

An Inventory of Bus Stops in Southeastern Massachusetts

A Point in Time Inventory Conducted Between May 2015 - October 2016

FINAL REPORT



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Table of Contents

Sections

Introduction	1
Study Area	1
Study Background	2
Methods	2
<i>Inventory Process</i>	2
<i>Database Development</i>	2
<i>Quality Check for Data Consistency</i>	4
Observations	5
<i>Key Findings</i>	5
<i>General Recommendation for Stop Improvements</i>	9
<i>Develop Stop Evaluation Criteria</i>	10
<i>Prioritize Stops for Improvement</i>	10
<i>Develop Standard for Stop Improvement</i>	10

Figures

Figure 1: SRPEDD Region Bus Stop Study Area	1
Figure 2: SRPEDD Region Bus Stops by RTA	5
Figure 3: Bus Stop Signage	5
Figure 6: Crosswalks at bus stops	6
Figure 4: Bus Stop Lighting	7
Figure 5: Observed Hazards at Bus Stops	8

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Introduction

A bus stop is more than a place where a transit bus picks up and drops off passengers. It is a place of transition where a pedestrian becomes a passenger and where a passenger becomes a pedestrian. The passenger's experiences of approaching the stop, waiting for the bus, and boarding the bus are all part of the transit experience and will greatly influence the perception of transit riders. Southeastern Massachusetts is home to two Regional Transit Authorities (RTA) and more than thirteen hundred bus stops. To better understand the existing conditions of the bus stops in Southeastern Massachusetts, and to develop plans for future improvements, the Southeastern Regional Planning and Economic Development District (SRPEDD) conducted a thorough inventory and analysis of each and every bus stop in the region.

Study Area

The stops included in the bus stop inventory are located within the SRPEDD region (Figure 1) and are serviced by two Regional Transit Authorities: Greater Attleboro Taunton Regional Transit Authority (GATRA) and Southeastern Regional Transit Authority (SRTA).

GATRA provides Fixed Route bus service to the communities of Attleboro, Mansfield, Middleborough, North Attleborough, Norton, Raynham, Taunton, Plainville, Seekonk, and Wareham.

SRTA provides Fixed Route bus service to the communities of Dartmouth, Fairhaven, Fall River, New Bedford, Somerset, Swansea, and Westport.



Figure 1: SRPEDD Region Bus Stop Study Area

Study Background

The Bus Stop Inventory was conducted between May 2015 to September 2016 and includes a comprehensive inventory of the conditions at each individual bus stop for the regions two Regional Transit Authorities. This document serves as a summary report outlining the development of the inventory and database, the data collection process, the prioritization of bus stop improvements, and the phasing plan to implement improvements. Bus stop information in this inventory may refer to data collected at a designated place where buses stop for passengers to board or alight from a bus, as well as at a bus station or terminal that allows the interchange between routes and nearby stops with other public transport modes.

Methods

Inventory Process

The bus stop inventory is a combination of field data collection and desktop data quality checking. To aid in field data collection, SRPEDD created an ESRI based geographic database that was accessed by survey teams in the field with a tablet (Photo 1). Data collected in the field was quality checked in house to ensure consistency in reporting.

Database Development

The first step of the inventory process was to establish a list of criteria that was to be collected at each bus stop. The work area consisted of all currently active known SRTA and GATRA bus stops on transit routes in the SRPEDD region.

Using Arcmap, a geodatabase was created with all the necessary GIS Files that were required to complete the Field inventory. This includes, but is not limited to, a bus stop file and a fixed bus route file. Within this new geodatabase, the criteria is entered into the bus stop file. Data was collected and recorded through various methods, including: multiple choice, a drop down menu, and write-in comments. The map was then published onto ArcGIS Online where it can be opened using ESRI's Collector App. ESRI's Collector App is designed to help increase data collection efficiency and accuracy with ArcGIS out in the field. Collector was downloaded onto an Android Tablet, where SRPEDD staff could access the designated bus stops and enter necessary data for each individual bus stop to the comprehensive dataset. Using Collector helped simplify directly entering raw data into a master database.

