
County Connection

# Bus Stop Spacing and Location Guide

**November 2023**

County Connection

CENTRAL CONTRA COSTA TRANSIT AUTHORITY (CCCTA)
Bill Churchill, General Manager




## Acknowledgements

TMD

**Transportation Management & Design**

# Table of Contents



## Figures

# 1. Introduction

The purpose of this guide is to develop a bus stop spacing policy for County Connection and provide direction on how to apply the policy. The tradeoffs that need to be considered in deciding how to space bus stops are briefly discussed. Two approaches to bus stop spacing based on industry best practice are presented, with a recommendation as to which approach is best suited for County Connection. The bulk of this document addresses how to apply the spacing policy since there are several factors that must be taken into consideration in identifying and installing each specific bus stop. Note that a peer review of documents from other transit agencies was used as the methodology for this guide.

# 2. Existing Conditions

County Connection currently does not have a policy regarding the spacing of bus stops. In actual practice there is a wide variation of spacing between bus stops. For example, Route 1 averages 5.5 stops per mile in the southbound direction and 6.1 stops per mile in the northbound direction. However, on Route 1 there is considerable variation in spacing of stops. There are 21 stops less than 0.2 mile apart including seven that are less than 0.1 mile apart, and five that are more than 0.25 mile apart.

Other examples of existing bus stop spacing include Route 10 which averages 6.5 stops per mile in each direction, Route 15 which averages 5.4 stops per mile eastbound and 6.19 stops per mile westbound, and Route 16 which averages 5.7 stops per mile northbound and 6.1 stops per mile southbound. Average spacing on all four routes ranges between 0.16 and 0.18 miles between stops. These examples appear to be typical throughout the system. See **Appendix A** for a table of current County Connection average stop spacing.

Some conclusions that can be drawn from this are that, on average, bus stops are very close together and, as explained below, bus stop consolidation is warranted. Also, on three of the four examples above the number of stops varies by direction. Since most passengers travel round trip there should be corresponding stops in each direction, which appears to not always be the case. Additionally, while bus stop consolidation is generally warranted, there are places where bus stops are too far apart and additional stops may be justified.

# 3. Stop Spacing Recommendations

## 3.1 Overview

Stop spacing refers to the distance between bus stops along a route. Stop spacing affects overall travel time and, therefore, competitiveness with driving and demand for transit. The tradeoff is between close stops, which result in short walking distances but longer transit trip times, and stops spaced further apart, which results in longer walking distances but higher speeds, more reliable bus service, and shorter transit trip times. Routes and corridors with higher demand and frequency should have stops spaced further apart, as riders are more willing to walk further for higher frequency service. Additionally, higher demand results in more riders boarding, which slows the bus. Meanwhile, feeder and shuttle services require stops closer together. Since riders are less likely to walk to less frequent service, there will not necessarily be people at each stop, meaning the bus will experience fewer delays.

The ability to increase stop spacing depends in part on the quality of the pedestrian network and connectivity in the area – can pedestrians safely and directly walk to the next-closest stop? Topography and natural features often impact achievable street connectivity; trips may be lengthened by having to avoid lakes or by limited crossings of rivers, or they may be made more difficult by hills. Post-World War II development often has very large blocks and cul-de-sacs, which greatly reduce connectivity. In a grid network, shorter blocks facilitate more direct travel, placing more area within walking distance of a stop. It may also depend on the characteristics of the passengers using the stop – for example, people with limited mobility may find it difficult to walk to the next stop. In many cases, the extra time spent walking to another stop will be more than made up with time savings during the trip on the bus.

Additionally, the more frequently the bus stops, the more time is lost in decelerating and accelerating (approximately 15 seconds). If stops are too close together, the bus becomes incapable of reaching its maximum speed. As a result, each stop impacts the progression band provided by the street's signal timing, resulting in an increased likelihood of the bus to stop at lights and causing additional delays. Therefore, consolidating stops can be a productive way to improve transit speeds, even though average dwell times increase due to more riders boarding, as long as accessible routes are available from a consolidated stop to the next closest stop and walking distances are not excessive.

Furthermore, industry best practice encourages to use the maximum bus stop spacing unless superseded by other determining factors such as topography (hills), limited access areas (freeways, bridges, airports), surrounding attractors, and transfer points.

Bus stop spacing will continue to be governed by a number of factors, which are described in greater detail below. It is intended that this process be objective, but also flexible enough to respond to unique needs and circumstances.

There are two approaches commonly used to determine bus stop spacing – density and service type.

