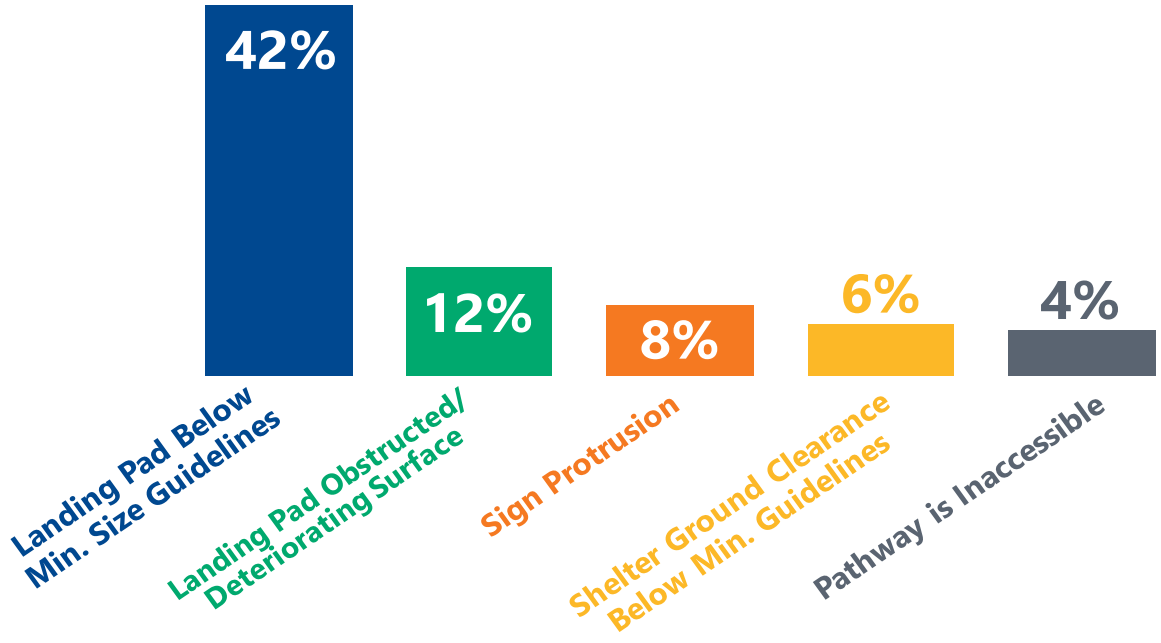


Figure 2-9: Landing Pad ADA Compliance

In the City of Takoma Park, landing pads that did not meet the minimum size guidelines were the leading cause of non-compliant bus stops. Shown in Figure 2-9, landing pads must connect from the street curb to the sidewalk, extend 96-inches from the curb, and 60" parallel to the bus. Landing pads must remain completely clear of any obstructions or protrusions and have a firm and stable surface with a maximum slope of 2%.

Illustrated in Figure 2-10, when combined, landing pad issues were surveyed in 54% of Takoma Park's bus stops. Other compliance factors included bus stop sign protrusions, inaccessible pathways/ sidewalks, and passenger shelters without adequate room for passengers with wheelchairs or mobility assistance devices.

Figure 2-10: Percentage of Bus Stops with an ADA Compliance Issue



Bus Stop Boarding and Alighting Areas

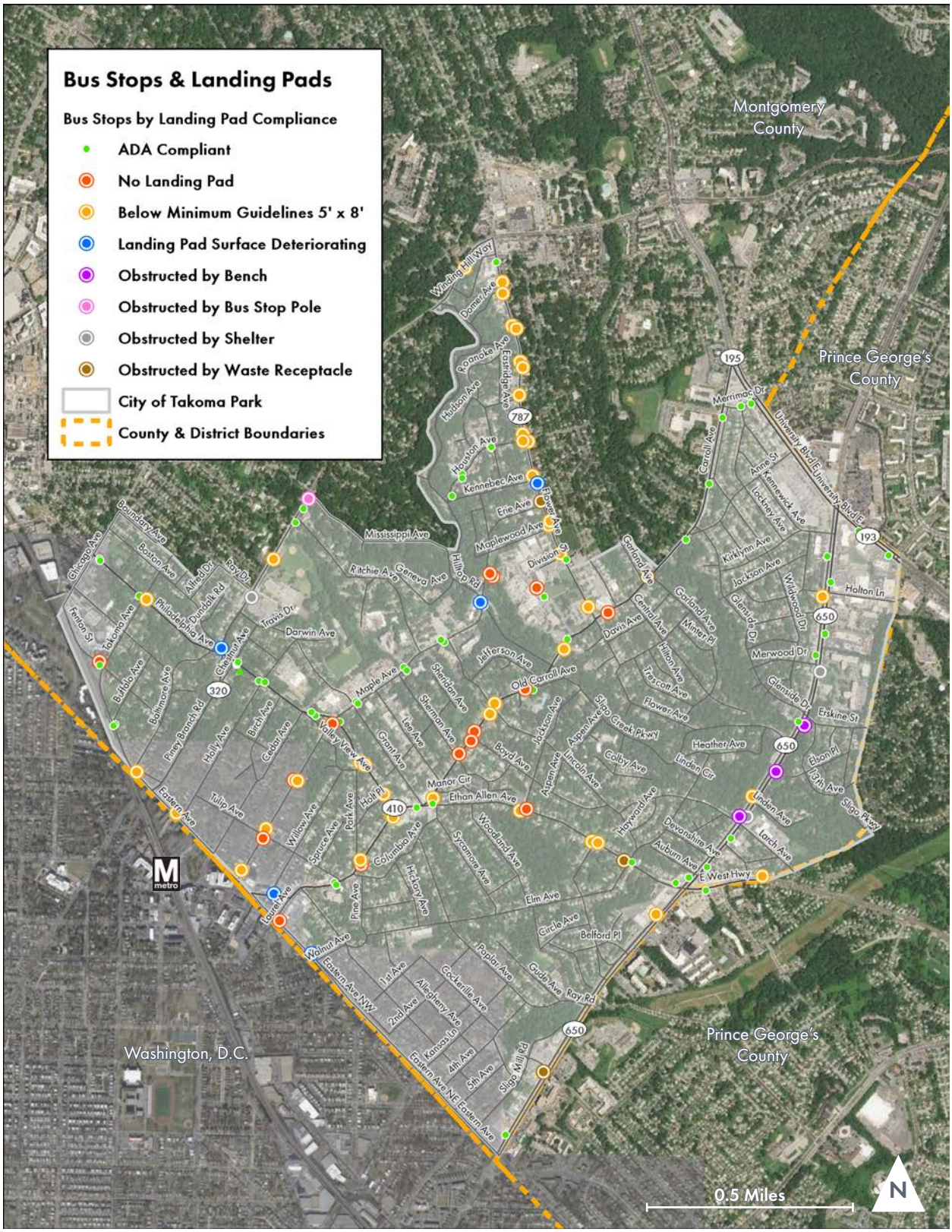
Passenger boarding and alighting areas, also referred to as landing pads, are one of the most critical bus stop elements under the ADA Guidelines. The ADA requires a firm, stable, and unobstructed landing pad that is at least 5 feet wide and 8 feet deep - oriented perpendicular to the roadway.

In all, 66 of the 138 surveyed bus stops had an ADA compliant landing pad that was connected to both the curb and the greater pedestrian network. Bus stops that used a small sidewalk as the landing pad were the leading impediment to landing pad compliance. Further details about the surveyed landing pads can be seen in Table 2-3 and Figure 2-11.

Table 2-3: Passenger Boarding and Alighting Areas (Landing Pads) Overview

Landing Pad Elements	Metrobus	Ride On	Shuttle-UM	Total	Percentage
Total Landing Pads	51	78	9	138	100%
ADA Compliant	30	35	3	66	48%
ADA Non-compliant	21	45	6	72	52%
Obstructed 5′ x 8′	*7*	*7*	*2*	*16*	*12%*
Less than 5′ x 8′	6	3	0	9	10%
Sidewalk (less than 5′ x 8′)	6	23	4	33	20%
No Landing Pad/Sidewalk	2	12	0	14	10%
Landing Pad Surface Problems					
No Surface Problems	47	55	8	110	79%
Catch Basin	0	1	0	1	<1%
Slope	1	2	0	3	2%
Uneven Pavement	1	3	0	4	3%
Major Cracks	0	5	1	6	5%
Landing Pad Obstructions					
No Obstructions	37	56	7	100	72%
Bench	4	0	0	4	3%
Shelter	2	1	0	3	2%
Trash Receptacle	2	4	1	7	5%
Wall	2	1	0	3	2%
Bus Stop Pole	0	1	0	1	<1%
Utility Pole	0	1	0	1	<1%
Other	2	1	0	3	2%
Landing Pad Material					
Asphalt	0	3	2	5	4%
Brick	0	3	0	3	2%
Concrete	49	57	7	113	82%
Other	0	3	0	3	2%

Figure 2-11: Overview of Landing Pad Compliance



Accessible Pathways

Accessibility goes beyond the bus stop. The ADAAG Standards state that bus stop landing pads shall be connected to streets, sidewalks, or pedestrian paths by an accessible route. In general terms, the bus stop area extends from the landing pad to the nearest connection to the greater pedestrian network. In most cases, this connection is the curb ramp closest to the bus stop.

Nearly every bus stop in the City of Takoma Park has an accessible connection to the sidewalk network. However, a handful of inaccessible bus stops were observed during the field survey. Three notable standouts are shown in Figure 2-12.

The bus stop pictured on the top right, located along University Blvd. in Prince George's County, is situated on a concrete median between the main travel lanes and the parking access lane. The narrow median lacks a pedestrian access ramp and is too narrow for a bus's ramp to be deployed. For passengers with mobility assistance devices this bus stop is challenging to reach and waiting for the bus results in exposure to oncoming traffic.

Sidewalk barriers and obstructions are also bus stop accessibility challenges. Pictured center right, the bus stop's access to the curb ramp and crosswalk is obstructed by a utility pole. All accessible routes must maintain a minimum width of 48 inches. While this example directly impacts access to the bus stop, the entire sidewalk network is subject to ADA standards.

Only one stop was found with no sidewalk access, pictured bottom right. The stop is located on the hospital access road near the intersection of Maple Ave. and Sligo Creek Pkwy. The stop is on hospital property; there is a sidewalk on the opposite side of the access road and along Maple Ave.

Figure 2-12: Examples of Bus Stops Lacking Accessible Connections

Bus Stop Signage

A bus stop sign is the defining element of a bus stop. It establishes the location to board the bus for residents and visitors and also ensures consistent service to and from defined locations. Each of the three transit agencies that operate in Takoma Park have policies that only allow passengers to board and alight at signed bus stops.

Signs are a key marketing tool for transit agencies. They advertise the service while also providing route and contact information. Seen in Figure 2-13, all Metrobus and Shuttle-UM signs are designed in the "blade" style where the sign cantilevers from the pole. Ride On signs varied between three distinct styles - full size (pictured at the shared Ride On and Shuttle-UM stop), shared blade (pictured at the shared Metrobus and Ride On stop, and a standalone blade (not pictured). Ride On is currently in the process of updating and replacing the standalone blade style signs with the two sign types pictured in Figure 2-13.

Figure 2-13: Bus Stop Signs in the City of Takoma Park

While the City of Takoma Park is not responsible for bus stop signage, the City should ensure that signs do not become protrusions and bus stop poles are not pathway or landing pad obstructions. Detailed in Table 2-4, 196 signs were surveyed at the 138 bus stops. These signs all account for shared bus stops; except for two Ride On bus stops where two Ride On signs are used as a means to display all route information.

Table 2-4: Bus Stop Signage Overview

Signage Elements	Metrobus	Ride On	Shuttle-UM	Total	Percentage
Total Signs	51	129	16	196	100%
Sign Damaged	1	5	1	7	4%
Sign Protrusion	51	10	2	12	6%
Bus Stop Pole Obstruction	0	1	0	1	<1%
Sign Style					
Blade	51	40	16	107	55%
Full-size	0	72	0	72	37%
Ride On Standalone Blade	0	17	0	17	9%

Bus Stop Passenger Amenities

The majority of bus stops in Takoma Park feature some type of passenger amenity. The most common amenity is lighting, which is a key element in promoting a sense of safety at the bus stop during dark early morning and evening hours.

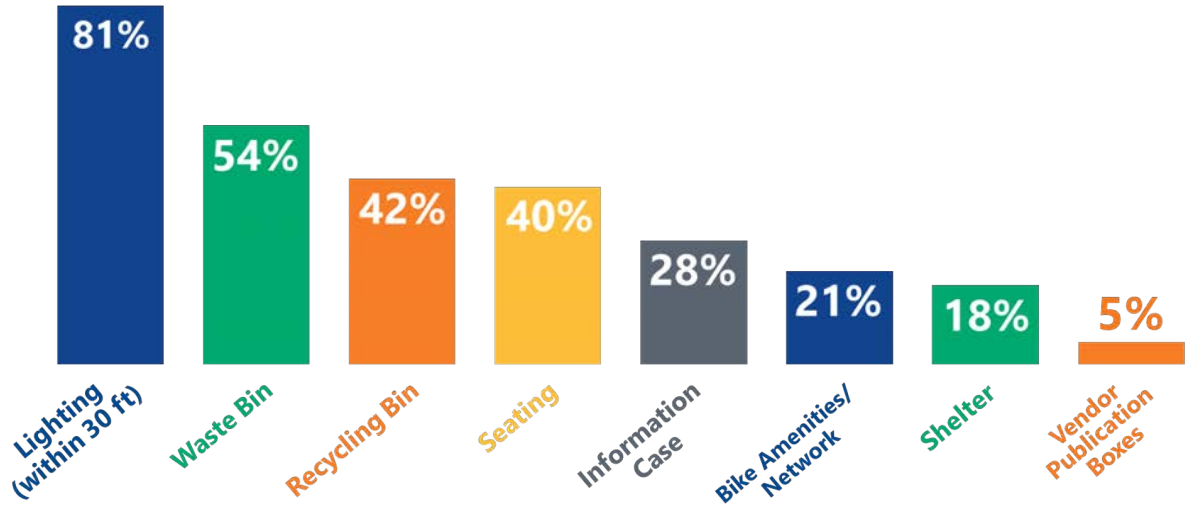
Forty percent of the bus stops featured passenger seating in the form of benches or chairs. Several of Takoma Park's bus stops feature unique seating options like wooden Adirondack chairs and porch rockers (see Figure 2-14).

Figure 2-14: Bus Stop Passenger Amenities in the City of Takoma Park

Passenger shelters are located at 18% of bus stops. The City of Takoma Park currently utilizes a contract vendor to install and maintain bus stop shelters in exchange for the advertising rights on the shelter.

Public transit information is provided at 28% of Takoma Park's bus stops. Many of the City's bus stops feature distinctive cylindrical information cases attached to bus stop poles. Bike amenities, including racks, bike lanes, and Capital Bikeshare Stations were found at 21% of stops.

Figure 2-15: Percent of Bus Stops with Passenger Amenities



Bus Shelters

Bus stop shelters provide needed refuge from the elements and seating for passengers waiting for the bus. During the field survey, 25 bus stop shelters were located in the City. There are a number of publicly or independently maintained bus stop shelters in Takoma Park, including the stone built shelter pictured on the top right in Figure 2-16. The City currently has a contract with InSite Street Media, a private company that installs and maintains shelters in exchange for the advertising rights on the shelter. InSite has specific site requirements for shelters; they must be located in high traffic areas that are attractive and viable for advertisers. An InSite bus shelter is pictured in the bottom photo of Figure 2-16.

Figure 2-16: Examples of Bus Stops with Shelters

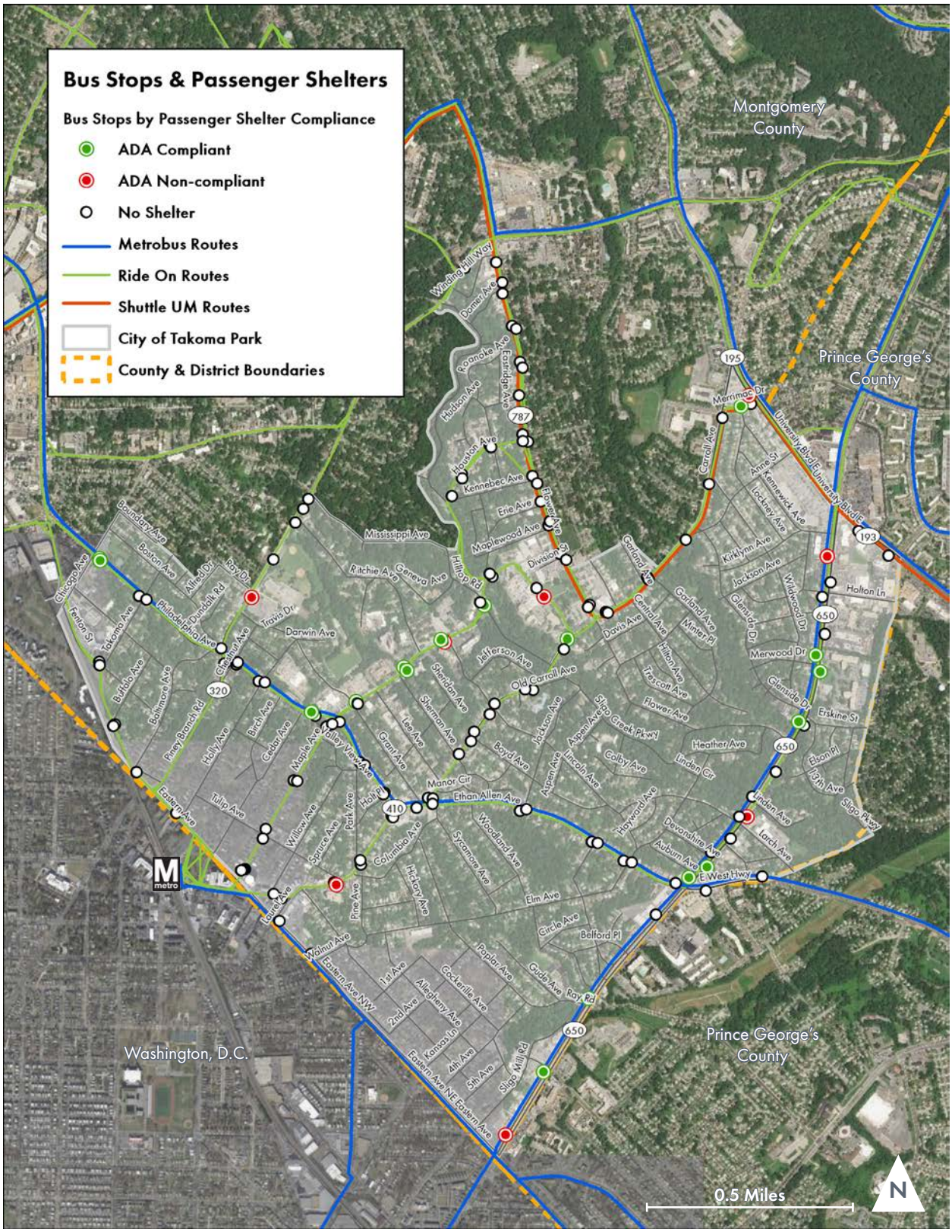
The ADA guidelines stipulate that all shelters must have an open interior space within the shelter that is at least 30 inches wide and 48 inches deep. Of the 25 bus shelters, 17 (68%) are ADA compliant. The eight non-compliant shelters have either entry barriers or lack adequate interior space.