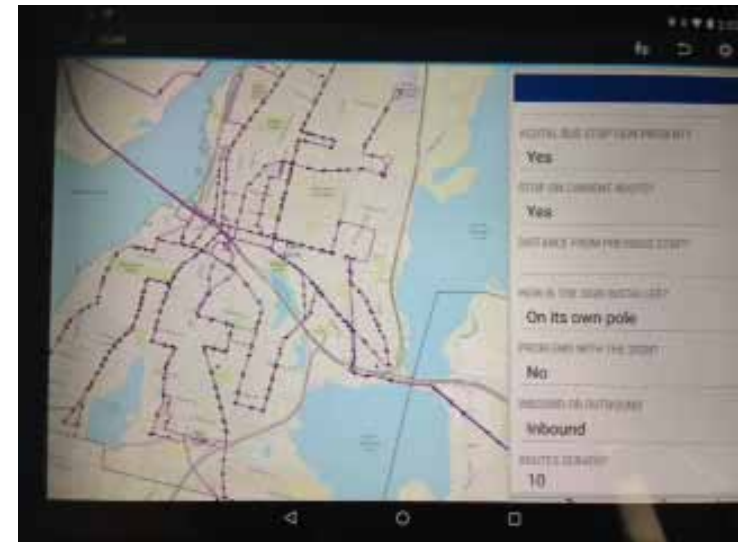


Photo 1: Tablet with ESRI Collector Application

Inventory Collection

With the development of the master database and field work map, staff began the data collection process could begin. In order to identify existing conditions, staff worked in pairs (Photo 2) to collect data at every bus stop in the SRPEDD region served by SRTA and GATRA. Below is a list of equipment used by staff to conduct the bus stop inventory.

Field Work Utensils:

- Safety Vest;
- Measuring Wheel;
- Tape Measure ;
- Android Google Tablet; and
- Smartphones (equipped with level/compass).

Using the tablet, staff recorded site conditions and measurements, and entered all information into ESRI's Collector App.



Photo 2: SRPEDD Staff Collecting Field Data.

Over the course of field data collection, SRPEDD staff visited over 1,300 bus stops in the 18 communities served by fixed route transit.

The data collection effort took 11 months over a two year period and required more than 1,000 staff hours.

Inventory Site Analysis

Staff collected data on the existing site conditions of the bus stops which involved assessing the safety of the location and placement of the bus stop, evaluating potential hazards or obstructions (Photo 3) that may affect passenger boarding or alighting, determining sidewalk conditions (Photo 4), and reviewing any damages to the bus stop sign itself. Staff also examined and assessed the conditions of bus stop amenities (Photo 5). This included documenting any damages to preexisting benches or shelters, recording any missing or incorrectly placed curb ramps, marking the status of the nearest crosswalk and streetlight visibility, and noting the presence of trashcans (Photo 6) or vandalism.

In addition to cataloging site conditions, surveyors collected measurements at each bus stops. In an effort to note sidewalk and pedestrian connectivity, staff measured the distances between the bus stop and the nearest cross street, nearest accessible crosswalk, and nearest available street lighting. All measurements were collected by measuring wheel, tape measur, and a smartphone level.



Photo 3: Bus stop with overgrown vegetation.



Photo 4: Bus stop without a connection to sidewalk network



Photo 5: Bus Stop with bus shelter.



Photo 6: Bus stop with a trash can.

Quality Check for Data Consistency

As the bus stop inventory database was compiled, quality control checks for data consistency was monitored to ensure that all bus stop information included proper documentation, measurements, and a completed dataset for each individual stop. The purpose of the quality check was to minimize the incorrect information and significant errors. Inventory data could be double checked through Google Earth and/or TransCAD.

Observations

Key Findings

The Bus Stop Inventory project was designed to collect detailed data for each bus stop in the region. The data will be used in future planning studies and will also provide a baseline for measuring the quality of the region's bus stop infrastructure. Based on the data collected SRPEDD identified several key indicators that can be used to determine the quality of the regional bus stops.

Bus Stops by Regional Transit Authority

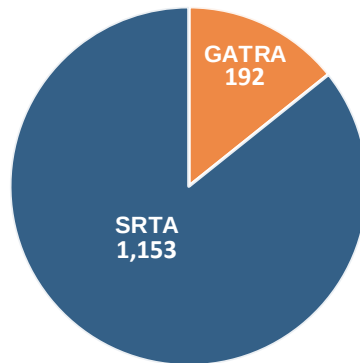


Figure 2: SRPEDD Region Bus Stops by RTA

The region is home to 1,345 bus stops, 1,153 are served by SRTA and 192 are served by GATRA. GATRA operates a “flag stop” system which allows passengers to board and alight at the location of their choosing, so long as the bus is able to stop safely. The GATRA “flag stop” policy means that there are fewer designated stops, which explains the difference in stop numbers between GATRA and SRTA. The following information is presented for the entire SRPEDD region and is not specific to either GATRA or SRTA.

Of the region's 1,345 bus stops, 273, or 20% of all stops are served by multiple routes. A stop that is served by multiple routes is an important element of the bus network because in addition to serving as a point of entry and exit to the system, it also serves as location that riders can transfer from one route to another.