## 3.2 Spacing by Density

While the standard walkshed radius for stop spacing is generally ¼ mile, the following density areas should be considered as outlined in Determining Levels of Density

### 3.2.1 Determining Levels of Density

In order to apply the spacing recommendations above, the following information may be used in order to determine the appropriate level of density:

1. The standards must be adjusted to account for the difference between net and gross acreage. Taking an average of 25% of gross acreage used for such things as right-of-way, 22 units/acre becomes approximately 16 units/total acre (including right-of-way).
2. Mixed use, commercial and industrial areas should also be included by using a conversion to identify the number of people per acre (e.g., employees for employment areas). Residential areas should use an average of 2.5 persons per household as used in the table above. Nonresidential should use 3.4 employees per unit.
3. Future growth needs to be accounted for as well and can be determined by looking at zoning and regional growth projections.

Figure 1: Spacing by Density

| | High Density Areas | Medium to Low Density Areas | Low to Rural Density Areas |
|---|---|---|---|
| **Units per Acre** | 22 or more units/acre | 4-22 units/acre | Below 4 units/acre |
| **Persons per Acre** | Residential: 41 or more persons/acre<br><br>Non-residential: 56 employees/acre | 8-41 persons/acre | Less than 10 persons/acre |
| **Spacing Recommendation** | Stops every 3 blocks/780 ft | Stops every 4 blocks/1,000 ft | Stops no more frequent than every 1,000 ft |
| **Notes** | Includes regional designated centers (e.g., Town Centers, Main Streets)<br>Less than this is only appropriate in special circumstances on a stop-by-stop basis or for safety | Less than this is only appropriate in special circumstances on a stop-by-stop basis or for safety | As needed on a location basis |

*Source: TriMet Bus Stop Guidelines*

## 3.3 Spacing by Service Type

Spacing should also consider the type of service being provided. County Connection has three types of service: local, express, and school. **Figure 2** includes a list of possible spacings and explanations for these different service types.

Figure 2: Spacing by Service Type

| Service Type | Spacing (feet) | Explanation |
|---|---|---|
| **Local** | 800 – 1,300 ft | Stops may be located more closely than listed based on trip attractors, stop activity or demand, transfer points, or other land uses that may warrant it. |
| **Express** | 1,000 – 2,600 ft | Service may use local stops as necessary to provide geographic coverage and to minimize delay for longer-distance passengers. |
| **School** | TBD | Same as local service |
| **BRT** | 1,760 – 2,640 ft | People will walk further to high frequency/high capacity service. |

*Source: AC Transit Multimodal Corridor Guidelines*

## 3.4 Recommended Approach

Based on the suburban nature of the County Connection service area, bus stop spacing should be based on service type.

- Local bus stop spacing should average 1,000 feet or five stops per mile with a minimum distance of 800 feet and maximum of 1,300 feet.
    - This policy should be applied to all new route alignments where bus stops are being installed for the first time as well as when considering requests for installing new stops on existing alignments.
- An audit of bus stop locations on existing local and express routes should be performed to identify where existing bus stop spacing does not meet the standard above.
    - Because it appears that this could be a significant effort, the audit may need to occur in phases, prioritizing routes based on highest ridership and/or poorest reliability (since consolidating/replacing stops could improve reliability).
    - An audit of bus stop spacing on school (600 series) routes is unnecessary. Where a school route shares an alignment with a local route, it will share stops with that route and any modifications to stop locations for the local route would also apply to the school route. Where school routes do not share an alignment with a local route, there is no need to expend resources making stop adjustments, except to address specific problems with a stop location, since the stop is served only once or twice a day. However, the bus stop spacing policy should be used when locating stops on any new alignment used exclusively by school service.
- Considering the factors described below, develop specific recommendations for bus stop removal (where a stop can simply be removed without making other changes), bus stop consolidation (new location(s) replacing two or more existing stops), or adding stops where gaps exist and there is a market to be served.
    - Bus stop removal should take place once identified as this involves minimal effort and expense. Bus stop consolidation and additions should occur as soon as practical but will require additional effort in gaining necessary approvals and may require additional infrastructure.
- County Connection currently does not operate BRT service, however, may in the future and should plan stops 1/3 to 1/2 mile apart.

## 3.5 Factors to Consider

Multiple factors should go into the spacing and placement of bus stops. **Figure 3** includes a list of ridership factors County Connection should consider as bus stops are added, moved, or removed.