A number of the InSite bus shelters were flagged for ADA non-compliance due to inadequate interior space. The placement of the interior bench was a key determinant in the compliance of these shelters. The triangular design of the shelter's advertisement panel encroaches into the interior clear space. This coupled with an oversized or poorly placed bench reduces the clearance of the interior space to below ADA guidelines. Table 2-5 and Figure 2-17 provide additional bus shelter details.

Table 2-5: Bus Shelter Overview

Shelter Elements	Metrobus	Ride On	Shuttle-UM	Total	Percentage
Total Stops	51	78	9	138	100%
Stops with Shelter	14	10	1	25	17%
Stops without Shelter	37	68	8	113	83%
Shelter Compliance					
ADA Compliant	10	6	1	17	68%
ADA Non-Compliant	4	4	0	8	32%

Figure 2-17: Overview of Shelter Compliance



Passenger Seating

Passenger seating provides comfort for waiting passengers while improving the visual appeal of a bus stop and creating a sense of character in the community. Fifty-five bus stops (40%) have some form of passenger seating; including benches and chairs. Seating ranges from brightly colored wooden porch rockers (Figure 2-18) and Adirondack chairs to benches made of aluminum, cast iron, steel, or wood. Seating is available across the City, but concentrations are found along Carroll Ave., Maple Ave. and New Hampshire Ave.

Figure 2-18: Porch Rockers

Passenger seating may not interfere with the bus stop landing pad or the minimum 4-foot wide accessible pathway. During the field survey, four locations were found to have a landing pad obstruction due to passenger seating. Even though seating is a highly desired amenity, accessibility should take precedence. Seating was well maintained and no major damages were documented. Table 2-6 provides an overview of passenger seating in the City of Takoma Park.

Table 2-6: Passenger Seating Overview

Seating Elements	Metrobus	Ride On	Shuttle-UM	Total	Percentage
Total Stops	51	78	9	138	100%
Stops with Seating	30	21	4	55	40%
Stops without Seating	21	57	5	83	60%
Seating Type by Bus Stop*					
Freestanding Bench	14	13	3	30	22%
Shelter Bench	13	10	1	24	17%
Adirondack Chair	2	0	0	2	1%
Porch Rocker	2	0	0	2	1%
Total Number of Bus Stop Seating Elements*					
Total Seating Elements	42	24	5	71	100%
Freestanding Bench	20	14	4	38	54%
Shelter Bench	13	10	1	24	34%
Adirondack Chair	3	0	0	3	4%
Porch Rocker	6	0	0	6	8%

*Some bus stops had more than one type of seating and/or more than one seating element.

Information Cases

Bus stop information cases provide route maps, schedules, and other pertinent information to passengers. Of the City's 138 bus stops, 38 were found to have at least one information case. All information cases are installed on bus stop poles. Both the City and WMATA have posted information cases in Takoma Park.

Figure 2-19: Information Cases

The most common information cases are the blue tube or turnable cases pictured in Figure 2-19. These cases are a notable characteristic of bus stops in Takoma Park. They are located at 29 bus stops (21%) and three of those bus stops have two turnable information cases mounted side by side. Metrobus information cases have been placed at bus stops in Takoma Park by WMATA. These include pole mounted flat panel cases and rectangular/four-sided cases. Metrobus information cases are posted at 10 bus stops (7%).

Information cases are not specifically referred in the ADA guidelines. However, care should be taken to ensure individuals with disabilities are able to access the information posted. ADA guidance recommends that public information should be posted between 48 and 67 inches from the ground and on a paved area with ADA compliant maneuvering clearances.

Table 2-7: Information Case Overview

Info. Case Elements	Metrobus	Ride On	Shuttle-UM	Total	Percentage
Total Stops	51	78	9	138	100%
Stops with Info. Cases	26	9	4	38	28%
Information Case Style					
Bullet/Turnable	16	9	4	29	21%
Flat - Double Sided	4	0	0	4	3%
Flat - Single Sided	2	0	0	2	1%
Rectangular (4-sided)	4	0	0	4	3%
Information Case Accessibility					
Accessible	6	23	0	29	76%
Not accessible	5	4	0	9	24%

Bicycle Network & Amenities

A key element of the City's sustainability initiative, Takoma Park has encouraged the use of alternative transportation methods such as public transportation and bicycling. With improved bicycling amenities at bus stops - protected bicycle lanes and storage racks - the bike network can help support the public transportation network and vice versa. Bikes are an excellent first mile/last mile solution for individuals traveling to and from the bus stop. As most buses are equipped with bicycle racks, the complementary nature of bicycling and public transit justifies enhanced infrastructure for cyclists to make a multimodal connection at bus stops.

Figure 2-20: Sharrow Lane Adjacent to a Bus Stop on Carroll Ave.

Throughout Takoma Park, several bus stops are located on roads with designated bikeways and surrounding bicycle-related amenities, including bike racks, bike repair stations, and Capital Bikeshare stations. Shown in Table 2-8, 28% of bus stops are located on streets that make up the bicycle network and another 13 stops provide bicycle-related amenities.

Table 2-8: Bicycle Network Overview

Bike Elements	WMATA	Ride On	Shuttle-UM	Total	Percentage
Total Stops	51	78	9	138	100%
Stops on Bike Network	4	25	1	30	28%
Stops with Bike Amenities	7	6	0	13	9%
Stops on Bike Network					
Marked Lane	0	15	1	16	12%
Protected Lane	1	0	0	1	<1%
Sharrow	3	10	0	13	9%
Stops with Bike Amenities					
Bike Racks	2	4	0	6	4%
Capital Bikeshare	4	2	0	6	4%
Bike Repair Station	1	0	0	1	<1%

Other Amenities

Many bus stops throughout Takoma Park have other passenger amenities including trash receptacles, recycling bins, publication boxes, and street lighting. These amenities help improve the transit experience by keeping bus stops clean (trash and recycling receptacles), providing diversions to waiting passengers (vendor publication boxes), and improving stop safety (lighting).

Adequate lighting and trash receptacles were found at a majority of bus stops in Takoma Park, see Table 2-9. Since the survey was conducted during daylight hours, lighting was deemed adequate at the stop if it was located within 30-feet of the landing pad.

Table 2-9: Other Amenities Overview

Other Amenities	WMATA	Ride On	Shuttle-UM	Total	Percentage
Total Stops	51	78	9	138	100%
Lighting within 30'	47	59	6	112	81%
Trash Receptacle	35	32	8	75	63%
Recycling Bin	27	25	6	58	42%
Vendor Publication Boxes	4	3	0	7	5%

Figure 2-21: Bus Stop with a Trash Receptacle, Recycling Bin & Publication Boxes

The Carroll Ave. & Adventist Hospital Drwy. Bus Stop Features a Custom Built Stone Shelter

Chapter 3
Bus Stop Design Factors & Best Practices

Introduction

The field survey results summarized in Chapter 2 give the City of Takoma Park a thorough inventory of existing amenities and ADA compliance at all of the 138 bus stops. The existing conditions analysis showed that a majority of bus stops in Takoma Park are ADA non-compliant, demonstrating a need for comprehensive bus stop accessibility improvements. With the need for a city wide effort, staff and officials should be equipped with an understanding of basic bus stop design factors and best practices.

Chapter 3 provides an overview of basic bus stop placement and design factors as well as best practices from Maryland and the Washington Metropolitan Area. This chapter's conceptual illustrations are meant to serve as broad guidelines for future bus stop improvements. Every bus stop location is unique, installing or expanding sidewalks and landing pads will require an engineering assessment. The best practices featured in this chapter were considered for their attractiveness, efficiency, and ADA compliance.

Bus Stop Placement

Bus stops are largely centered around intersections due to the greater likelihood of safe and accessible pedestrian infrastructure including curb ramps, crosswalks, and pedestrian signals. However, the best placement depends upon vehicle and pedestrian travel patterns at the intersection, right-of-way availability, bus routing, and pedestrian facilities at the site.

The three general placement categories for bus stops are:

- Near-Side – before the bus passes through the intersection
- Far-Side – after the bus passes through the intersection
- Mid-Block – between intersections

Shown on the following page in Figure 3-1, the categorization of bus stop placement generally refers to the placement of the stop relative to the nearest intersection. There are advantages and disadvantages to each placement type; these are summarized in Table 3-1. All of these options can be safe and effective when used in the proper context. The following section outlines specific considerations for the three placement categories and other general placement factors.

Figure 3-1: Bus Stop Placement Categories

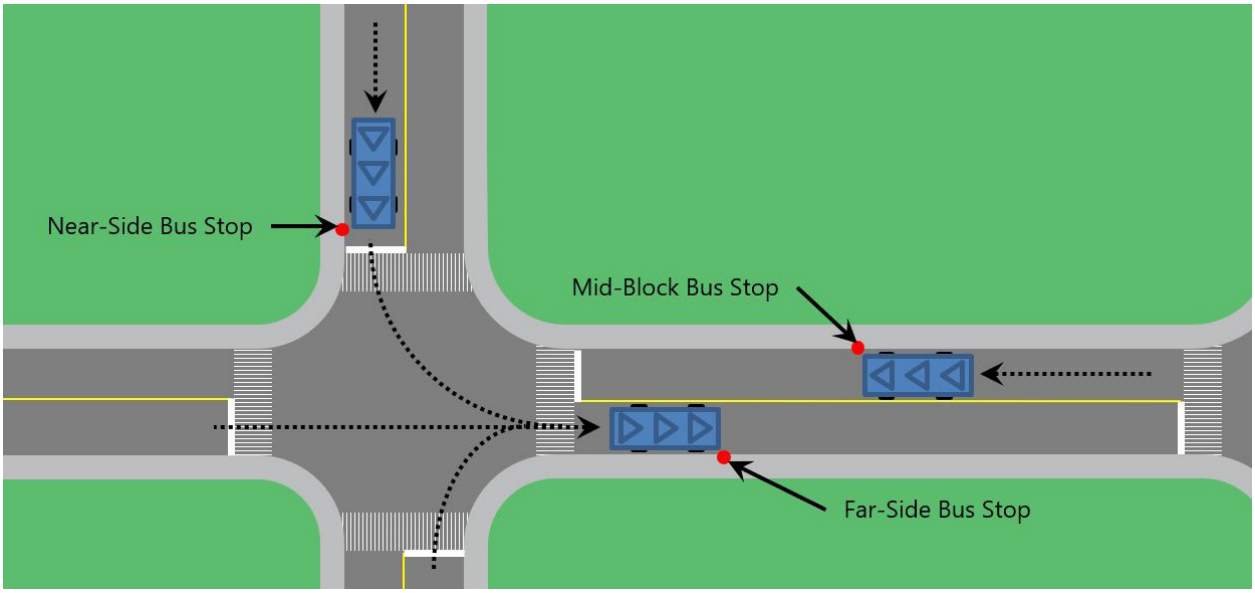


Table 3-1: Bus Stop Placement Overview

Placement	Advantages	Disadvantages	When Recommended
Near-Side	Allows passengers to board and alight while the bus is stopped at a red light Passengers can access the bus close to the crosswalk Minimizes interference with heavy traffic on the far-side of the intersection	Increases conflicts with right turning vehicles Stopped buses may obscure traffic and pedestrian control devices May block the through lane during peak periods	Traffic is heavy on the far-side Pedestrian controls and infrastructure is safer on the near-side Bus routing continues through the intersection
Far-Side	Encourages pedestrians to cross behind the bus Provides greater right turn capacity at the intersection versus near-side stops Drivers can take advantage of gaps in traffic created by the intersection	Traffic may queue behind bus blocking the intersection Could obscure sight lines for crossing vehicles May require the bus to stop after stopping for a red light	There is a high volume of right turns Intersections with multi-phase signals or dual turn lanes Traffic is heavier on the near-side
Mid-Block	Minimizes sight distance problems for pedestrians and vehicles Buses experience less pedestrian and traffic congestion	Encourages jaywalking Increases walking distance for passengers crossing intersections	Problematic traffic conditions at the nearest intersection Passenger generator is located mid-block

Near-Side Bus Stops

Near-side bus stops are popular due to the proximity of the stop to crosswalks and the ability to time a stopping bus with a red traffic light; note the bus stop pictured in Figure 3-2.. However, near-side bus stops can encourage other drivers to attempt to overtake the bus when turning right, leading to possible pedestrian and vehicular collisions. Use the following guidelines when deciding to place a near-side bus stop.

Figure 3-2: Near-Side Bus Stop on Philadelphia Ave.

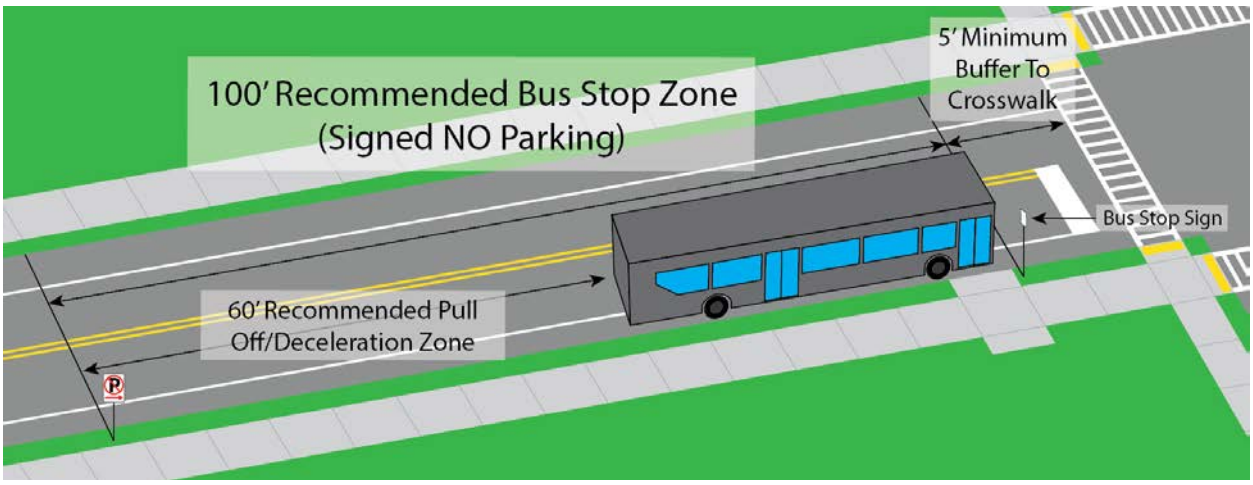
Utilize Near-Side Bus Stops If:

- The primary trip generator is on the near-side of the intersection
- Existing pedestrian facilities are greater and safer than on the far-side
- The route requires a right turn at the intersection
- Vehicle traffic is heavier on the far-side of the intersection

Specific Design Factors to Consider:

- Install a 100' bus stop zone with enforceable no parking signs
- Provide a 5' buffer between the stopped bus and crosswalk/intersection
- Provide a 60' pull off/deceleration zone before the bus stop

Figure 3-3: Near-Side Bus Stop Design Considerations



Far-Side Bus Stops

Far-side stops are popular because they encourage passengers to cross behind the bus and allow the bus operator to utilize gaps in traffic created by the intersection. However, far-side bus stops can lead to an unexpected stop for drivers following the bus and may lead to queuing in the intersection. Use the following guidelines when deciding to place a far-side bus stop.

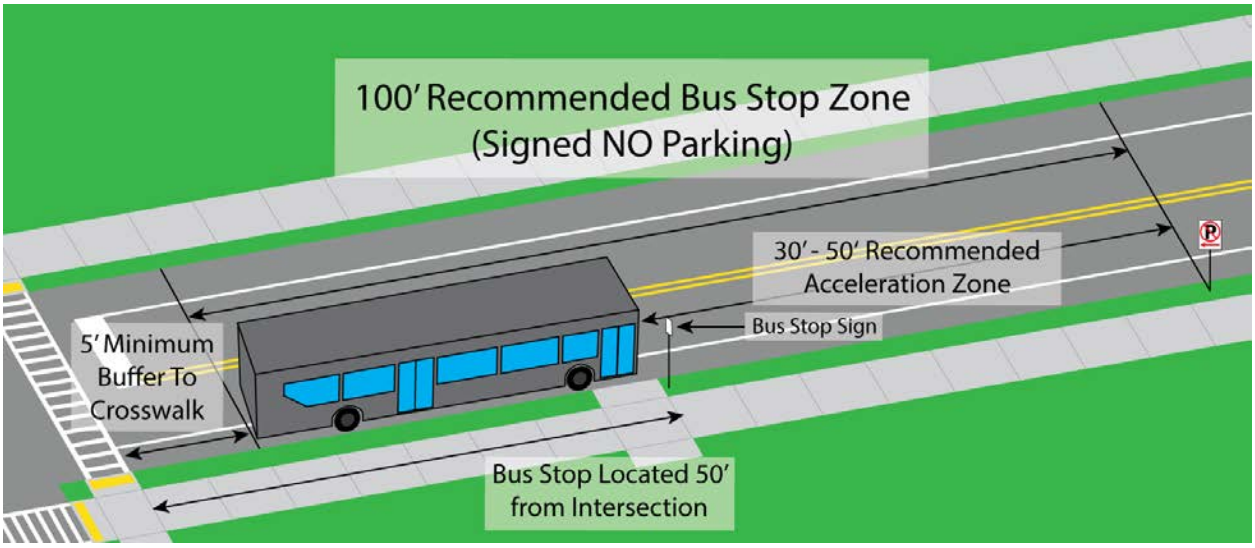
Utilize Far-Side Bus Stops If:

- The near-side of the intersection is a right turn only lane
- The primary trip generator is on the far-side of the intersection
- Existing pedestrian facilities are greater and safer than on the near-side
- There is a high volume of right turns on the near-side of the intersection
- Vehicle traffic is heavier on the near-side of the intersection

Specific Design Factors to Consider:

- Install a 100' bus stop zone with enforceable no parking signs
- Locate the bus stop at least 50' after the intersection to ensure the bus does not extend into the intersection and/or straddle the pedestrian crosswalk
- Provide a 5' buffer between the stopped bus and crosswalk/intersection
- Provide a 30' to 50' acceleration zone after the bus stop

Figure 3-4: Far-Side Bus Stop Design Considerations



Mid-Block Bus Stops

Mid-block bus stops are generally not preferred unless there is a mid-block pedestrian crosswalk near the stop. Other situations may necessitate a mid-block stop, including a major trip generator that is between intersections and locations that experience heavy traffic congestion around intersections. Use the following guidelines when deciding to place a mid-block bus stop.