SIGNAGE

Proper signage at a bus stop is critical to alert passengers where to wait for a bus. The sign, at a minimum, should identify the location as a bus stop, and identify the transit authority serving the stop and also notify motorists that parking is prohibited at the bus stop. The bus stops in the region are well signed with 95.2% of all stops having a sign present, with only 4.8% of those signs observed to have some damage such as graffiti, vandalism, faded, rusty, hazardous to pedestrians, or sign not permanently mounted.

Bus Stop Signage



Figure 3: Bus Stop Signage

SIDEWALKS

All transit passengers begin and end their journey as a pedestrian. In order to best provide a safe path of travel it is important that bus stops be connected to a sidewalk network (Photo 7). When bus stops are not connected to a sidewalk network (Photo 8), accessing the bus network becomes challenging for passengers and can prevent access to persons with disabilities.

SRPEDD observed 967 bus stops connected to a sidewalk, which represents 71.9% of all stops.



Photo 7: Bus stop connected to a sidewalk



Photo 8: Bus stop without a sidewalk connection

CROSSWALKS

Crosswalks provide passengers a safe location to cross the street to either approach or depart a bus stop. In Massachusetts, motorists are required by M.G.L Chapter 89, Section 11 to stop for pedestrians in the crosswalk. Locating bus stops near crosswalks ensures a safe path of travel for passengers and is complimentary to siting bus stops on a sidewalk network. SRPEDD observed that 700 stops (52%) had crosswalks present (Figure 6). SRPEDD used a distance of seventy-five (75) feet from the bus stop to the nearest crosswalk to determine whether a crosswalk was present at the stop.

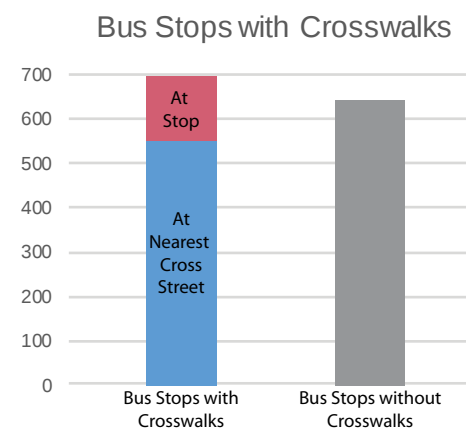


Figure 6: Crosswalks at bus stops

AMENITIES

Bus stop amenities include a bus shelter, a bench, a waste receptacle, or newspaper box; the most frequently observed amenities were shelters (Photo 9) or benches. Shelters and benches provide a basic level of comfort and can improve the transit experience for passengers. There were 111 shelters or benches identified throughout the region, representing 8.3% of stops. A shelter, however only provides comfort to passengers if it is in a state of good repair; 93.7% of all shelters were observed to be in a state of good repair.



Photo 9: Bus stop with shelter and route information sign

LIGHTING

Bus stops that are well lit provide waiting passengers a greater level of safety and security. Well lit bus stops also (Figure 4) make it easier for the driver of an approaching bus to identify if there is a waiting passenger at the stop. Stops can be illuminated by lights in shelters, decorative street lights, or overhead “cobra head” style street lights. The determination of a well lit stop was based on whether a street light was present within seventy-five feet of the stop. 66% of all the stops in the region have adequate lighting.

Bus Stop Lighting

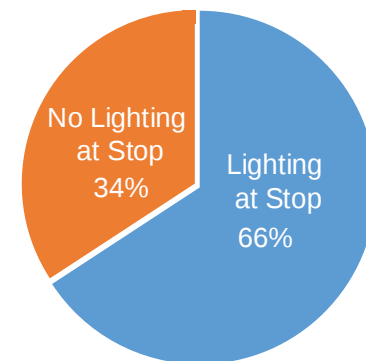


Figure 4: Bus Stop Lighting

HAZARDS

Bus stops are not typically designed and constructed as stand-alone infrastructure, but are more often sited on existing road ways. Because stops are sited on existing roadways, there are several unavoidable elements that can pose a hazard to waiting passengers. Some hazards create a barrier to access, while others have detrimental affects to passenger comfort or the perception of safety.

The most commonly encountered hazard was stops located in a high speed zone (Figure 5). This is common because many of the region’s bus routes operate outside of the urban cores and along roadways with higher speed limits.

The second most commonly encountered hazard was the lack of a crosswalk at the stop. Crosswalks improve passenger safety by providing a marked location to cross traffic.