Figure 3: Stop Spacing Ridership Factors to Consider

| Ridership Factors | Considerations |
| --- | --- |
| *Safety* | • Provide a safe location for operational movements<br>• Pedestrian safety<br>  ○ To and from the bus stop, and at the bus stop (waiting, boarding, and alighting)<br>  ○ Steer riders toward safe street crossings<br>  ○ Watch for other pedestrians<br>• Provide adequate lighting at stops for bus patrons<br>  ○ Lighting can be cast by pedestrian-scale light fixtures, lighted shelters, overhead street lights, or brightly-lit signs.<br>• Provide adequate sight distance (i.e., visibility for driver and waiting riders)<br>  ○ Avoid obstructions to sightlines between bus operators and passengers such as trees, signs, buildings, shelters, and topography<br>  ○ Bus stops should not be located over the crest of a hill, immediately in or after a roadway curve to the right, or at locations that might reduce visibility between buses and other vehicles |
| *Travel Time Delays* | • Far-side stops allow signal treatments to work most effectively<br>• Alternate placement of near- and far-side stops if signals occur at every stop |
| *Service Quality Tradeoffs* | • Fewer stops mean:<br>  ○ Faster, more efficient service<br>  ○ More potential for stop amenities<br>  ○ Longer walk distance for some<br>  ○ More ridership at existing stops |
| *Suitability for Bus Operations* | • Safe access into and out of bus stop location (no parking)<br>• Provide bus operators with adequate view of street and pedestrian areas<br>• Provide adequate sight distance for autos before bus stop, so drivers are aware the bus is stopped<br>• Avoid bus pull outs on roadways where the speed limit is 45 mph or less unless the stop is a layover location or a timepoint where a bus may need to stop longer than necessary to board passengers. Bus pullouts cause delay for reentering traffic lanes and can be a source of collisions between buses and oncoming traffic. |
| *Ridership* | • Assess both existing and projected boardings and alightings, as well as the ridership profile at the stop<br>• Low-ridership stops, particularly those near higher-ridership stops, may be considered for consolidation or removal |

| Ridership Factors | Considerations |
|---|---|
| *Pedestrian Environment* | • Connections and condition<br>  ○ Sidewalks immediately at the stop and those providing access to the stop and surrounding area are an important consideration<br>  ○ Look at pedestrian pathways (formal and informal), not just streets<br>• Crossings<br>  ○ Where bus stops are located near pedestrian crossings, the crossing should be marked and preferably located behind the stop, so that passengers are encouraged to cross behind the bus<br>  ○ Ideally, crossings should be signalized, especially in high-traffic and high-speed environments. Intersections and at-grade driveway crossings should have ADA-compliant curb ramps<br>  ○ At major transit generators, locate the stop near pedestrian access to the generator, preferably at the signal<br>  ○ Stops should be paired, at same intersection when possible |
| *Physically Accessible* | • Slope (no more than 2% for level surface, 8% for ramps)<br>• Construct 5'x8' concrete pad if necessary<br>• Check for curb ramps at intersection and surrounding streets<br>• Direct routes and comfortable, safe walking environment |
| *Existing & Future Land Use* | • Ensure compatibility with adjacent properties<br>• Note sensitive land uses, including medical facilities, municipal buildings, senior housing, and major transit trip generators such as shopping malls, schools, and dense commercial or residential complexes; Stop locations may be adjusted or added to provide better access to passenger origins and destinations<br>• Consider impacts on traffic |
| *Stop Elements* | • Bus stop signs should be placed 2.5 feet from the curb with informational signs flag-mounted away from the street<br>• Shelters require:<br>  ○ Five feet of pedestrian pass by, including clearance between poles, hydrants, and other obstacles<br>  ○ ADA landing pad adjacent to sign and outside of shelter<br>  ○ Clear pathway from the ADA waiting area inside the shelter to the ADA landing pad<br>  ○ Clear pathway from the rear door landing area to the pedestrian path<br>• Bench placement can be considered at any stop where accessibility is provided and placement does not compromise safety or accessibility<br>  ○ Should not be placed closer than 3.5 feet from curb<br>• Trash can placement must not infringe upon the APA pad or pathway |
| *Existing Service* | • Consideration should be given to maintaining and/or improving bus stops serving parallel or intersecting bus routes |

| Factors | Considerations |
|---|---|
| *Public Notification, Review, & Input* | • Before a stop is permanently added, letters should be sent to adjacent property owners and occupants warning them of the impeding change as soon as possible, preferably at least two weeks in advance<br>• While jurisdictions often place stops in the public-right-of-way, property owner input prior to these changes is encouraged<br>• Do not move existing stops for trash, noise, and/or nuisance; Instead, seek ways to address the problem directly |

# 4. Location of Stops

The table above provides factors that need to be considered. The material below provides guidance on bus stop placement for determining bus stop locations. When determining bus stop locations, it is best to proceed as if the stops were being placed for the first time. For cases with existing stops, if the existing stop does not fit into this process there must be a very compelling reason to retain it (e.g., if significant investment has already been made at the stop, or if there is heavy use by riders who are elderly or disabled and a new location would clearly degrade service for those riders). Additionally, it is easier to locate accessible transit stops when there is high street connectivity and when streets and adjacent land activities are designed for pedestrians and transit users.