Utilize Mid-Block Bus Stops If:

- The closest intersection is typically congested or has a complex alignment
- The primary trip generator is located mid-block
- Existing pedestrian facilities are greater and safer than at the intersection

Specific Design Factors to Consider:

- Install a 110' to 150' bus stop zone with enforceable no parking signs
- Provide a 40' to 60' pull off/deceleration zone before the bus stop
- Provide a 30' to 50' acceleration zone after the bus stop

Figure 3-5: Mid-Block Bus Stop Design Considerations

Bus Stop Pairs

A key for passenger convenience is establishing bus stop pairs. While this is not feasible along one-way or loop route segments, any bi-directional route segments should have an inbound and outbound stop located in close proximity to one another – preferably across the street. Ensuring that a bus stop is located along a safe pedestrian pathway helps promote transit ridership by empowering more customers to use the system.

Bus Stop Spacing

The spacing of bus stops is an optimization matter that attempts to balance the needs of passengers and operators. A greater distance between bus stops reduces the amount of deceleration/acceleration and therefore could reduce the overall operating time of the route to provide customers with a more rapid ride. The disadvantage to having a greater distance between bus stops is that some passengers will be required to walk further to the nearest stop, and may find this inconvenience enough of a deterrent, or even a hardship, to prevent them from riding. WMATA's bus stop spacing standard is four to five stops per mile for local service and two to three stops per mile for limited stop service.

Driveways

As a general rule of thumb, avoid the placement of bus stops in close proximity to driveways whenever possible. If this is unavoidable, adhere to the following guidelines:

- Attempt to keep at least one exit and entrance driveway open for vehicles to access the site
- Locate the stop where visibility for vehicles leaving the site is not obstructed
- Locate the stop so that passengers do not wait, board, or alight in the driveway
- It is preferable for the bus to fully block, rather than partially block, a driveway

Sight Lines

Bus stops should be located where they are clearly visible to the approaching bus operator as well as to other drivers and bicyclists. To minimize the risk of a bus being struck from behind while stopped or pulling back into traffic from an off-street bus stop, bus stops should not be placed over the crest of a hill or immediately beyond a curve where traffic is curving right.

On-Street Bus Stops

On-street bus stops are those where the bus comes to a halt in the travel lane, parking lane, or shoulder of the road. These three types of bus stops are the most frequently used because of their operating efficiency. They provide easy access for bus operators and have minimal delays to service. In addition, these types of stops can be established, relocated, or eliminated with relative ease.

Figure 3-6: On Street Bus Stop on Philadelphia Ave.

While on-street bus stops have a big advantage due to their minimal infrastructure, they can lead to increased congestion in high ridership and traffic areas. Safety concerns should be considered for bus stops in travel lanes. Some specific site considerations for on-street stops include:

- Posted speed limit should not exceed 45 mph
- Adequate street lighting
- Close proximity to controlled intersection
- Availability of pedestrian facilities (sidewalks, curb ramps, crosswalks)
- Adequate right-of-way for expanded passenger amenities and wheelchair access

Bus Stop in Travel Lane

Bus stops in a travel lane require minimal design and are the simplest of the three types of on-street bus stops to establish. Stops in the travel lane should be avoided at locations with high volumes of passenger activity where the bus may be stopped for significant periods of time.

Specific Design Factors to Consider:

- Ensure an ADA compliant landing pad connects to the curb and the pedestrian network
- Avoid this design at locations with high ridership and/or heavy traffic

Bus Stop on Shoulder

Similar to bus stops in parking lanes, a no parking zone would need to be designated and signed along the road's shoulder. The no parking zone should also allow adequate space for the buses acceleration and deceleration areas. It is recommended that there be at least 60' signed as no parking behind a stopped bus.

Specific Design Factors to Consider:

- Ensure adequate space for a no parking zone of 100' with 60' behind a stopped bus
- Ensure an ADA compliant landing pad connects to the curb and the pedestrian network
- Buses may have difficulty pulling back into traffic in congested areas
- Illegally parked cars may render the bus stop inaccessible

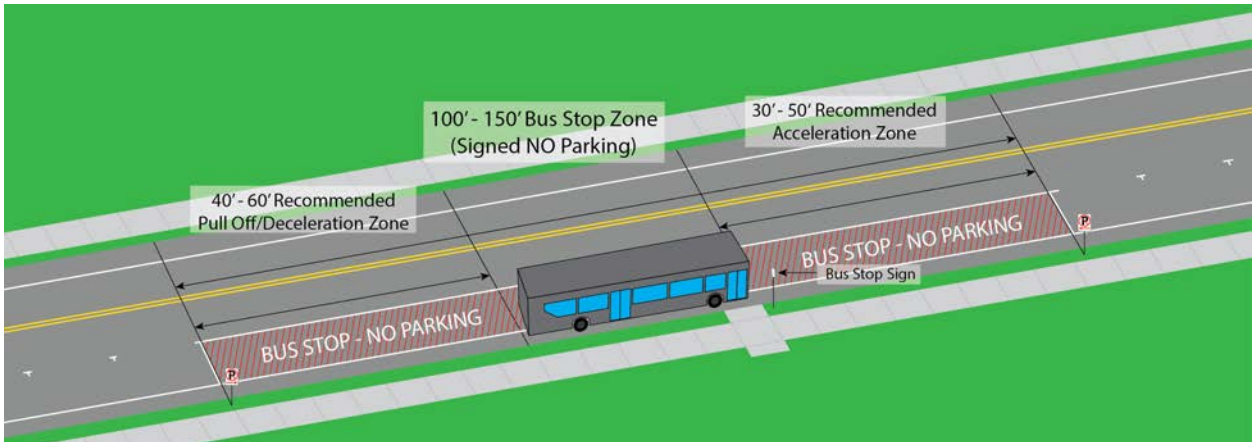
Bus Stop in Parking Lane

When establishing a bus stop in a parking lane or zone, it is crucial to designate and sign the bus stop area as a no parking zone. The no parking zone needs to include adequate space to accommodate the bus as well as acceleration and deceleration areas. If parked cars block bus access to the curb it may render the bus stop inaccessible and unusable for wheelchair-bound passengers. An alternative to the parking lane would be a curb bulb which would mitigate the issue of illegally parked cars and reduce the space needed for acceleration and deceleration areas.

Specific Design Factors to Consider:

- Ensure adequate space for a no parking zone of 110' to 150'
- Ensure an ADA compliant landing pad connects to the curb and the pedestrian network
- Buses may have difficulty pulling back into traffic in congested areas
- Illegally parked cars may render the bus stop inaccessible

Figure 3-7: Design Considerations for Bus Stops in Parking Lanes



Bus Curb Bulb

Sometimes referred to as bus bulbs, curb extensions, sidewalk extensions, or bulb-outs; curb bulbs are used to extend the boarding area adjacent to the travel lane. This is a useful design when site constraints prevent the construction of an ADA landing pad and in heavy traffic areas where it is difficult for the bus to pull in and out of traffic. Design considerations are shown in Figure 3-9. Curb bulbs can maximize the amount of on-street parking around bus stops and minimize needed curb clearances. Curb bulbs are traditionally constructed by expanding the concrete sidewalk, but some municipalities have begun using heavy duty plastic snap-in-place boarding platforms (Figure 3-8). These curb bulbs are reasonably priced compared to concrete expansion and can be easily installed.

Figure 3-8: Snap In Place Plastic Bus Bulb in Olympia, WA

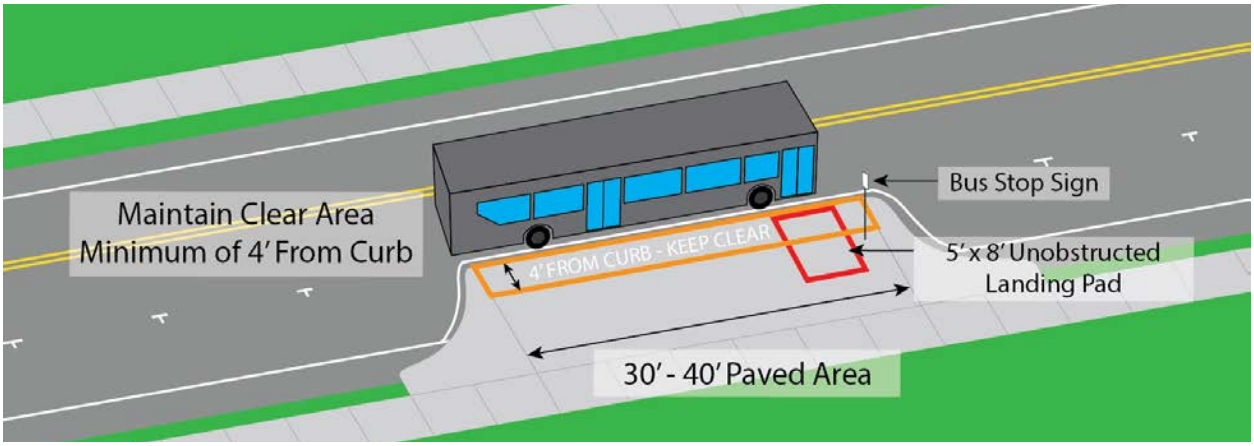
Utilize Curb Bulbs If:

- Parking is critical in the bus stop area
- Limited curb clearance exists in the bus stop area
- Bus delays when re-entering the traffic lane
- There are no restrictions on parking

Specific Design Factors to Consider:

- Requires a 30' to 40' paved area parallel to the travel lane
- An ADA compliant landing pad should fit fully within the curb bulb itself
- A 4' clear area must be maintained near the travel lane

Figure 3-9: Design Considerations for Curb Bulb Bus Stops



Bus Bay

Bus bays allow buses to pick up and drop off passengers outside of the travel lane. This allows traffic to flow unobstructed while the bus is stopped. There are various types of bus bays; but parallel bus bays are the most common outside of transfer centers. Parallel bus bays are constructed as an inset into the curb (see Figure 3-10) and can be closed or open. Closed bus bays have tapered ends for acceleration and deceleration and open bus bays have one end tapered and one end that continues as a through lane.

Figure 3-10: Bus Bay on Carroll Ave.

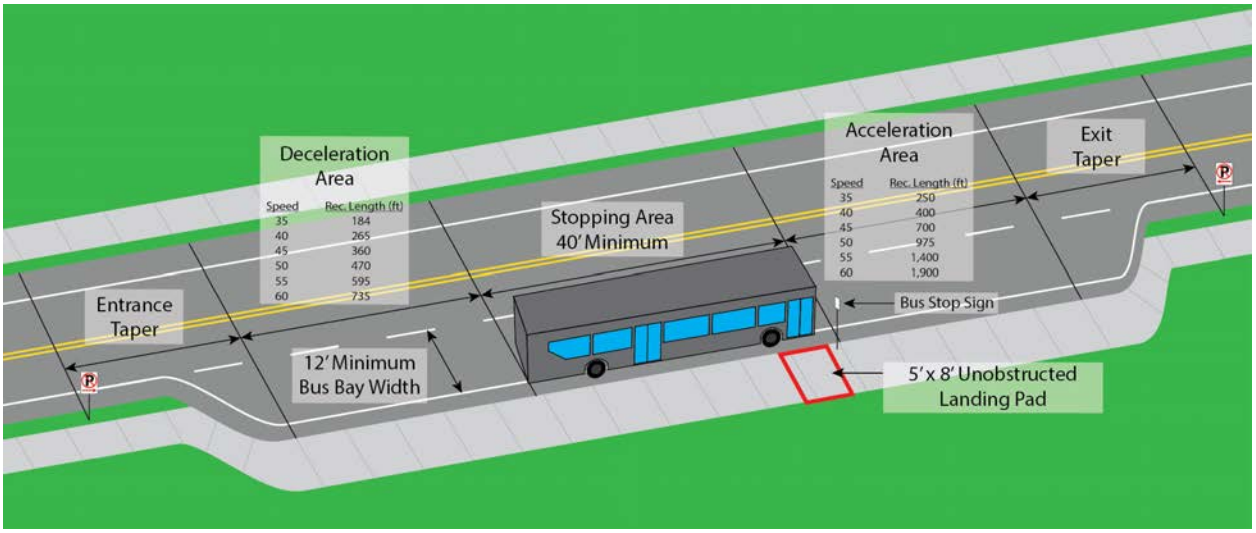
Utilize Bus Bays If:

- Traffic speeds exceed 45 mph
- Average peak-period dwell time exceeds 30 seconds per bus
- Buses are expected to lay over
- Multiple buses serve the stop at the same time
- There is a history of vehicles colliding into the rear of the bus

Specific Design Factors to Consider:

- Ensure adequate space for acceleration and deceleration areas (see Figure 3-11)
- Ensure an ADA compliant landing pad connects to the curb and the pedestrian network
- Buses may have difficulty pulling back into traffic in congested areas

Figure 3-11: Design Considerations for Bus Bay Bus Stops



Bus Stop Island

A bus stop island is separate from the primary pedestrian network due to a service road or bicycle lane. In Takoma Park, several bus stops on New Hampshire Avenue are located on a bus stop island due to the road's southbound service road (see Figure 3-12). When installing a bus stop island, it is important to ensure that pedestrians have a safe and accessible crossing from the sidewalk to the island. On the bus stop island, there must be an ADA compliant boarding and alighting area, and bus stop signage. If an existing bus stop island does not have a 5' by 8' landing pad, steps should be taken to widen the island to create space. Additional amenities should be installed only if they do not compromise a bus stop's ADA compliance.

Utilize Bus Stop Island If:

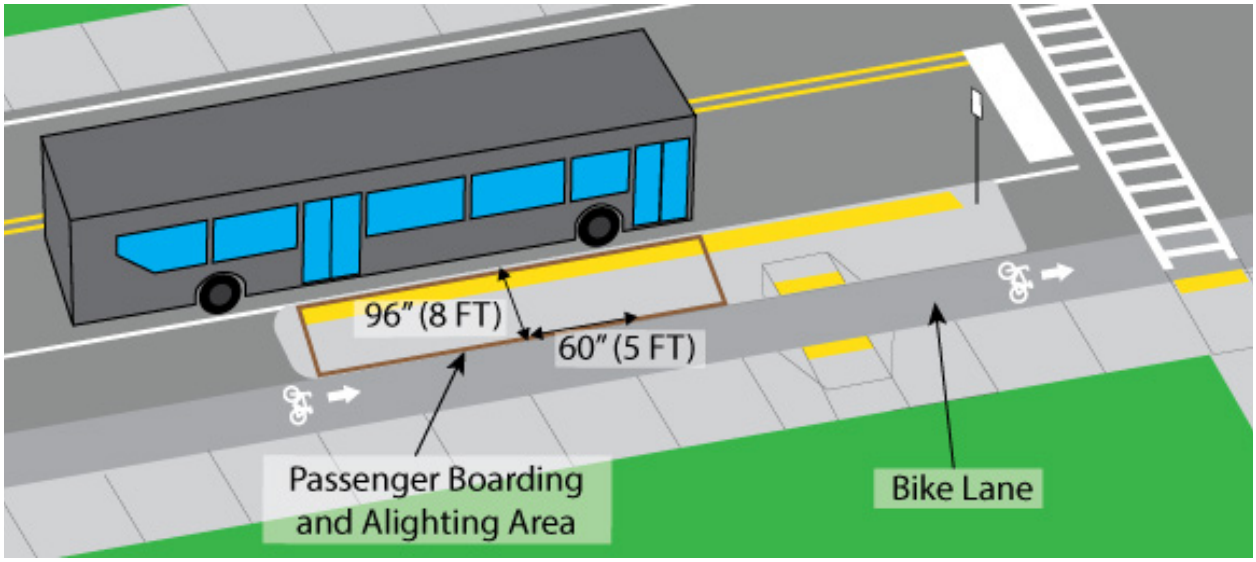
- There is a service road
- There is a bicycle lane
- The street is heavily congested, making pulling in and out of traffic more time-consuming

Figure 3-12: Bus Stop Island on New Hampshire Ave.

Specific Design Factors to Consider:

- Provide an ADA accessible crossing between the sidewalk and the island, including crosswalk markings, curb ramps, and detectable warnings
- Ensure an ADA compliant landing pad connects to the curb and the pedestrian network
- Only install shelters, passenger seating, and other amenities if space allows

Figure 3-13: Design Considerations for Bus Stop Islands



Bus Stop Amenities - Best Practices

Landing Pad & Sidewalk

Constructing and maintaining flat, properly sized landing pads and sidewalks is one of the most important, and costly, improvement activities to ensure ADA compliance. Despite the simple and straightforward guidelines, constructing and maintaining landing pads may require enhanced engineering solutions.

Landing Pad and Sidewalk Design Factors to Consider:

- Landing pads must be 100% clear of any obstructions and free of dirt and debris at all times
- Landing pads must be at least 5 by 8 feet and physically connected to a sidewalk/accessible pathway
- A backstop/knee wall is useful for bus stops with steep elevation changes and erosion issues
- Sidewalk must be at least 4' wide and compliant with the PROWAG

The three landing pads in Figure 3-14 demonstrate different ways that construction is influenced by existing sidewalks and adjacent land conditions. The left image shows a landing pad developed by expanding the sidewalk through a grassy buffer and to the street curb. In areas without landscape buffers, the landing pad would extend opposite of the curb as shown in the middle image. The right image shows a landing pad with a knee wall which provides protection from erosion accumulation or as a backstop for landing pads backing up to a steep ditch.