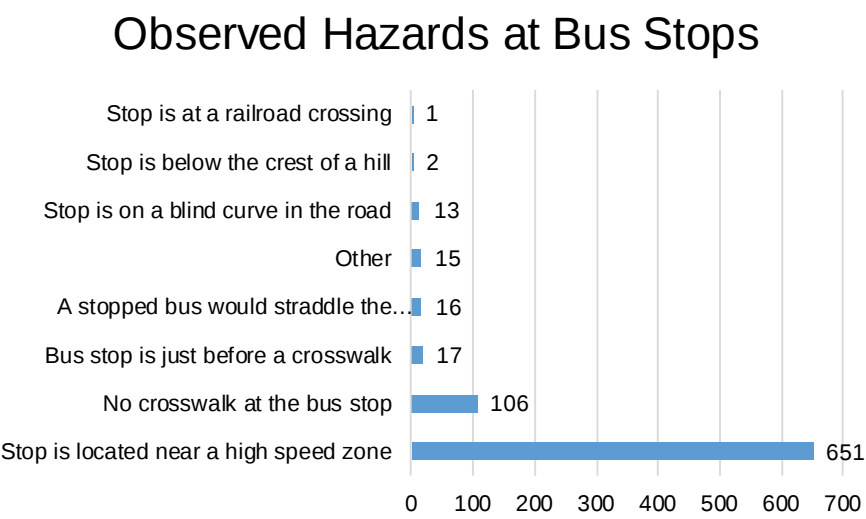


Figure 5: Observed Hazards at Bus Stops

Next Steps

General Recommendation for Stop Improvements

After reviewing the data analysis regarding the bus stop inventory in the SRPEDD region, SRPEDD recommends the following for both Regional Transit Authorities:

Install shelters at transfer bus stops and stops with high frequency of boarding

Stops that are served by multiple routes function as transfer points between routes. For many of the routes in the SRPEDD region, transferring from one route to another means waiting at the stop. A bus shelter provides protection from the weather and a place to sit and wait for the next bus. Stops with frequent boardings also warrant shelters since there is a high probability that one or more passengers will be waiting for an arriving bus.

As technology and funding allows, shelters should include dynamic signs that display the estimated wait time until the next arriving bus. Providing waiting passengers with an estimated wait time can reduce passenger stress and anxiety.

Sign Improvements at major bus stops including

- Route identification - Signage should alert passengers which routes serve the stop. This basic information can provide passengers with the confirmation that they are in the correct location and that the bus they intend to board serves that stop.
- Direction of Travel - Signage should alert passengers which direction the bus is traveling when it arrives. It is important to inform passengers whether the stop serves inbound or outbound travel so that the passenger can wait in the correct location for the bus they intend to board.

Consolidate stops and eliminate under-utilized stops

Not all stops are used regularly, and more often is the case that stops are located in close proximity to each other. Studying the passenger boarding habits, determinations can be made on the ideal locations for stops that will serve the largest number of passengers and provide the best access to the bus network. Eliminating stops that are rarely used, or consolidating several close stops into a single location will improve bus reliability by limiting the number of times the bus may need to stop when in service.

Painted curbs to indicate bus stop loading areas

Stops need to be clearly delineated not only for passengers, but for passing motorists. Parking is typically prohibited in front of stops, however the stop zone may not be properly marked and a motorist may mistakenly park too close to the stop and create a barrier for a boarding passenger. Painting the curb for the entire length of the stop zone will alert motorist in a very clear manner where parking is prohibited.

Stops with notable hazards or safety concerns should be removed immediately

It is unfortunate, however at times, bus stops are located in unsafe or hazardous locations. Hazards include locations at blind turns, below the crest of a hill, close to a railroad crossing, mid-block without a safe crossing, or in a high speed area. These hazards can expose a waiting passenger to potential for injury and should be avoided unless the stop is an absolute necessity.

Develop Stop Evaluation Criteria

By developing stop evaluation criteria, SRPEDD hopes to accomplish an organized way of maintaining and identifying current bus stops in the region. The results collected in this inventory will help to identify which bus stops in the region are acceptable and which bus stops need immediate attention based on criteria involving safety, accessibility, and comfort. The evaluation criteria will also be able to help RTA's monitor their own database of bus stop information and help to provide guidance and abidance with legal requirements.

Prioritize Stops for Improvement

The criteria included with the bus stop inventory can be used to prioritize bus stops and establish a standard to follow to determine if current bus stops meet passenger needs. Factors to consider for selecting, identifying, and evaluating bus stops include:

- Presence of bus stop sign or route information;
- Presence of amenities (benches, trashcans, shelters, lighting);
- Environment surrounding bus stops; and
- Hazardous locations or safety concerns.

Develop Standard for Stop Improvement

Developing a standard for bus stop improvements, will ensure that bus stops maintain a consistent look across the SRPEDD region to be more easily identifiable. The standards will ensure bus stops are complaint with the Americans with Disabilities Act, and will identify the appropriate amenities for a given situation.

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