Preferred bus stop locations are determined in the following sequence:

- Transfer locations
    - New stops to facilitate transfers with other existing transit
- Designated crossings
    - Stops at signalized intersections with safe pedestrian crossings
- Other major stops/transit trip generators

As programs or requests for bus stop changes call for review of specific bus stops, the spacing criteria outlined above should be considered. Even key bus stops may require adjustment (e.g., near-side to far-side placement). Long-term user and operating benefits will be weighed against project costs and neighborhood/rider objections to proposed changes.

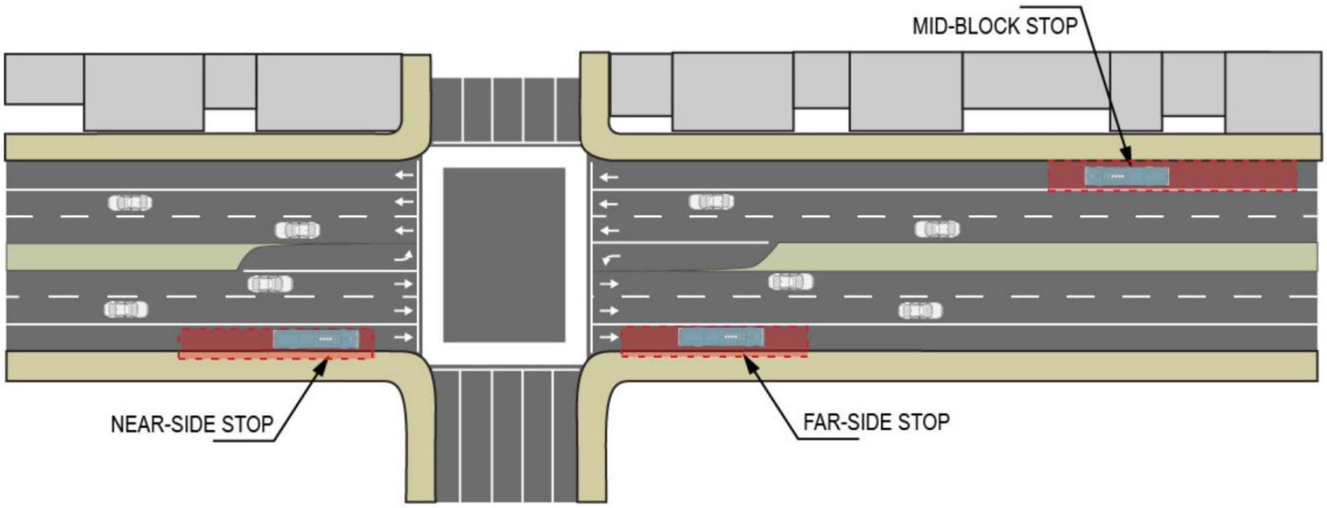
## 3.6 Placement of Stops

The most common location for transit service is on the side of the street, usually in mixed traffic lanes but sometimes in exclusive lanes. Side-of-street alignments permit the use of simple stops on the sidewalk and are generally less expensive to construct than center-of-street alignments. On one-way streets, side-of-street alignments are usually on the right side of the street to suit vehicle doors.

Determining the proper location of bus stops involves choosing between near-side, far-side and mid-block stops. Each of these stop locations have benefits and drawbacks, and the choice between these stop locations is affected by the existing conditions along a route such as roadway type and width, transit service characteristics, and land use.

Far-side bus stops are located after an intersection, allowing the bus to travel through the intersection before stopping to load and unload customers. Far-side bus stops support the use of a broad array of active transit signal priority treatments and take up the least amount of curbside space. Near-side bus stops are located before an intersection, allowing customers to load and unload while the vehicle is stopped at a red light or stop sign. Mid-block bus stops are located between intersections. **Figure 4** depicts these stop types.