Figure 3-14: Landing Pad & Sidewalk Design Examples

Bus Stops in Small Spaces

The field survey revealed that narrow sidewalks were a major reason for ADA non-compliance at bus stops. Limited right-of-way often results in landing pads that are less than the required 5 by 8 feet and have limited space for amenities. Limited space is a major challenge when installing passenger amenities; care must be taken to ensure that nothing obstructs the ADA landing pad or sidewalk. When installing landing pads in small spaces, it is important to keep in mind a set of bus stop priorities. The highest priority when improving a bus stop is establishing -- or maintaining -- ADA compliance, meaning that amenities should only be installed if they do not obstruct the landing pad or pedestrian pathway. If the space is unworkable, considerations could be made to move the location of the stop to the other side of the intersection.

Specific Design Factors to Consider in Small Bus Stop Areas:

- Ensure first and foremost that landing pads, signs, and sidewalks are ADA compliant
- If there is enough ridership to warrant a shelter, consider installing a cantilevered shelter
- If a bus stop is relocated, make sure to collaborate with transit operators
- Trash and recycling receptacles should be attached the bus stop pole, rather than on the pad

Figure 3-15: Space Efficient Bus Stops in Takoma Park

Bus Stop Lighting

Bus stop and street lighting benefit the public health and welfare of a community. Bus stops are active locations during dark early morning and night time hours. Adequate lighting improves visibility for passengers, bus operators, and passers by. While many bus shelters have interior lights, most bus stops depend on illumination from surrounding street lighting. For the purposes of the field survey, if a light was located within 30 feet of the landing pad it was considered illuminated. Night-time light surveys would be an excellent step in determining the need for additional lighting in the City. Measures like clearing overgrown vegetation and other sight obstacles will also improve bus stop safety.

Figure 3-16: Bus Stop at Night
Source: Washington Post

Bus Stop Poles

At locations where there are two or more service providers, bus stop signs should be consolidated onto one bus stop pole. This eliminates any doubts about a stop's location when two bus stop signs/ poles are in close proximity. Consolidating onto one bus stop pole also reduces duplicative efforts, improves safety and promotes an image of a well-coordinated and collaborative transit system. In Takoma Park, Ride On and Shuttle-UM have a number of shared stops along Carroll Ave. and Flower Ave. where there are two bus stop poles and signs (see Figure 3-17). The City should coordinate with both operators to relocate bus stop signs onto a shared pole. In some instances, signage at these shared stops is a pathway protrusion. Care should be taken to ensure signage does not protrude into the walk path or is installed at a height of 80 inches or greater.

Figure 3-17: Two Bus Stop Poles at a Stop on Carroll Ave.

Benches and Passenger Seating

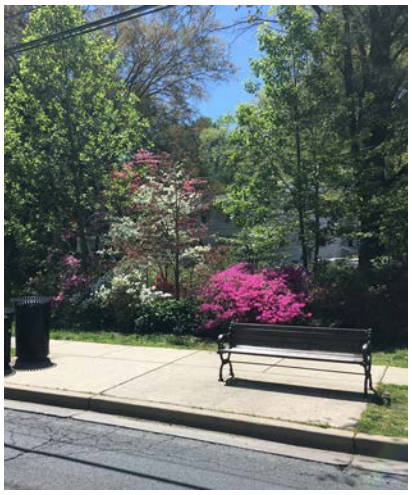
Benches provide customers a more comfortable place to wait for the bus. They can also add to the visual appeal of bus stops and provide opportunities for advertising. Bus stop seating generally falls into one of two categories: shelter or freestanding. Design considerations for both types are slightly different.

Passenger Seating Design Factors to Consider:

- Benches cannot obstruct the 5 by 8-foot landing pad
- Shelter benches cannot obstruct the 30 by 48-inch interior clear space
- Benches cannot obstruct the sidewalk and block the pedestrian pathway
- If space is an issue, benches can be cantilevered from walls
- There are no strict measurement requirements for benches

Figure 3-18 demonstrates Takoma Park's different seating designs. On the left are Takoma Park's signature porch rockers which add a splash of color to New Hampshire Avenue. The second image is a standard bench that is properly positioned within the landing pad to provide adequate space for boarding and alighting. The right image includes a more recently installed bench that is attractively designed and makes use of a larger boarding and alighting area. The City of Takoma Park's porch rockers and Adirondack chairs provide greater flexibility when providing seating in smaller spaces.

Figure 3-18: Passenger Seating Design Examples

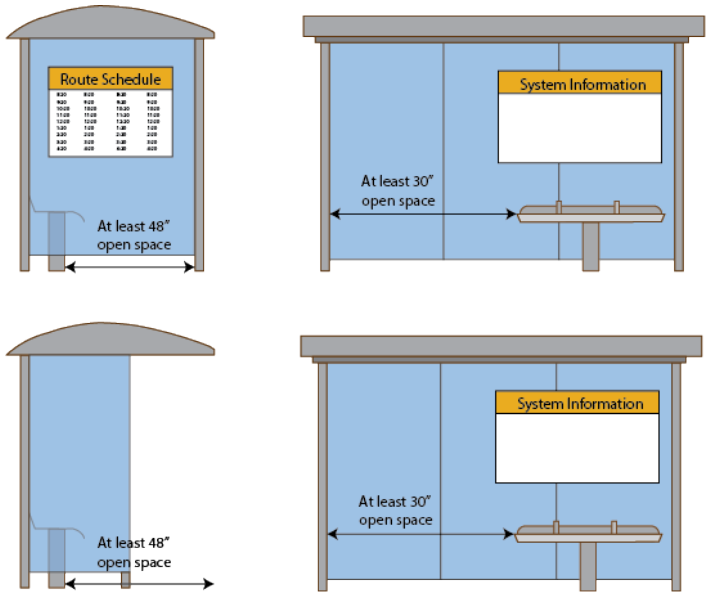

Passenger Shelters

The Takoma Park City Council recently approved a resolution to install shelters at all bus stops with over 30 average daily boardings. Some research has shown that shelters have a positive correlation with high ridership, and they provide riders with a designated waiting area for all weather. When designed thoughtfully, shelters can exceed their basic utility and become powerful marketing tools for a transit system. The best shelters are those that include a robust level of information about transit services and the surrounding area.

Passenger Shelter Design Factors to Consider:

- The shelter must be placed outside of the 5 by 8-foot landing pad
- Shelters require an open space that is at least 30" wide and 48" deep
- A clearance of 4' (preferably more) is required when installing shelters on sidewalks
- A clearance of 12" should be preserved on all sides of the shelter for maintenance and cleaning
- Shelters should have some or all of the following features:
    - Trash receptacle
    - Bench that does not extend into the 30" by 48" open space
    - Bus schedule(s)
    - Map(s) (route, system, and/or surrounding area)
- Provide perforated paneling to diffuse sun and glare during warmer months
- If there is limited space, shelter cover can be cantilevered to reduce sidewalk obstruction
- If service hours extend into the evening, there should be enhanced lighting

Figure 3-19: Shelter Design Diagram



Real-Time Arrival Digital Displays

Providing riders with real-time arrival information increases trust in the transit system and provides riders with an accurate wait time as they arrive at the stop. Additionally, digital displays can immediately update riders if there are emergency service changes. The City of Takoma Park wishes to install digital arrival displays at each bus shelter in the City. Currently, only WMATA provides real-time arrival information at bus stops, while Ride On displays arrival times based on published schedules. As real-time information becomes more commonplace, digital arrival displays are becoming a more sought after bus stop amenity. At stops without a shelter, there are many options for installing real-time arrival displays, but consideration should be given to the required electrical connect.

Real-Time Design Factors to Consider:

- Digital displays should be installed at all sheltered stops per City initiative
- If there is enough ridership, digital displays should be installed at stops without a shelter
- Schedule or real-time arrival information for *all* routes serving a stop should be provided
- Pole-installed digital displays should protrude no further than 4" from the pole
- Pole-installed digital displays should provide maneuvering clearance to access the information case
- WMATA will install real-time arrival displays at stops with over 100 daily WMATA boardings

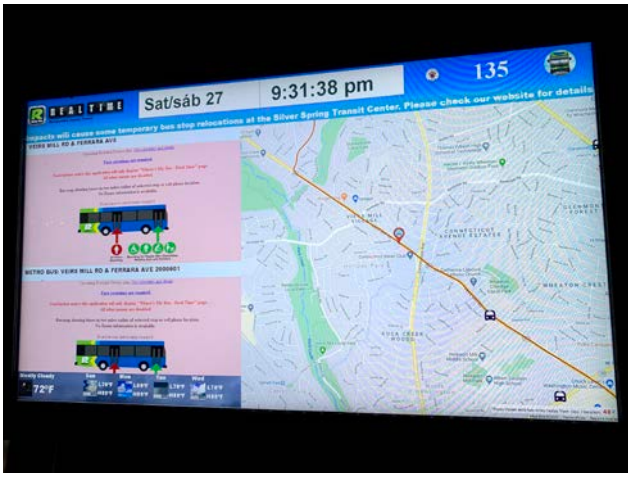


Figure 3-20: Example of a Ride On Digital Display on Viers Mill Rd.

Figure 3-21: Example of a WMATA Digital Display on Eastern Ave.

Impact of the Built Environment on Ridership Literature Review

Figure 3-22: Bus Stop on New Hampshire Ave.

All transit systems have the goal of maintaining and increasing ridership. To supplement the Sustainability and Climate Action Plan, increasing transit ridership has been identified as an important initiative towards a more sustainable community. Since the City of Takoma Park does not directly operate transit services, improving bus stops and the pedestrian network is the most direct way that the City can increase ridership and awareness of the transit options available. While there is not a large amount of pre-existing literature that researches how certain passenger amenities impact ridership, some studies have been undertaken to determine if there is a positive correlation between the two variables. This section reviews previously published research papers about the relationship between transit ridership and the physical environment, including transit amenities.

Land Use Impacts on Transport: How Land Use Factors Affect Travel Behavior (2019)

Todd Litman

This study is a comprehensive review of how land use planning and distribution impacts all transportation modes. This paper analyzes how land use change impacts active transportation, transit ridership, and other mode splits. The paper notes that land use changes with a positive impact on active transportation like walking and cycling benefit transit ridership. Expanding sidewalks, limiting on-street parking, and creating mixed use developments also bolster transit ridership. This article supports a holistic and cohesive strategy for land use and transit planning, wherein transit is emphasized in lockstep with the development of walkable areas.

Analyzing how Bus Ridership Is Influenced by Physical Environments, Crime, and Collision Adjacent to Bus Stops (2018)

Jin Eo

This 2018 study used a multivariate regression analysis to determine correlations between environmental factors and bus stop ridership levels in Los Angeles. Ridership numbers from the Los Angeles County Metro Transportation Authority were used with environmental variables including shelters, tree shade surrounding the stop, crime levels, and surrounding land uses. The study determined that there were positive correlations between bus ridership and shelters, tree shade within a quarter mile of the stop, and higher crime levels. These findings show that shelters have a statistically significant correlation with higher ridership numbers, but the study does not go so far as to say that installing shelters has a causal relationship with higher ridership.

Determinants of Bicycle-On-Bus Boardings: A Case Study of the Greater Cleveland RTA (2013)

Bradley J. Flamm, Temple University

This study examined what factors impacted the amount of Bicycle-On-Bus-Boardings (BoBBs) the Greater Cleveland Regional Transit Authority (GCRTA) experienced. Using BoBBs data from 2008-2011, the study performed a multivariate regression analysis to better determine which factors had a positive or negative impact on BoBBs. The study found that weather had more influence on BoBBs than regular boardings. BoBBs were negatively impacted by bad weather, to a far greater extent than overall boardings or ridership. Since a BoBB was defined as a boarding where the on-bus bike rack was utilized, there was little insight into the appeal of bike racks at bus stops to riders.

Impact of Weather on Bus Ridership in Pierce County, Washington (2012)

Stover, Nelson/Nygaard Consulting Associates, Seattle, Edward D. McCormack, University of Washington

A 2012 study examined how inclement weather, especially rain and snow, impacted bus stop ridership while also observing how ridership losses can be mitigated by providing transit amenities. The study performed a regression analysis on three years of ridership data from Pierce Transit, a large urban transit system that serves Tacoma (WA), and weather data from Seattle-Tacoma International Airport. The regression analysis found that inclement weather conditions lead to lower transit ridership, in keeping with other studies of its type. Regarding transit amenities, the study team suggests that shelters could greatly mitigate the impact of weather, though the study also states that there is limited empirical data to support this.

How built environment affects travel behavior: A comparative analysis of the connections between land use and vehicles miles traveled in US cities (2012)

Lei Zhang, Jinhyun Hong, Arefeh Nasri, Qing Shen

This 2012 study was undertaken to re-examine the impacts of the built-environment on travel behavior by performing case studies on the following American cities: Seattle (WA), Richmond-Petersburg (VA), Norfolk-Virginia Beach (VA), Baltimore (MD), and Washington (DC). For each case study, researchers performed a Bayesian multilevel modeling method with various socioeconomic and demographic data included with five built-environment factors: residential density, employment density, entropy (level of mixed-used development), average block size (walkability), and distance to city center (decentralization and level of development). Specifically, this study hoped to determine how much these factors impacted the amount of vehicle miles traveled (VMT) in each study area. The modeling found that encouraging more mixed-use development and smaller city blocks can help reduce VMT per person, aiding in relieving traffic congestion and benefiting the transit environment. The study, however, was not able to come to any broad conclusions. Land use changes do not impact a city's VMT equally, but suggest that further analysis could create a better understanding of how the impact of mixed land use environments differs from city to city and region to region.

Bus Stop Urban Design: Nine Techniques for Enhancing Bus Stops and Neighbourhoods and Their Application in Metro Vancouver (2012)

Kevin Jingyi Zhang

This 2012 study from University of British Columbia was oriented towards creating tangible goals to help guide bus stop design and improvement in Vancouver. The study stresses the importance of bus stop amenities, highlighting greater comfort and shorter perceived wait times for customers. Broadly, the study outlined 7 goals each bus stop should try to achieve: 1) safety, 2) thermal comfort, 3) acoustic comfort, 4) wind protection, 5) visual comfort, 6) accessibility, and 7) integration. Safety, often the highest priority for transit riders, was broken into three categories: risk of accident, risk of crime, and individual perceptions. Zhang suggests providing more traffic lights, crosswalks, and barriers to protect waiting riders from the risk of an accident. To reduce crime, Zhang foregoes increased surveillance in the form of security cameras, instead suggesting to provide lighting at all times and make bus stops visible from nearby buildings. Individual perceptions, influenced by age, gender, and experience in a certain area, can also influence individual risk assessments. Further consideration of which amenities are most valued by women, seniors, and newcomers/tourists will help improve the efficacy of these strategies.

Bus Stop Amenities and Their Relationship with Ridership: A Transportation Equity Approach (2011)

Matthew R. Talbott

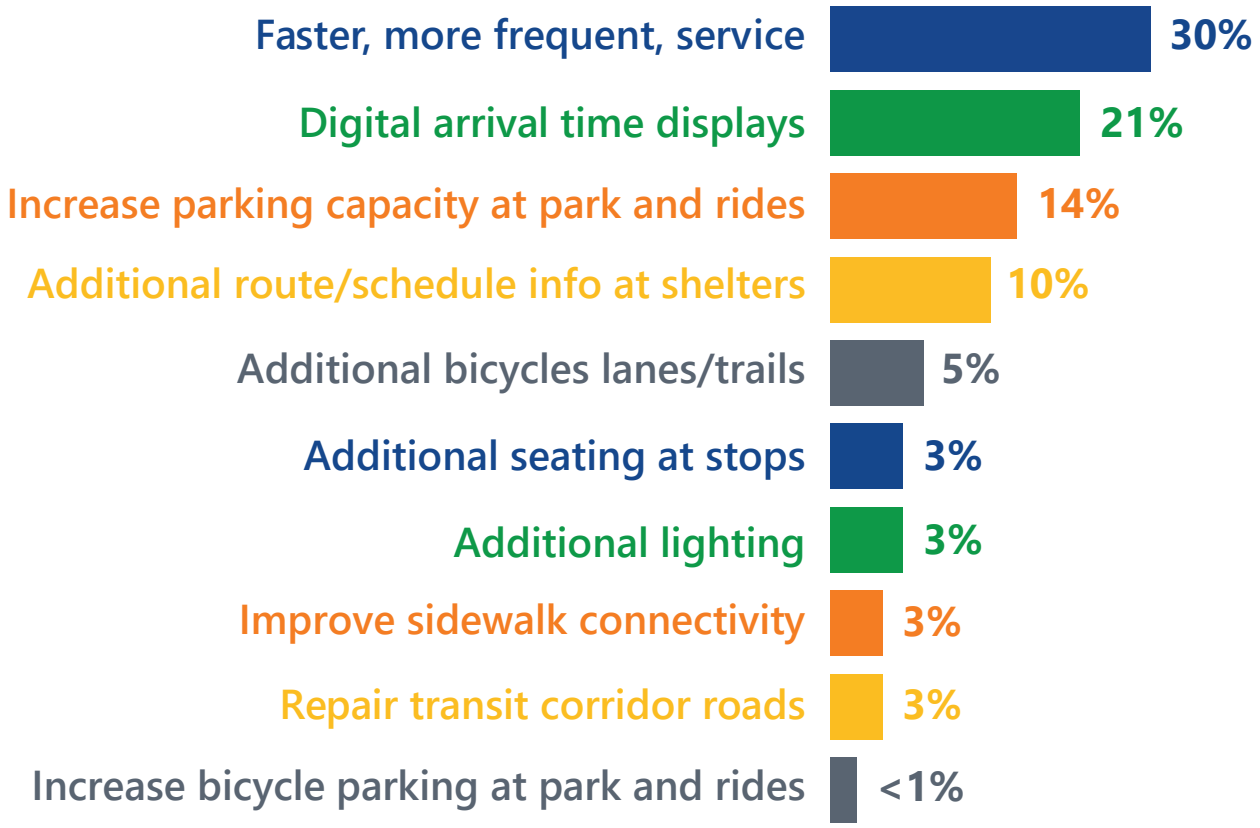
This 2011 study performed a regression analysis on the dependent variable of stop ridership and the independent variables of bus stop amenities at each stop. The study used data from transit systems in Greensboro (NC), Kansas City (MO), and Seattle (WA). While findings varied for each individual system, the regression analysis showed that the presence of basic amenities (trash receptacles, benches) was positively correlated with higher ridership. The study also analyzed the relationship between individual amenities and ridership. The only amenity that had a positive correlation with ridership was shelters. Despite the general positive relationship, it should be noted that transit amenities are often installed because of higher ridership. It could be concluded that both ridership and transit amenities are dependent variables of service frequency and reliability.

City of Bellevue Transit Improvement Survey (2012)

City of Bellevue, WA

In 2012, the City of Bellevue administered a Transit Improvement Survey as part of their Transit Master Plan. As a suburb that does not operate any of its public transportation services, Bellevue makes for a good comparison with Takoma Park. The survey asked both riders and non-riders in the city about their satisfaction with King County Metro's service in the City of Bellevue. When current transit riders were asked how the city should invest in transit moving forward, 30 percent of riders stated they wanted improved service speed and reliability. 21% of riders wanted the city to invest in more real-time bus information at major stops, and 10% of riders wanted more route, schedule, and wayfinding information at shelters. The full results of this survey question are featured in Figure 3-23.

Figure 3-23: City of Bellevue Transit Improvement Survey - How Should the City Invest?



The New Hampshire Ave. & Sligo Creek Pkwy. Bus Stop Features a Bicycle Repair Station

Chapter 4
Improvement Guidelines

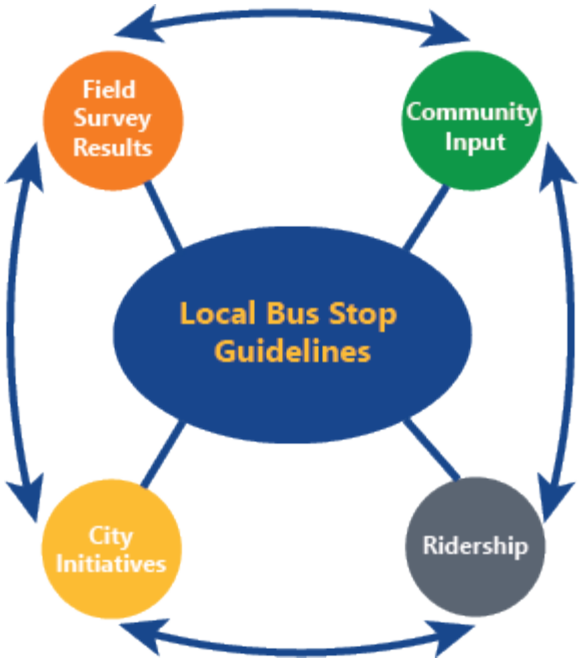
Introduction

The existing conditions review identified various non-compliance issues at the City's bus stops. With these conditions in mind, it is imperative that the City of Takoma Park develops bus stop improvement guidelines that increase transit accessibility and visibility in a way that is both holistic and fiscally responsible. This section will build on these guidelines to explore prioritization factors, cost estimates for proposed improvements, improvement approaches, potential challenges, and potential funding for bus stop improvements.

Local Bus Stop Guidelines

Local government must make a sizable financial commitment to improve the bus stops in their jurisdiction, a reality that necessitates the adoption of local bus stop guidelines and prioritizing the improvements that are believed to be most beneficial. The City of Takoma Park's proposed bus stop guidelines are summarized in Figure 4-1.

The main components of ADA compliance are bus stop signs, landing pads, sidewalks, and the closest curb ramp. Ensuring that each of these elements is ADA compliant is a top priority for all stops. The City of Takoma Park has prioritized lighting and seating amenities at each stop and has set a goal to provide shelter and seating at all 138 stops. Shelters are also considered a high priority



Bus Stop Element	Guideline
Bus Stop Sign	Required
ADA Compliant 5′ x 8′ Landing Pad	Required
Sidewalk Connection	Required
Lighting	All Stops
Bench/Seating	All Stops
Information Case	Site Specific
Trash/Recycling	Site Specific
Shelter	30+ Daily Boardings
Real-time Arrival Displays	All Shelters

Figure 4-1: Local Bus Stop Guidelines

amenity, but only at stops with at least 30 average daily boardings. Takoma Park's City Council recently agreed on a policy stipulating that all stops with over 30 cumulative daily boardings should have a shelter installed. Additional improvements, including trash/recycling receptacles and information cases, were deemed lower priority improvements and should only be considered on a site-by-site basis.

Bus Stop Improvement Oversight & Coordination

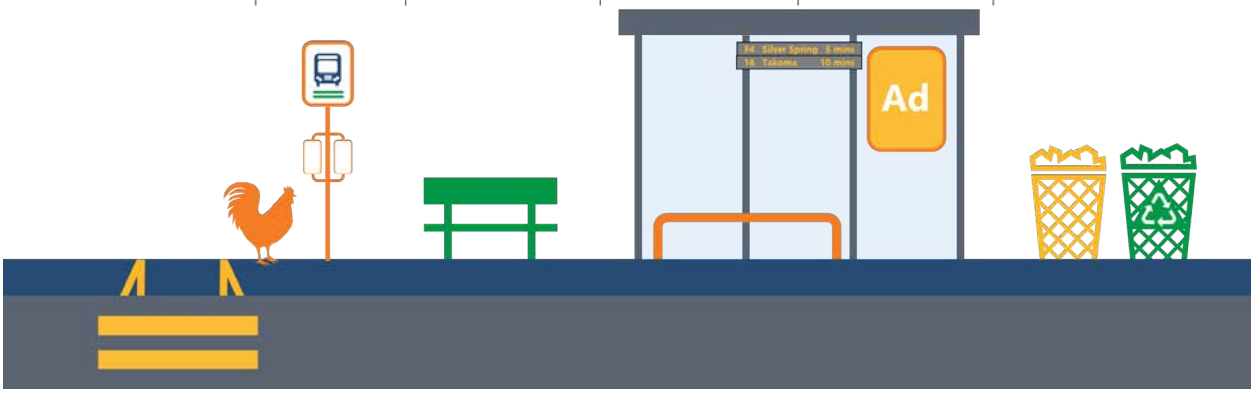
Bus stop improvements in the City of Takoma Park should be a collaborative effort between state and local agencies, and the private sector. Many of the improvements recommended in this report cannot be achieved solely through unilateral action by the City of Takoma Park. For example,

- Bus stop improvements along state highways require coordination and permitting from the Maryland Department of Transportation State Highway Administration (MDOT SHA),
- Replacing damaged bus stop signs will require coordination with transit providers, and
- New and replacement shelters could be installed by InSite through the City's contract.

Figure 4-2 illustrates the layers of bus stop oversight and maintenance in the City of Takoma Park. The City has primary control over many of the passenger amenities like seating, recycling & trash, and shelter placement through its contract with InSite. Installing other amenities will require additional collaboration with transit agencies, contractors, and stakeholders.

Figure 4-2: Bus Stop Oversight Diagram

Sidewalks & Crosswalks	Bus Stop Signage	Passenger Information	Seating	Shelter	Recycling & Trash
City of Takoma Park MDOT SHA	Metrobus Ride On Shuttle-UM	City of Takoma Park Metrobus Ride On Shuttle-UM	City of Takoma Park	City of Takoma Park InSite (Contractor)	City of Takoma Park InSite (Shelters Only)



State Highways & Private Property

Sixty percent of the bus stops in the City of Takoma Park are located along a Maryland State Highway. This is an important distinction because MDOT SHA is generally responsible for construction and maintenance along these roadways (illustrated in Figure 4-4). The City can conduct improvement activities on state owned roads, but must follow a review and permitting process through MDOT SHA. Coordination with ongoing road and sidewalk improvement projects can help to expedite the improvement process and could yield additional cost and time savings.

Figure 4-3: State Highways in the City of Takoma Park

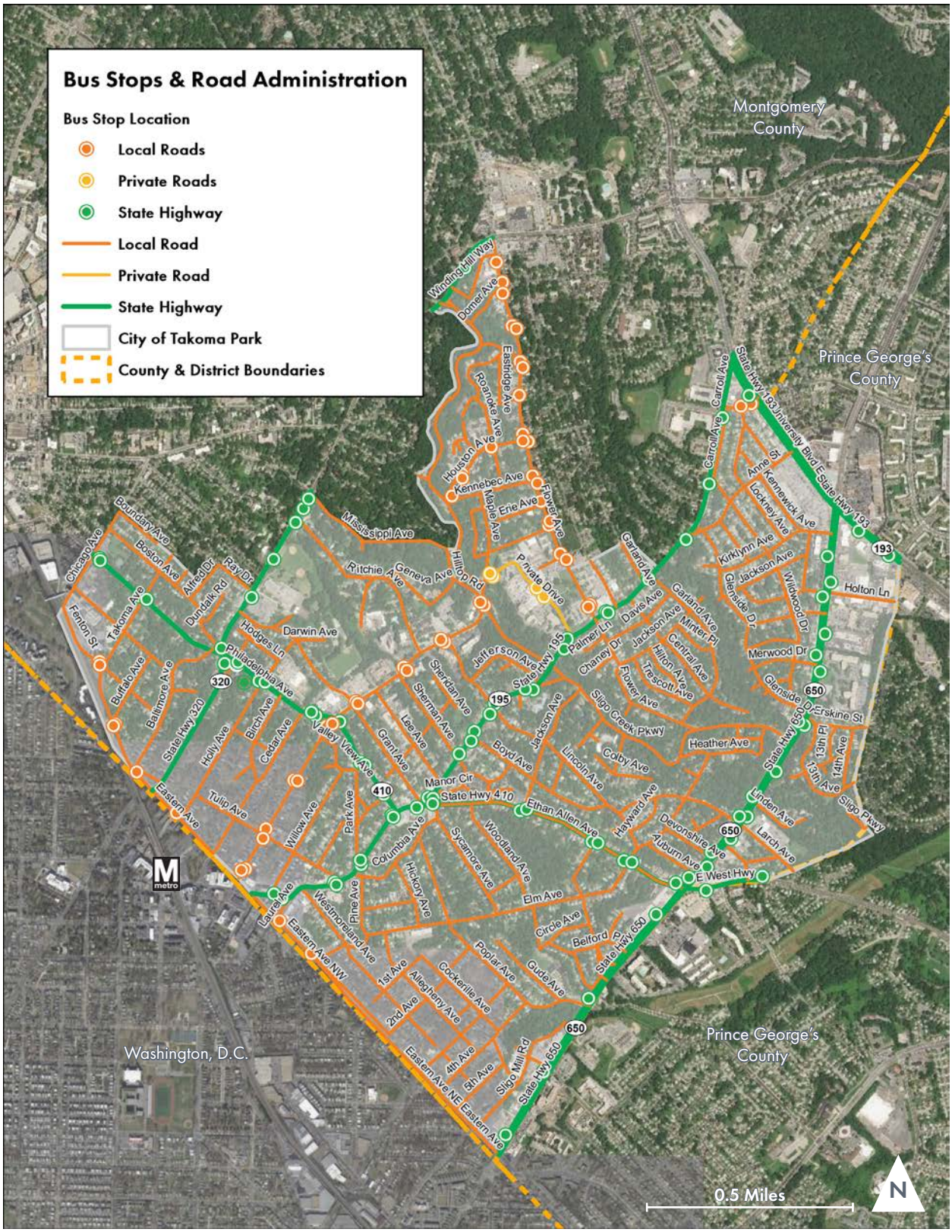
Four bus stops in the City are located on private property - a private drive serving Adventist HealthCare. All four stops are ADA non-compliant; two lack sidewalk access and the other two require larger landing pad or shelter clearances. Since these stops are on private property, improvements will require action by Adventist HealthCare. Since the relocation of Washington Adventist Hospital, ridership at these stops has likely declined. Ride On is considering service realignments due to the relocation.

The agencies/organizations that oversee a bus stop can have a major impact on the associated costs and time investments for the City of Takoma Park. Table 4-1 provides a summary of recommended bus stop improvements by road administration. Expanding landing pads and improving sidewalk accessibility are key elements of the recommended improvements.

Table 4-1: Recommended Number of Bus Stop Improvements by Road Administration

Recommended Improvement	State	City	Private	Total
Landing Pad	39	30	3	72
Curb Ramp	6	23	2	31
Sidewalk	0	3	2	5
Lighting Initiative	14	11	1	26
Shelter	17	4	1	22
ADA Improvements	*6*	*1*	*1*	*8*
30+ Initiative	*11*	*3*	*0*	*14*
Seating Initiative	43	37	3	83

Figure 4-4: Bus Stop Locations by Street Type



Transit Agency Coordination

Installing a new sign may not require a financial investment on part of the City, but it still requires the City to collaborate with the involved transit agency. During the field survey, 12 signs were found to be protruding into the walk path (see Table 4-2). Relocating or replacing these signs should be a priority as they present a potential safety hazard for pedestrians and transit riders.

Figure 4-5: WMATA Bus Stop Passenger Information Case

Some transit providers provide passenger amenities, including bus schedules and route maps, at their bus stops. Through coordination, the City could work with the transit providers to provide expanded or updated passenger information at bus stops.

Installing real-time arrival information at bus stop shelters could be accomplished through coordination with local transit providers. For example, WMATA installs dynamic information displays at bus stops with over 100 daily boardings. In the City of Takoma Park there are seven Metrobus stops with over 100 average daily boardings. While WMATA may not elect to place real-time information at all of those bus stops, coordination by the City of Takoma Park could yield cost and time savings. Efforts to expand real-time information should also be coordinated with Ride On and Shuttle-UM.

Table 4-2: Recommended Bus Stop Improvements by Transit Agency

Recommended Improvement	Metrobus	Ride On	Shuttle-UM	Total
Protruding Sign (Relocate)	0	10	2	12
Real-Time Arrival Information	23	15	1	39
Existing Shelters	*14*	*10*	*1*	*25*
30+ Initiative Shelters	*9*	*5*	*0*	*14*

Shelter Advertising Contractor

The City of Takoma Park utilizes the services of a bus stop shelter advertising contractor. The current contractor, InSite Street Media, provides and installs passenger shelters at bus stops in high traffic areas. The advertising contract is a valuable and cost-effective tool in providing passenger shelters. Since high-traffic areas are likely to produce greater transit ridership and advertising revenues, this results in shelters at many of the busiest bus stops in the City.

Figure 4-6: InSite Street Media Shelter

The City's relationship with InSite will reduce the financial burden of purchasing and installing shelters. However, the contractor can only place shelters where they generate advertising revenue. This means that some stops with 30 or more average daily boardings will not quality for a shelter under the contract. Additional investments from the City will be required to meet the goal of installing shelters at every bus stop with 30+ daily boardings.

Table 4-3: Recommended Bus Stop Shelter Improvements by Transit Agency

Recommended Shelters	Metrobus	Ride On	Shuttle-UM	Total
Total Additional Shelters	13	9	0	22
ADA Compliant Replacement	4	4	0	8
Private Road	*0*	*1*	*0*	*1*
Local Road	*0*	*1*	*0*	*1*
State Road	*4*	*2*	*0*	*6*
30+ Boardings Shelter Initiative	9	5	0	14
Private Road	*0*	*0*	*0*	*0*
Local Road	*0*	*3*	*0*	*3*
State Road	*9*	*2*	*0*	*11*

Estimated Improvement Costs

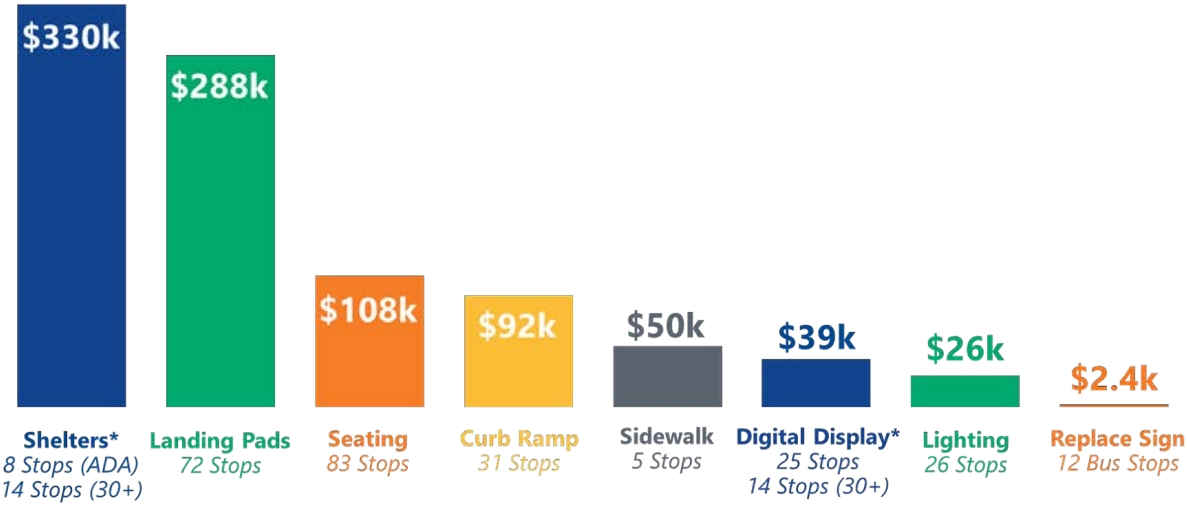
Cost estimates help city officials and employees understand the scope of improvements and develop an on going bus stop improvement program. Utilizing recent bus stop improvement costs in Montgomery County, cost estimates were generated for each type of improvement and amenity. Table 4-4 provides these estimated costs; it should be noted that these are planning estimates based on an average of available cost information.

Improvement	Item Cost
Estimated Capital and Installation Costs	
Bus Stop Sign	$200
Boarding and Alighting Area/Landing Pad	$4,000
Sidewalk Connection	$10,000
Curb Ramp	$3,500
Detectable Warning (Curb Ramp)	$100
Passenger Seating/Bench	$1,300
Trash Receptacle	$1,000
Information Case	$500
Shelter	$15,000
Lighting	$1,000
Digital Arrival Display	$1,000
Estimated Additional Administrative & Implementation Costs	
Implementation and Coordination Activities	10% of Subtotal
Survey, Design, and Inspection	50% of Subtotal

Table 4-4: Cost Estimates per Improvement

To estimate the total cost for each bus stop, ADA compliance results, ridership thresholds, and existing amenities were compared and totaled. This included the shelter requirement at stops with at least 30 daily boardings, real-time arrival at all sheltered stops, and lighting and seating at all bus stops. The estimated capital costs are provided by improvement in Figure 4-7. The total amount for all recommended improvement is $934,800. Also noted in Table 4-4, bus stop improvements will likely incur additional administrative and implementation costs which could drive this total up to $1.5 million (a 60% increase).

Figure 4-7: Estimated Capital & Installation Costs for Recommended Bus Stop Improvements



Based on ADA compliance and City initiatives, 115 of the 138 bus stops in Takoma Park are recommended for accessibility or passenger amenity improvements. Many of the recommended improvements are minor, but others will require more expensive design and construction work. The maximum estimated cost for a single bus stop is $24,800 (for the stop at Flower Ave. and Houston Ave.). Many of the bus stops along Flower Ave. require expanded landing pads and improved sidewalks to be considered ADA compliant.

Table 4-5 provides the summarized costs for individual improvements by road administration. The most expensive bus stop improvements are the installation or renovation of shelters at 22 stops followed by landing pad expansions at 72 stops. The City's relationships with state, local, and private entities will assist in reducing this financial burden. These hefty sums demonstrate the financial commitment needed to improve bus stops and can be useful when developing a planning approach that is economical and holistic.

Table 4-5: Estimated Capital & Installation Costs for all Recommended Improvements

Road Administration	State Road		City Road		Private Road		Total	
Recommended Improvement	Stops	Est. Costs	Stops	Est. Costs	Stops	Est. Costs	Stops	Est. Costs
ADA Accessibility Improvements	50	$265,200	34	$236,100	4	$50,600	88	$551,900
Sign Relocation	8	$1,600	4	$800	0	$0	12	$2,400
Landing Pad Expansion	39	$156,000	30	$120,000	3	$12,000	72	$288,000
Curb Ramps & Tactile Surfaces	6	$17,600	23	$70,300	2	$3,600	31	$91,500
Sidewalk Accessibility	0	$0	3	$30,000	2	$20,000	5	$50,000
Shelters (ADA Improvements)	6	$90,000	1	$15,000	1	$15,000	8	$120,000
City Improvement Initiatives	72	$262,900	44	$114,100	4	$5,900	120	$382,900
Enhanced Street Lighting	14	$14,000	11	$11,000	1	$1,000	26	$26,000
Seating Initiative	43	$55,900	37	$48,100	3	$3,900	83	$107,900
Shelter Initiative (30+ Daily Boardings)	11	$165,000	3	$45,000	0	$0	14	$210,000
Real-Time Displays	28	$28,000	10	$10,000	1	$1,000	39	$39,000
Existing Shelters	*17*	*$17,000*	*7*	*$7,000*	*1*	*$1,000*	*25*	*$25,000*
30+ Daily Boardings	*11*	*$11,000*	*3*	*$3,000*	*0*	*$0*	*14*	*$14,000*
Total Estimated Capital Costs	78	$528,100	48	$350,200	4	$56,500	130	$934,800
Metrobus	49	$330,000	2	$10,600	0	$0	51	$340,600
Ride On	31	$188,300	39	$283,500	4	$56,500	74	$528,300
Shuttle-UM	2	$9,800	7	$56,100	0	$0	9	$65,900
Implementation and Coordination	10%	$52,810	10%	$35,020	10%	$5,650	10%	$93,480
Survey, Design, and Inspection	50%	$264,050	50%	$175,100	50%	$28,250	50%	$467,400
Total Estimated Costs	-	$844,960	-	$560,320	-	$90,400	-	$1,495,680

Bus Stop Improvement Prioritization

Bus stop improvements are a major capital investment. Prioritization is the key for getting the maximum value from that investment. The City of Takoma Park has identified five distinct prioritization factors for bus stop improvements - cost, safety, ridership, racial equity, and climate impact (Figure 4-8). Bus stop prioritization should be rooted in these factors and based on a standardized process to identify stops that are heavily utilized and have a high level of community importance.

Figure 4-8: City of Takoma Park's Bus Stop Improvement Priority Factors

Potential Standardized Prioritization Scoring

Considering the City's prioritization factors, the study team developed the following prioritization process using publicly available data. The process utilizes surrounding land use data, ridership, the ADA compliance of the bus stop, and a sidewalk connectivity measure. To ensure bus stop improvements are provided in an equitable manner, a Title VI analysis of the recommended improvements was also conducted and presented in a later section. Of the five factors, climate impact was the only category that could not be quantified with available data. However, increasing public transit ridership reduces vehicle emissions and lessens the negative impacts of transportation in regards to climate change.

A prioritization score based on four available data points was calculated for each stop in the City of Takoma Park. Figure 4-9 displays the categories and their weighted scores. These scores were aggregated to create a cumulative score out of 100.

Figure 4-9: Potential Bus Stop Prioritization Score Weighting

Adjacent Land Uses

The survey tool allowed surveyors to input a maximum of three distinct land uses near each bus stop. These inputs were then grouped by potential transit use and assigned numerical point values. Colleges, medical facilities, and multi-family residential areas had the highest point values due to their popularity as transit origins and destinations. Single-family residential areas, parks, and vacant lots had the lowest associated point value. Figure 4-10 shows the land use groups and their associated point values.

For each stop, the point values of each land use identified during the field surveys were summed. The highest sum was 12. To determine their score out of 30 , each stop was multiplied by a factor of 2.5 so that any stop with a combined land use score of 12 would receive all 30 points.

Tier 1 *5 Points*	Education (College) Medical Multi-Family Residential
Tier 2 *4 Points*	Commercial Retail Education (School) Human Service
Tier 3 *3 Points*	Commercial Office Cultural Recreation
Tier 4 *2 Points*	Government Office Industrial Place of Religion
Tier 5 *1 Point*	Single-Family Residential Park (Field/Open Use) Vacant (Empty Lot/Forest)

Figure 4-10: Land Use Tiers

Ridership

Average daily boardings data from WMATA and Ride On, provided by the City of Takoma Park, was used as the basis of the ridership component of the prioritization score. At stops with WMATA and Ride On service, the cumulative average daily ridership was used. Similar to the land use score, five ridership tiers were created and assigned point values. Stops with over 40 daily boardings received the highest ridership score of 30, stops with less than 10 daily boardings received the lowest possible ridership score of 6. Figure 4-11 illustrates the different ridership tiers and their associated point values

Tier 1 *30 Points*	40+ Average Daily Boardings
Tier 2 *24 Points*	30 to 39 Average Daily Boardings
Tier 3 *18 Points*	20 to 29 Average Daily Boardings
Tier 4 *12 Points*	10 to 19 Average Daily Boardings
Tier 5 *6 Points*	0 to 9 Average Daily Boardings

Figure 4-11: Ridership Tiers

ADA Compliance

Each stop's ADA compliance was determined after the field survey and is detailed in the existing conditions section of this report. The field survey data was used to calculate the ADA component of the prioritization score. Stops that are already ADA compliant received 15 points out of a possible 30, while ADA non-compliant stops received 30 points.

Sidewalk Connectivity

A qualitative assessment of sidewalk connectivity was given at each stop during the field survey. This assessment resulted in a stop's surrounding pedestrian facilities being rated as either "good," "fair," or "poor." To form the sidewalk connectivity component score, stops rated as having "poor" sidewalk connectivity were given the maximum score of 10 points; "fair" sidewalks were given 7 points; and "good" sidewalks were given 3 points.

Highest Priority Bus Stops

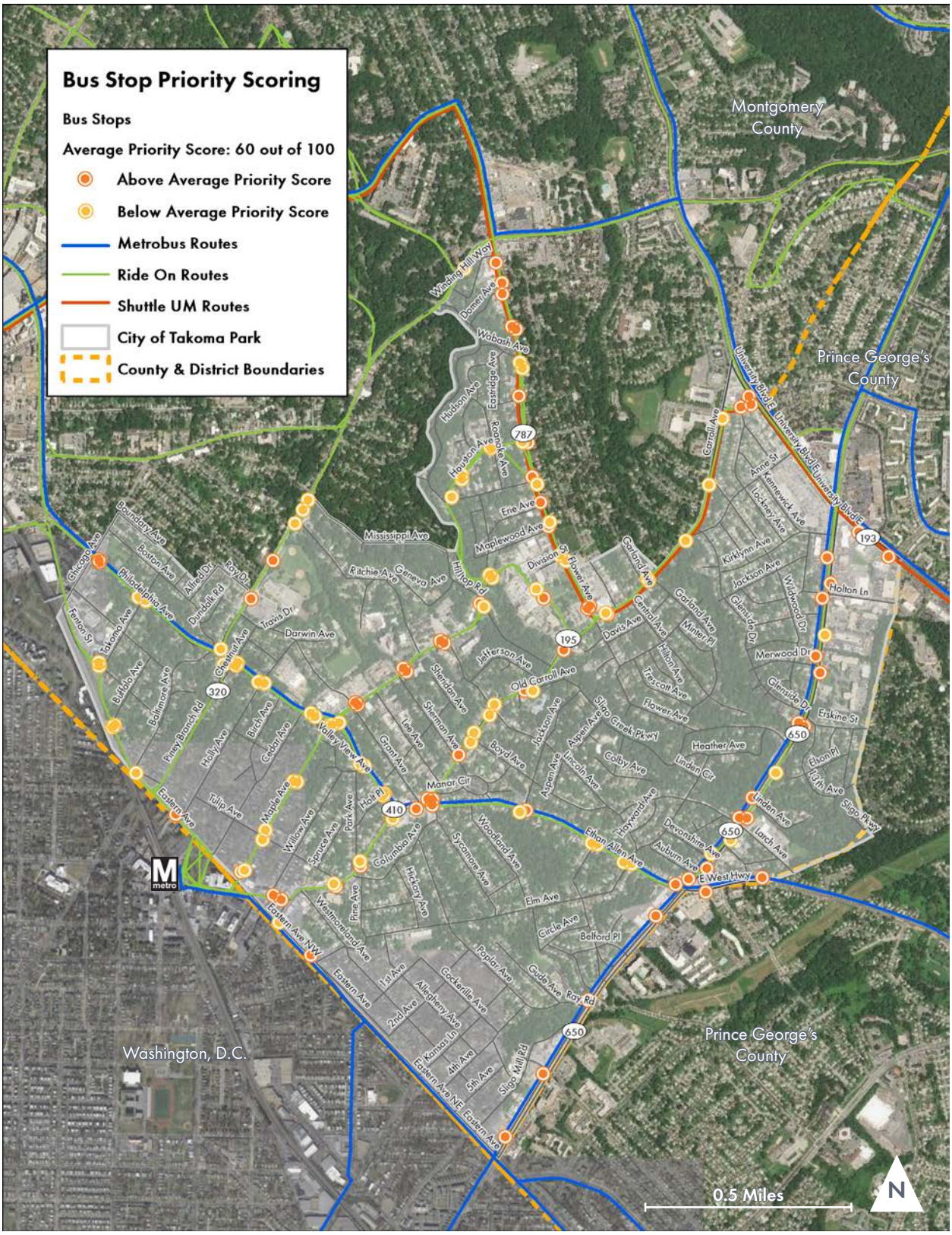
Each category score was calculated and then combined to create the stop's overall priority score. The top 10 priority stop list presented in Table 4-6 illustrates where improvements are most needed in Takoma Park. Six of the ten stops listed are located on New Hampshire Avenue, where large shopping centers and high-density housing make it a vital transit corridor within the City. Other areas of interest are a stop at Adventist HealthCare, which had the fifth highest priority score. It is important to note that Washington Adventist Hospital recently moved out of the City of Takoma Park, therefore the ridership data utilized during the prioritization may not be recent enough to reflect that change.

The average priority score for all bus stops was 60, Figure 4-12 maps the 138 stops based on whether they had a below average or above average priority score. Concentrations of above average priority bus stops are located along Carroll Ave, Flower Ave., Maple Ave., and New Hampshire Ave.

Table 4-6: Top 10 Highest Priority Stops

Location	Ride On ID	WMATA ID	Shuttle-UM ID	Cumulative Ridership	ADA Improvement Costs	Priority Score
New Hampshire & Merwood	29022	2000095	--	47	$4,000	100
University & Merrimac	26686	2000163	--	174	$10,000	97
New Hampshire & Holton	28982	2000108	--	101	$14,000	92
Carroll & Tulip	20746	--	--	56	$10,000	92
Washington Adventist Hospital	26952	--	--	67	$10,100	92
New Hampshire & Eastern	--	3001889	--	59	$10,000	89
Flower & Carroll	22332	--	37041	33	$17,600	89
Crossroads Professional Building	28980	3004109	--	44	$10,000	87
New Hampshire & Sheridan	--	3001925	--	63	$4,000	84
Merrimac & University	24022	--	37066	47	$0	82

Figure 4-12: Average Bus Stop Priority Scoring



Demographics and Title VI

The results of the ADA field survey were reviewed to determine potential considerations for compliance with Title VI of the Civil Rights Act of 1964. As recipients of federal funds, the City of Takoma Park must ensure bus stop improvement programs are in compliance with Title VI.

The Title VI assessment was informed by a GIS based analysis that was completed for the City of Takoma Park. The analysis examined the distribution of ADA non-compliant stops in regard to the study areas with above and below average minority and low-income populations. For additional analysis, population density and limited English proficiency (LEP) populations were also mapped. These maps are provided in Figures 4-13 through 4-17 over the following pages.

Title VI - Below Poverty Individuals and Minorities

The Title VI assessment demonstrated that a higher percentage of low income individuals live in the western half of the City, specifically the area surrounding Flower Ave., north of Eastern Ave., and north of Philadelphia Ave. Larger percentages of minorities can be found in the western and northern parts of the City.

LEP Populations

A person is considered to be LEP if they respond on the Census that they speak English less than "very well." LEP populations can be found in the block group north of Philadelphia Avenue. Providing translated materials to these groups is necessary and may yield higher ridership for the bus system.

Population Density

The block groups with the highest population density can be found along Maple Avenue and Carroll Avenue, where most of Takoma Park's large apartment complexes are located. Denser areas normally generate the most ridership for a transit system, and improvements in these areas will likely benefit the most people.

Maps for each demographic category are located on the following pages. These maps should be used by the City of Takoma Park to guide bus stop improvement programs in an effort to equally serve all members of the Takoma Park community.

Figure 4-13: Percent Below Poverty by Census Block Group

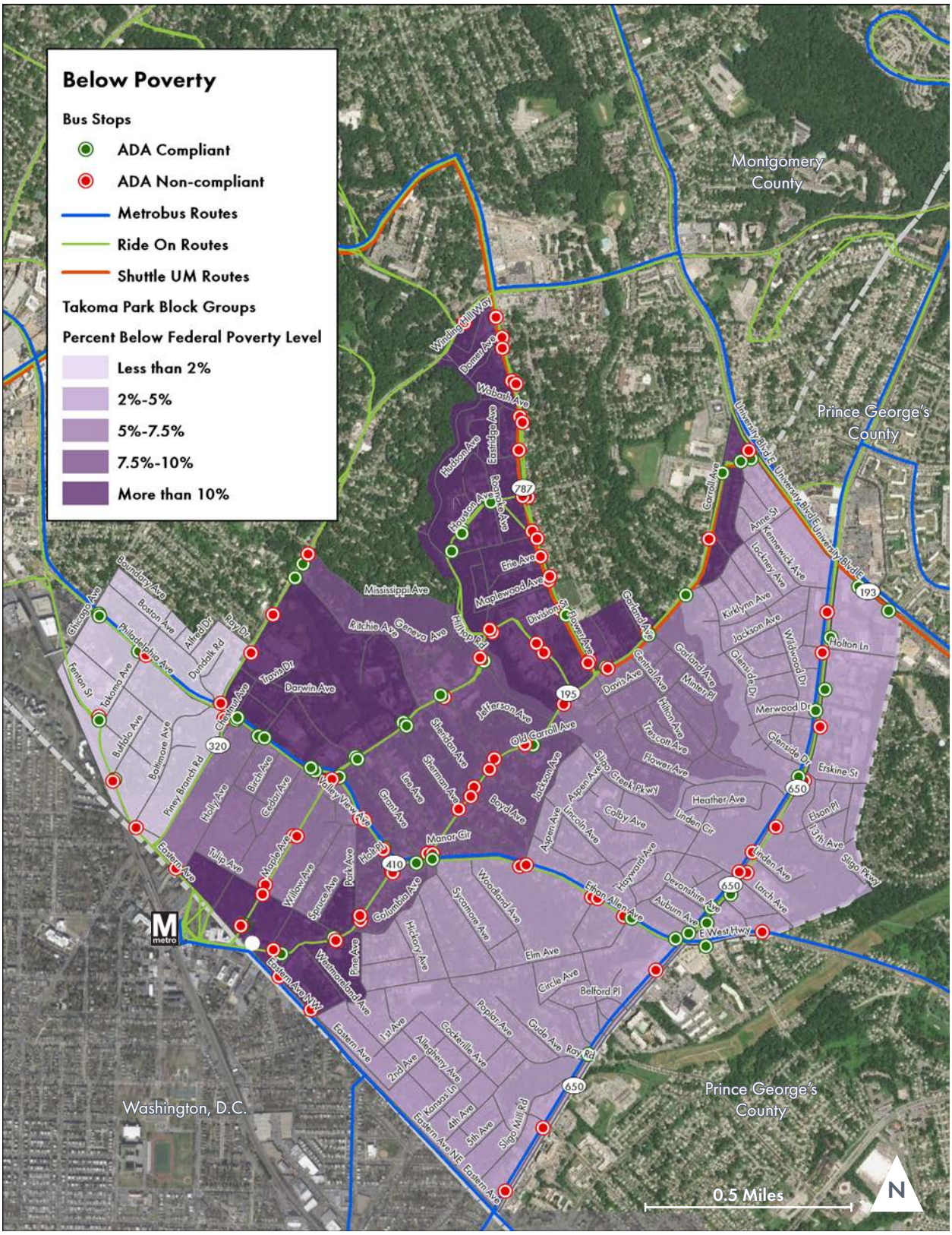


Figure 4-14: Percent Minority by Census Block Group

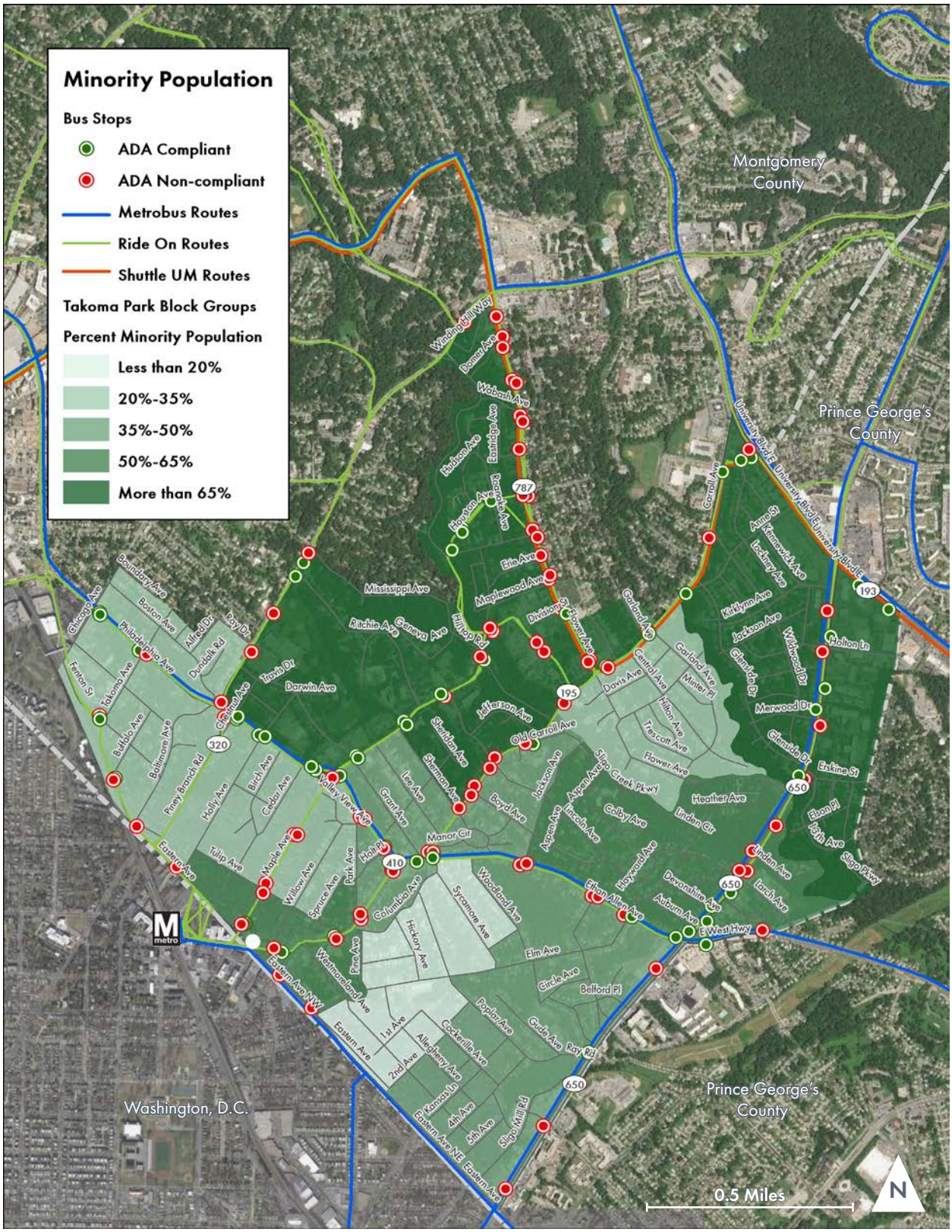


Figure 4-15: Percent Limited English by Census Block Group

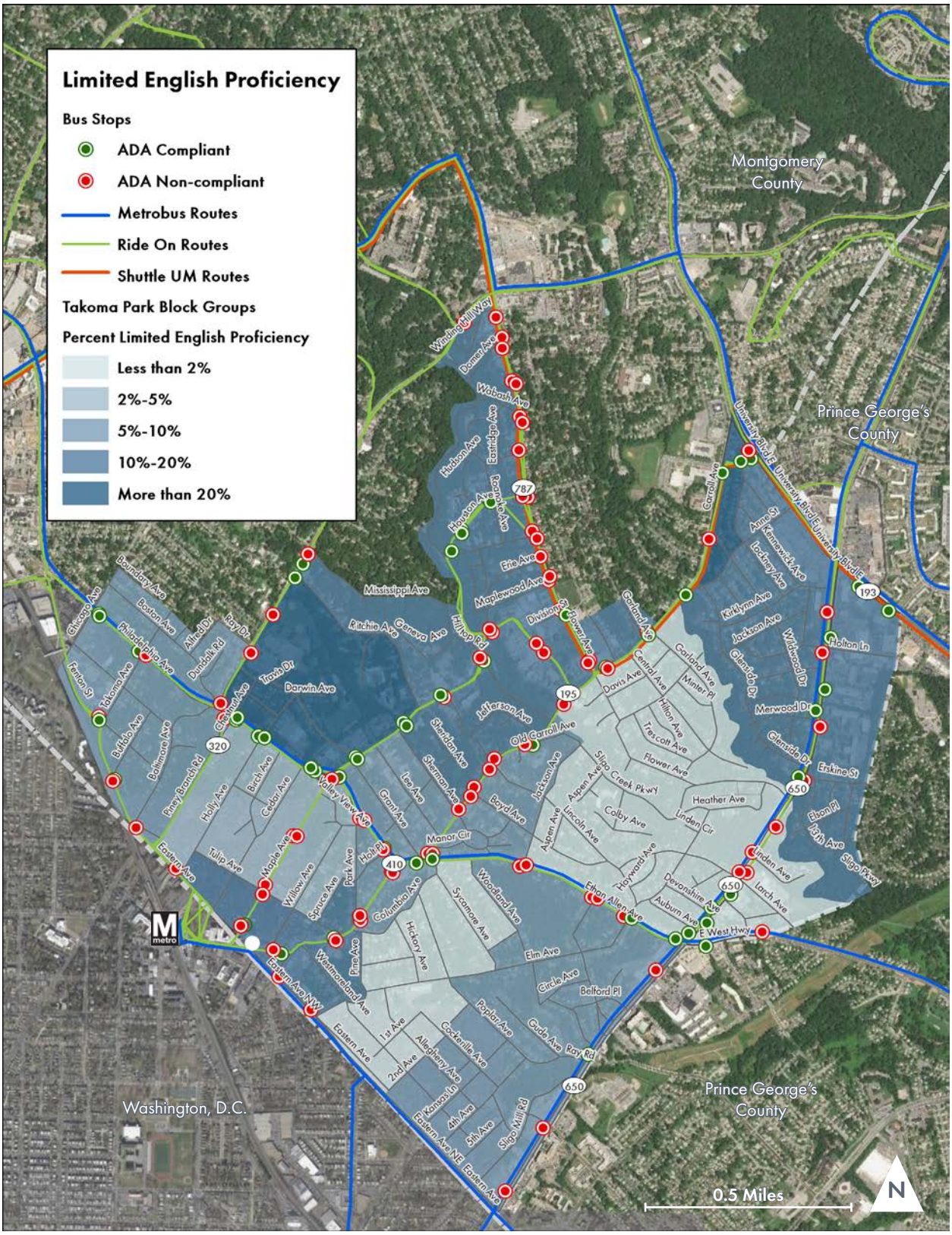
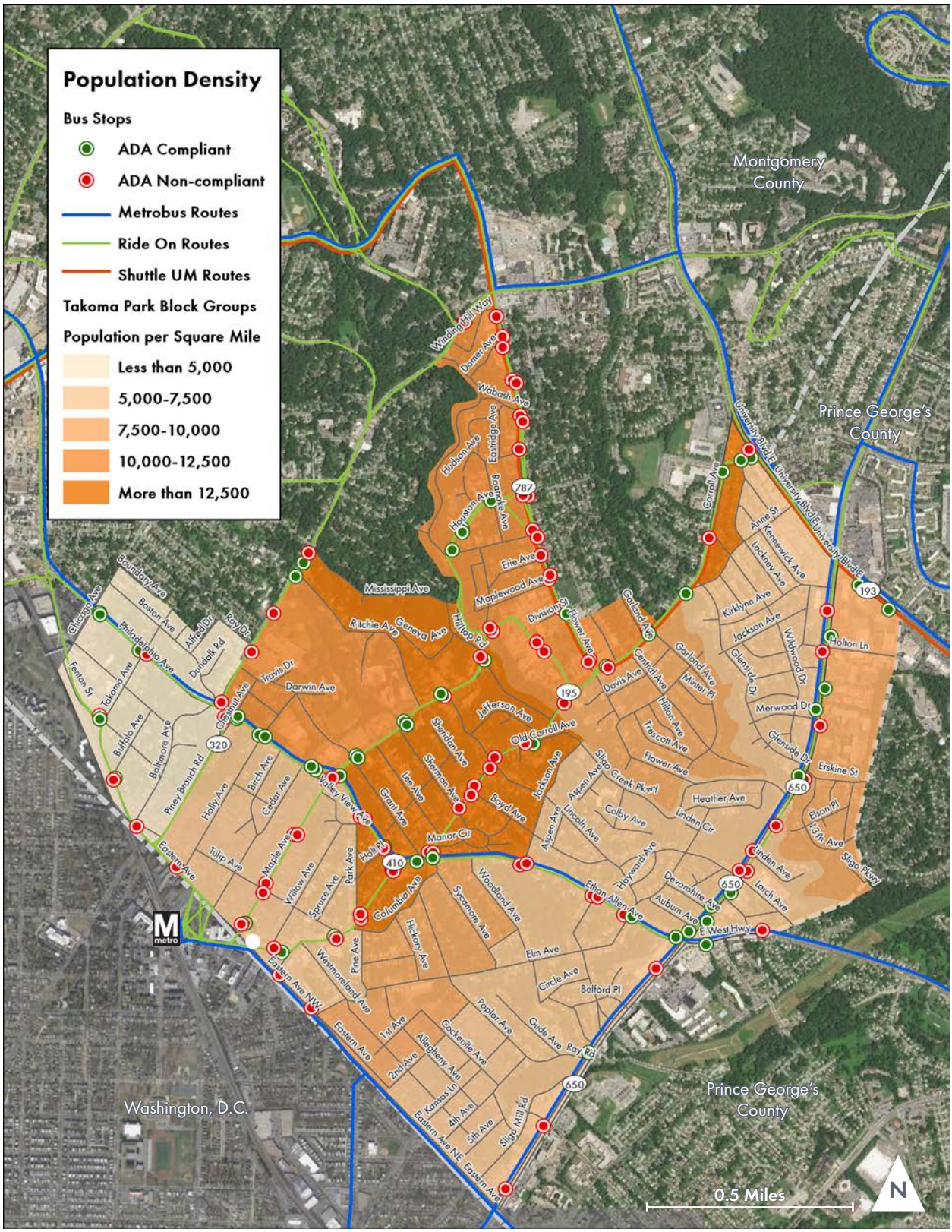


Figure 4-16: Population Density by Census Block Group



Improvement Approaches

While useful, the bus stop prioritization rankings developed in the previous section are not expected to serve as a rigid guideline for bus stop improvements. Many factors can influence which bus stops are prioritized for improvements. Strategies include:

- Corridor-by-Corridor Approach
- Amenity-by-Amenity Approach
- Ridership-Based Approach
- Community-Based Approach

The rest of this section will expound upon each of these strategies and provide some examples.

Corridor-by-Corridor Approach

The Montgomery County Bus Stop Improvement Program was adopted over a decade ago to make strategic bus stop improvements in Montgomery County. At the outset of this program, stops along major transportation thoroughfares were prioritized for improvements regardless of factors like ridership or land use. Prioritizing a major arterial or intersection rather than a group of individual stops could increase the visibility of all bus stops along that corridor. In Takoma Park, New Hampshire Ave. would be the most likely candidate for corridor specific improvements. Stops along New Hampshire Ave. tend to have higher ridership and are served by major Ride On and WMATA bus routes. Six New Hampshire Ave. stops landed in the top 10 for prioritization scores.

Improving bus stops at major intersections is also beneficial to passengers who might be making a transfer between two bus lines. Takoma Park has previously taken this approach by overhauling bus stops and the pedestrian network at the intersection of Ethan Allen Ave. and New Hampshire Ave. As a major transfer point between WMATA's F4 and K6/K9 routes, significant changes were made that improved accessibility and the rider experience. Larger boarding and alighting areas, bike racks, trash cans, and benches were installed to make more accessible and attractive stops. Figure 4-17 displays before and after images of the stops at Ethan Allen Ave. and New Hampshire Ave. Before photos were obtained using Google's Street View Archives. It should be noted that the westbound F4 stop on Ethan Allen Avenue was moved from the near-side to the far-side of the intersection.

If the City is considering an intersection based approach to improve bus stop and sidewalk accessibility, the following intersections would be excellent candidates for improvements:

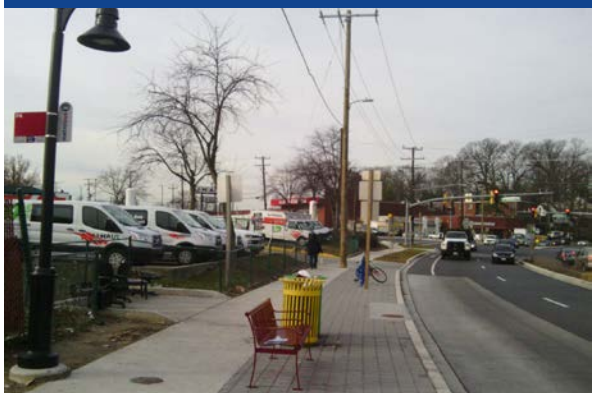
- Flower & Carroll
- Carroll & Philadelphia

Figure 4-17: Ethan Allen Ave. & New Hampshire Ave. Bus Stop Improvements

Eastbound Bus Stop on Ethan Allen Ave. @ New Hampshire Ave.

2009

2020



Westbound Bus Stop on Ethan Allen Ave. @ New Hampshire Ave.

2009

2020

Amenity-by-Amenity Approach

Bus stop improvements can be guided by prioritizing the installation of certain amenities over others. For example, Takoma Park's contract with InSite allows shelter prioritization to occur concurrently with other accessibility improvements.

In areas where transit is provided during early-morning and late-night hours, a focus may be placed on ensuring that there is adequate lighting for waiting passengers. At stops with higher ridership, a transit system may prioritize installing real-time arrival displays at major stops.

In Takoma Park, installing ADA compliant landing pads should be one of the City's highest priorities. Since Takoma Park wishes to increase transit ridership, the installation of lighting at all stops, as well as shelters at all stops with over 30 daily boardings, may be prioritized over other passenger amenities. Research has documented that shelters, along with the sense of security provided by adequate lighting, can help attract new passengers while continuing to support existing ridership.

Ridership-Based Approach

Another option to guide bus stop improvements is choosing a single bus stop characteristic and systematically improving stops by that characteristic. Since one of Takoma Park's primary objectives in improving bus stops is increasing transit ridership, using cumulative ridership to guide improvements would likely be the most logical characteristic to use as a guide. Using ridership as the sole prioritization factor presents stakeholders with two general improvement options - prioritizing high ridership stops for improvements or prioritizing low ridership stops for improvements

Figure 4-18: Bus Stop on Philadelphia Ave. & Chicago Ave.

Prioritizing lower ridership stops will increase the visibility of transit in lower density residential areas, while prioritizing higher ridership stops will see increased amenities on large commercial corridors and higher-density neighborhoods. Figure 4-18 shows the Philadelphia Avenue & Chicago Avenue stop, which has the highest ridership in Takoma Park.

Community-Based Approaches

This approach engages the local community to improve bus stops and install amenities in ways that are collaborative, creative, and public facing. These efforts help to increase the visibility of transit in the community by serving as a marketing initiative with a transit provider. Collaborative bus stop improvement initiatives in other areas have fostered greater community involvement and engaged local artists, businesses, and other stakeholders to create attractive, creative, and compliant bus stop designs.

In Baltimore (MD), the Southeast Community Development Corporation (CDC) has facilitated several creative bus stop redesigns in the neighborhoods surrounding Patterson Park. The Southeast CDC has advocated for funding from local government, businesses, and non-profits to fund these initiatives. Figure 4-19 shows two bus stops that have added to the vibrancy of the built environment while still providing bus riders a safe and accessible transit experience.

Other community institutions like schools, local businesses, and neighborhood organizations can be integrated in the bus stop improvement process as well. St. Mary's Transit in Southern Maryland runs an Adopt-A-Spot program that gives advertising space to local business in exchange for trash collection and maintenance at the stop. In Bethesda (MD), the Bethesda Urban Partnership operates a free shuttle bus and has installed unique benches at all its stops, many of which are co-located with Ride On. It is recommended that initiatives like these be undertaken strategically, since the increased outreach and community engagement will likely be more time-consuming than a normal bus stop improvement project.

Figure 4-19: Community-Oriented Bus Improvements in Maryland

Baltimore

Baltimore

St. Mary's County


Bethesda

Improvement Challenges

Implementing a bus stop improvement program is not without its obstacles. Coordinating with local and state entities, on-street parking issues, and limited space on the public-right-of-way can complicate the improvement process and require additional administrative efforts. This section describes some of the challenges that may arise throughout the bus stop improvement process.

Local and State Coordination

Coordinating with the three transit providers in Takoma Park is necessary if bus stop improvements are to be made. At stops with more than one provider, the City of Takoma Park may take on the role of conduit between the two providers, helping to facilitate negotiations about who is responsible for making the recommended improvements. Open communication with transit service providers should ease the improvement process while creating a feedback loop that can help refine the process.

Figure 4-20: Local & State Coordination Confusion

At the state level, the permitting process to perform maintenance on state highways can be arduous. State highways in Takoma Park are the City's most important transit thoroughfares, and improvements at these stops improve the experience for the most riders. Developing a working relationship with the Maryland State Highway Association (MDOT SHA) can expedite the process.

On-Street Parking Considerations

The elimination of on-street parking is an effective way to provide extra space in the PROW, but it can cause a public outcry from both residents and local businesses who depend on on-street parking. While public discontent is to be expected, the best way to avoid a worst-case scenario is to provide a better built environment that promotes activity and walkability. Another way to mitigate the elimination of on-street parking at bus stops is to create a curb bulb when possible.

PROW

Another way to create additional space for a compliant landing pad is by negotiating with homeowners to use part of their property to install the additional space needed for the landing pad. Doing this will require some sort of negotiation with the homeowner, and the interactions will likely vary case-by-case. A general analysis of Takoma Park's property parcel data showed that of the 73 stops that needed a landing pad installed, 35 could potentially require going into private property to create the necessary space. Examples of potential conflict locations are show in Figure 4-21.

Figure 4-21: Landing Pad Installation Conflicts in Takoma Park



Maintaining Bus Stops

Just like any piece of transportation infrastructure, bus stops must be maintained to be keep them attractive and effective. Takoma Park should ensure that regular maintenance activities are performed at all bus stops. Bus stop maintenance activities may include trash removal, litter pickup, graffiti removal, replacement of damaged amenities, and snow removal.

Contracted Bus Stop Maintenance

As the improvements are conducted and the number of bus stop amenities increase, the City may consider contracting with city/county partners or private companies. Jurisdictions may partner with their public works or waste management divisions to provide regular maintenance and trash pickup. While others have entered into contracts with waste management companies or advertisement agencies to maintain bus stops in exchange for advertisement rights.

Volunteer Based Bus Stop Maintenance

The City may also consider establishing an adopt a bus stop program that would allow individuals, local service organizations, and business partners to sponsor improvements or volunteer to maintain stops. Similar to the Adopt-A-Highway program, volunteers would regularly visit the sponsored bus stop to pickup trash and assist with minor repairs and snow removal; larger repairs would be reported to the transit provider or city for further maintenance. In exchange for their time or sponsorship, a sign with their name(s) and/or organization could be placed at the stop to market the program and honor the participants. MDOT MTA's Adopt-A-Stop Program is an excellent regional example of a volunteer based program.

Potential Funding for Improvements

Typically, the primary barrier to improving bus stop accessibility and amenities is a lack of funding. There are various funding options, from competitive grants to business improvement districts. These funding options and more are outlined below.

Bonds

Municipal or infrastructure bonds could help finance bus stop and pathway improvements. Bonds are a voter-approved mechanism that allow debt which is paid back through local taxes.

Improvement Districts

Common in high activity centers and downtowns, business improvement districts, public improvement districts, infrastructure development zones, and tax increment development districts are excellent vehicles for beautification and passenger enhancements at and around bus stops. These districts and zones are typically funded through property taxes or special levies and have the ability to issue bonds and borrow money for beautification efforts.

Transportation User Fees

Surcharges or sales taxes could be added to parking fees or other existing transportation related charges such as registration fees or revenue producing projects. Enforcement fees (parking fines, sidewalk related violations, etc.) could also be allocated to future bus stop and sidewalk improvements.

Grants

Grants are typically the primary source of bus stop improvement funding. However, traditional capital grants like the Federal Transit Administration's Section 5307 and Section 5339 are just a sampling of potential grants. Other competitive grants that could fund sidewalk and bus stop improvements are the Department of Housing and Urban Development's Community Development Block Grant (CDBG), the Federal Highway Administration's Congestion Mitigation and Air Quality Improvement (CMAQ) Program, and the U.S. Department of Transportation's Better Utilizing Investments to Leverage Development (BUILD) grants.

Public-Private Partnerships

Public-private partnerships could also generate funding for improvements. Potential partners may include neighborhood associations, local businesses, foundation grants, and real estate developers.

Appendix A
Field Survey Guide

Location Information

Longitude & Latitude

Coordinates generated by GPS receiver and quality checked by database administrator.

Stop ID

A unique numerical value that is assigned to each bus stop prior to the field survey.

On Street

The on street is the name of the street that the bus is stopped on when serving the bus stop.

At Street

The at street is the closest cross street to the bus stop. The cross street may, on occasion, be an address number, business name, or a descriptor (e.g. East Side of Sligo Trail).

Heading

The direction a bus would be facing when stopped at the bus stop (90 - East, 180 - South, 270 - West, 360 - North). Range: 1 to 360

Placement

Identify the location of the bus stop relative to the intersection

☐ Nearside ☐ Far-side ☐ Mid-Block
☐ Across From ☐ At Location

General Characteristics

Status

Describe the current status of the bus stop.

- ☐ Active
- ☐ Inactive
- ☐ Under Construction
- ☐ Restricted Access
- ☐ New
- ☐ Not Found

Pull-Out Capacity

Identify if there is a designated bus stop pull-out area to allow buses to serve the stop out of the travel lane and how many 40-foot buses can fit into the designated area. Shoulders and on-street parking are not considered bus pull-out areas. (Range: 0 to 10+)

Adjacent Land Use

Identify the types of land use that are adjacent to the bus stop.

- ☐ Residential - Single Family
- ☐ Residential - Multi Family
- ☐ Commercial - Retail
- ☐ Commercial - Office
- ☐ Industrial
- ☐ Mixed Use
- ☐ Park - Open Space
- ☐ Vacant Lot
- ☐ Education - School
- ☐ Education - College
- ☐ Medical
- ☐ Cultural Attraction
- ☐ Recreation Center
- ☐ Place of Religion
- ☐ Government Building
- ☐ Human Service Agency
- ☐ Transit Center

Speed Limit

Identify the posted speed limit for the roadway adjacent to the bus stop. (Range: 0 to 55 mph)

Travel Lanes

Identify the total number of travel lanes along the roadway adjacent to the bus stop (the number of lanes one would need to cross to reach the other side of the roadway); include turning lanes when necessary. (Range: 0 to 10+)

Median

Identify the presence of a raised median or pedestrian refuge island across the on street. (Yes/No)

Bus Stop Signs and Pole

Pole(s)

Identify the presence and number of bus stop signs. (Range: 0 to 3)
For shared stops with multiple poles, each bus stop pole will be recorded separately.

Pole Owner

Identify the owner of the bus stop pole. For a shared stop where there are multiple providers, the uppermost head sign is the owner of the pole. Do not include information for other installation methods (e.g. utility poles, light poles, etc.).

- ☐ Ride On
- ☐ WMATA
- ☐ Shuttle-UM
- ☐ Other
- ☐ Not Applicable

Pole Installation

Identify how the bus stop pole is installed; do not include information for other installation methods (e.g. utility poles, light poles, etc.).

- ☐ Not Applicable
- ☐ Earth
- ☐ Concrete
- ☐ Brick
- ☐ Asphalt
- ☐ Other

Pole Damage

Identify if there is any physical damage to the bus stop pole.

- ☐ Not Applicable
- ☐ None
- ☐ Bent/Leaning
- ☐ Broken/Severed
- ☐ Loose
- ☐ Other

Sign(s)

Identify the presence and number of bus stop signs. (Range: 0 to 4)
For shared stops with multiple providers, each bus stop sign will be inventoried separately.

Sign/Stop Number

Agency specific stop number. (Numeric field)

Bus Stop Sign and Pole (cont.)

Sign Owner

Identify the owner of the sign.

- ☐ Ride On
- ☐ WMATA
- ☐ Shuttle-UM
- ☐ Other

Sign Installation

Identify how the bus stop sign is installed at the bus stop.

- ☐ Bus Stop Pole
- ☐ Bus Stop Shelter
- ☐ Traffic Sign Pole
- ☐ Utility Pole
- ☐ Light Pole
- ☐ Traffic Light Pole
- ☐ Building
- ☐ Other

Sign Type

Identify if the type of sign installed at the bus stop.

- ☐ Blade
- ☐ Full-size
- ☐ Other

Sign Height

Identify if the distance from the bottom of the sign to the ground is greater or less than 80 inches.

- ☐ 80” or Greater
- ☐ Less than 80”

Sign Route Information

Route information that is posted on the sign. (Free form field)

Sign Damage

Identify if there is physical damage to the bus stop sign.

- ☐ None
- ☐ Loose/Not Secured
- ☐ Missing Letters/Numbers
- ☐ Graffiti
- ☐ Stickers
- ☐ Torn/Bent
- ☐ Other

Customer Information

Information Case

Identify the type of information case at the bus stop.

☐ None ☐ Flat - Single Sided ☐ Flat - Double Sided
☐ Rectangular (4-Sided) ☐ Bullet (Turnable) ☐ Other

Information Case Accessibility

Identify if the information case is accessible - meaning there is a paved and unobstructed 30" by 48" area directly in front of the information case with a clear forward or parallel approach.

☐ None/Not Applicable ☐ Accessible ☐ Obstructed
☐ Unpaved

Information Case Height

Identify the height range of the information case from the sidewalk/ground surface.

☐ None/Not Applicable ☐ Between 48" & 67" ☐ Below 48"
☐ Over 67"

Information Case Damage

Identify if there is any physical damage to the information case.

☐ None/Not Applicable ☐ Loose/Not Secured ☐ Broken
☐ Graffiti ☐ Stickers ☐ Other

Route Schedule

Identify if there is a route schedule available at the bus stop. (Yes/No)

Route Map

Identify if there is a route/system map available at the bus stop. (Yes/No)

Information Updated/Revised

Identify the revision or publication date of customer information. (Free form field)

Boarding and Alighting Area/Landing Pad

Landing Pad

Identify if there is a 5' by 8' paved landing pad at the bus stop.

- ☐ Unobstructed 5' x 8'
- ☐ Obstructed 5' x 8'
- ☐ Less than 5' x 8'
- ☐ Sidewalk (Less than 5' x 8')
- ☐ No Landing Pad/Sidewalk

Landing Pad Material

Identify the surface material of the landing pad.

- ☐ Concrete
- ☐ Brick
- ☐ Asphalt
- ☐ Other

Landing Pad Surface Problem

Identify if the landing pad has problems that could impede its use by pedestrians or persons with a mobility device.

- ☐ None
- ☐ Major Cracks
- ☐ Slope
- ☐ Catch Basin
- ☐ Uneven Pavement
- ☐ Vegetation
- ☐ Dirt/Debris
- ☐ Other

Landing Pad Obstruction

Identify if there is a potential obstruction in the landing pad area.

- ☐ None
- ☐ Bus Stop Pole
- ☐ Bench
- ☐ Shelter
- ☐ Trash Can
- ☐ Traffic Sign Pole
- ☐ Utility Pole
- ☐ Fence
- ☐ Wall
- ☐ Mailbox
- ☐ Vendor Publication Box
- ☐ Other

Landing Pad Connect to the Curb

Identify if the landing pad connects to the on street curb.

- ☐ Yes
- ☐ No
- ☐ No Curb

Boarding and Alighting Area/Landing Pad (cont.)

Knee Wall

Identify the presence of a knee wall around the landing pad. (Yes/No)

Rear Landing Pad

Identify the presence of a 5' by 8' paved landing pad for the rear doors of the bus. (Yes/No)

Rear Landing Pad Obstruction

Identify if the 5' by 8' rear paved landing pad is obstructed. An obstruction is any permanent object that reduces the usable 5' by 8' space. (Yes/No)

Landing Pad Connect to the Sidewalk

Identify if the landing pad is connected to a sidewalk.

☐ Yes ☐ No ☐ No Sidewalk

Sidewalk Accessibility

Sidewalk Width

Document the width of the sidewalk in feet. Round down to the nearest foot and enter zero (0) for bus stops with no sidewalk. (Range 0 to 10+)

Sidewalk Landscape Buffer

Identify if there is a presence of landscaping/grassy area between the sidewalk and curb. (Yes/No)

Sidewalk Surface Problem

Identify if there is an impediment that could make travel along the sidewalk difficult and/or unsafe.

- ☐ None
- ☐ Catch Basin
- ☐ Dirt/Debris
- ☐ Major Cracks
- ☐ Uneven Pavement
- ☐ Other
- ☐ Slope
- ☐ Vegetation

Sidewalk Obstruction

Identify if there is an object along the sidewalk between the stop and the intersection that reduces the sidewalk width to less than 48".

- ☐ None
- ☐ Shelter
- ☐ Utility Pole
- ☐ Mailbox
- ☐ Bus Stop Pole
- ☐ Trash Can
- ☐ Fence
- ☐ Vendor Publication Box
- ☐ Bench
- ☐ Traffic Sign Pole
- ☐ Wall
- ☐ Other

Sidewalk Connectivity

Identify if there are connectivity issues to major trip generators from the bus stop based on the presence of sidewalks along the on street and cross street. This is a cursory visual observation.

- **Good** - Sidewalks are present along the on street and cross street where there are trip generators and/or bus stops.
- **Fair** - Sidewalks are present along the on street where there are trip generators and/or bus stops but not along the cross street where there are trip generators and/or bus stops.
- **Poor** - No sidewalk is present at the bus stop location or in the surrounding vicinity.

Curb Ramp and Intersection Accessibility

Curb Ramp Type

Identify the type of curb ramp that is closest to the bus stop.

☐ None ☐ Perpendicular ☐ Diagonal
☐ Parallel ☐ Blended Transition

Curb Ramp Compliant

Assessment of the running and cross slope, and assessment of minimum clearances for the curb ramp closest to the bus stop. (Yes/No)

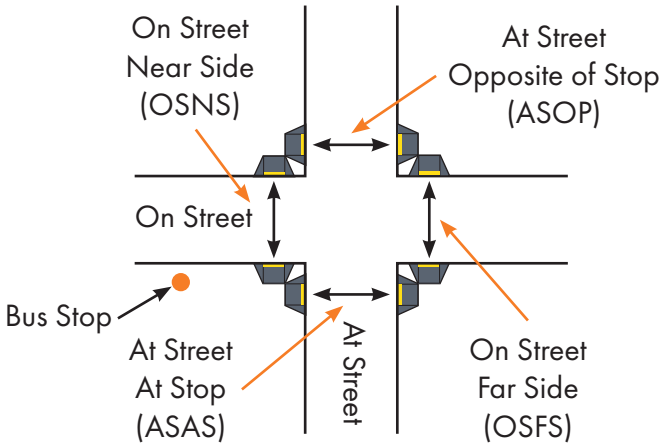
Detectable Warning

Identify if there is a detectable warning surface on the curb ramp closest to the bus stop. (Yes/No)

Curb Ramp Connections

Determine if there are connecting curb ramp pairs at the nearest intersection or mid-block crossings.

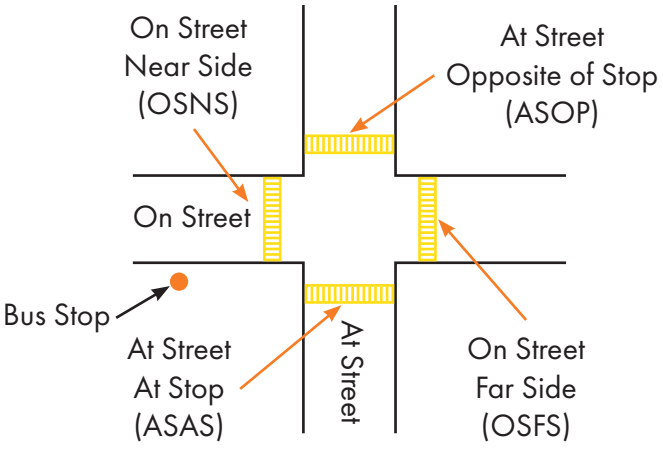
OSNS ☐
OSFS ☐
ASAS ☐
ASOP ☐



Crosswalk Connections

Determine if there are marked crosswalks at the nearest intersection or mid-block crossings.

OSNS ☐
OSFS ☐
ASAS ☐
ASOP ☐



Curb Ramp and Intersection Accessibility (cont.)

Traffic Control Device

Identify if there is a traffic control device for the on street and cross street intersection nearest the bus stop.

On Street Traffic Control

☐ None ☐ Traffic Light ☐ Stop Sign ☐ Yield Sign

Cross Street Traffic Control

☐ None ☐ Traffic Light ☐ Stop Sign ☐ Yield Sign

Pedestrian Control Device

Identify if there is a pedestrian control signal for the on street and cross street intersection nearest the bus stop.

On Street Pedestrian Control

☐ None ☐ Automatic ☐ Push Button ☐ Audible

Cross Street Pedestrian Control

☐ None ☐ Automatic ☐ Push Button ☐ Audible

Pedestrian Control Device Accessibility

Identify if there is a firm and level 30" by 48" surface with a forward or parallel approach to access the pedestrian control. (Yes/No)

Pedestrian Control Device Height

Identify if the height of the center-point of the pedestrian control device button is within 15" to 48" from the ground surface. (Yes/No)

Bicycle Infrastructure

Bicycle Racks

Identify the availability of bicycle racks at the bus stop. (Yes/No)

Capital Bike Share

Identify the presence of a Capital Bike Share station at the bus stop. (Yes/No)

Bicycle Repair Station

Identify the presence of bike repair station. (Yes/No)

Bicycle Network

Identify the type of bicycle infrastructure along the on street of the bus stop.

- ☐ Sharrow
- ☐ Marked Lane
- ☐ Buffered Lane
- ☐ Protected Lane
- ☐ None

Bus Stop Parking

Type of Parking

Identify the availability and type of on-street parking at the bus stop.

- ☐ Yes, Marked
- ☐ Yes, Unmarked
- ☐ No, Signed
- ☐ No, Travel lane

No Parking Sign

Identify the type of no parking sign at the bus stop.

- ☐ No Parking Bus Stop Zone
- ☐ No Standing Bus Stop Zone
- ☐ No Stopping Bus Stop Zone
- ☐ No Parking Anytime
- ☐ No Standing Anytime
- ☐ No Stopping Anytime

Length of No Parking Zone

Distance of marked no parking zone. (0 to 100+, 10-foot increments)

Bus Stop Shelters

Shelter

Identify the presence and number of shelters at the stop. (0 to 5)

Shelter Feasible

Identify if there is adequate available right-of-way to install a new or additional shelter. (Yes/No)

Shelter Number

Identify the shelter's number, typically posted on the sides of the shelter. (Numeric)

Curb to Shelter

Identify the distance between the front of the shelter and the backside of the curb. (0 to 50-feet)

Clear Path to Shelter

Identify if there is unobstructed access to the entrance of the shelter. (Yes/No)

Shelter Entrance

Identify if the shelter entrance is less than 48-inches wide and/or the presence of an obstruction preventing a wheelchair user to enter the shelter. (Yes/No)

Wheelchair Fit Under Shelter

Identify if the interior of the shelter has a 3' wide by 4' deep unobstructed area to allow wheelchair users to completely fit inside and under the shelter. (Yes/No)

Shelter Damage

Identify any physical damage to the shelter.

- ☐ None
- ☐ Loose/Not Secured
- ☐ Roof
- ☐ Missing/Broken Panel
- ☐ Graffiti
- ☐ Stickers
- ☐ Other

Passenger Seating

Seating

Identify the number of chairs and benches at the bus stop. (0 to 10+)

Seating Type

Identify the type of seating available at the bus stop.

☐ Bench(es) ☐ Chair(s) ☐ Porch Rocker(s)
☐ Other

Seating Location

Identify the location of the seating.

☐ Freestanding ☐ Shelter ☐ Freestanding & Shelter

Seating Damage

Identify any physical damage to the seating.

☐ None ☐ Loose/Not Secured ☐ Broken Pieces
☐ Graffiti ☐ Stickers ☐ Other

Other Bus Stop Amenities

Trash Can

Identify if there is a trash receptacle at the bus stop. (Yes/No)

Recycling Bin

Identify if there is a recycling bin at the bus stop. (Yes/No)

Other Bus Stop Amenities (cont.)

Trash Can/Recycling Bin Installation

Identify how the trash can and/or recycling bin is installed at the bus stop.

☐ Freestanding ☐ Attached to Ground ☐ Attached to Shelter
☐ Attached to Bus Pole ☐ Other

Vendor Publication Boxes

Identify the number of vendor publication/newspaper boxes at the bus stop. (0 to 10+)

Lighting

Identify if there is a lamp post or street light within 30 feet of the bus stop. (Yes/No)

Comments

Free form notes to capture any miscellaneous comments.

Bus Stop Photos

Three photo slots for approach, across, and departure angles; one additional slot for unique elements

Appendix B
References

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