Figure 4: Stop Placement




*Source: AC Transit Multimodal Corridor Guidelines*

Stops should be placed at locations:

- That are safe for passengers and vehicles,
- That may be easily accessed from the surrounding neighborhood, major transit trip generators, and/or intersecting transit services, and
- Where improvements in safety, convenience, and/or reduced trip times outweigh negative impacts

Preferred bus stop placement based on particular situations are listed in **Figure 5** below.

Figure 5: Stop Placement Preferences

| Preferred Placement | Situation |
|---|---|
| *Far-side* | • Any signalized intersection<br>• If bus turns at intersection<br>• Intersection with many right turns<br>• Complex intersections with multi-phase signals or dual turn lanes |
| *Near-side* | • If nearside curb extension prevents autos from trying to turn right in front of bus |
| *Starting near-side, alternate sides to maximize advantage from timed signals* | • If two or more consecutive stops have signals |

| Preferred Placement | Situation |
|---|---|
| *One near-side, one far-side to eliminate crossing required to transfer* | • If obvious, heavy single-direction transfer activity |
| *Mid-block* | • If blocks are too long to have all stops at intersections<br>• Major transit trip generators not served by stops at intersections<br>• Mid-block pedestrian-crossing defined by refuge island and/or striping |
| *Off-street* | • Transit center<br>• Major transit generator that cannot be served by on-street stop, or where ridership gain will far outweigh inconvenience to passengers already onboard |

*Source: TriMet Bus Stop Guidelines*

## 3.7 Intersection Stops

Stops located at the ends of a block (i.e., near-side or far-side) are intersection stops. Benefits of intersection stops include reduced walking distances between origins, destinations, and stops; safer, legal street crossings since most crosswalks are at intersections; and accessibility to curb ramps and other accessibility features.

### 3.7.1 Far-side Stops

Far-side intersection stops are generally preferred because they reduce conflicts between right-turning vehicles and stopped buses, eliminate sight-distance deficiencies on approaches to an intersection, and encourage pedestrian crossing at the rear of the bus. Additionally, far-side stops are integral to implementation of transit signal priority. Far-side stops also allow passengers to cross the street from multiple directions to access the bus boarding area, due to its location on the corner of the intersection.

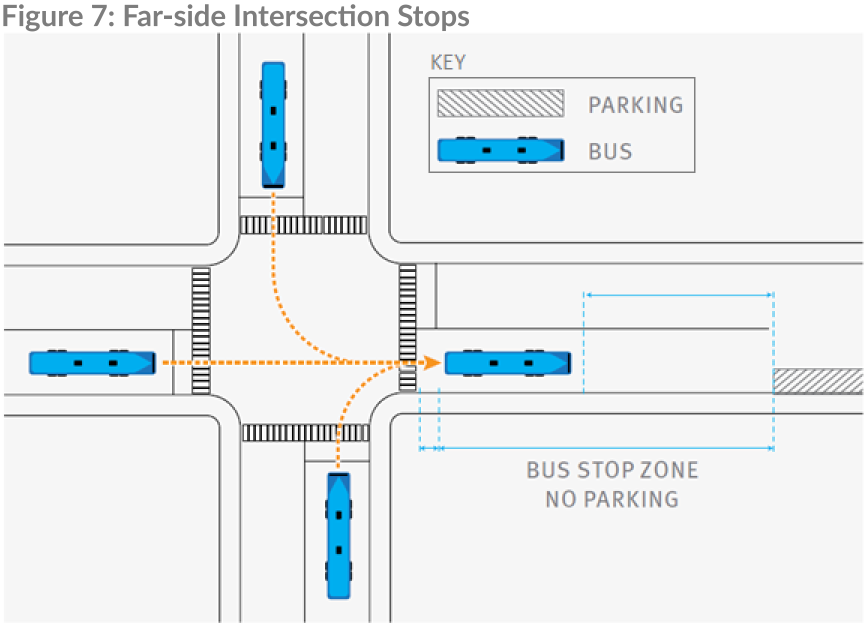
**Figure** 6 lists the pros and cons of far-side stops, while **Figure 7** illustrates them.

Figure 6: Far-side Pros & Cons

| | Far-side Pros | Far-side Cons |
|---|---|---|
| **Safety** | • Customers cross behind bus, resulting in fewer bus and pedestrian conflicts<br>• Better pedestrian and auto sight distances<br>• Creates gaps to reenter traffic<br>• Bus clears right turn lanes for traffic and other transit vehicles | • Drivers may not expect buses to stop immediately after intersections |
| **Travel Time** | • Enhances benefits of signal priority | • Queueing buses may block intersections |
| **Customer Experience** | • Under correct timing customers pass through intersections before stopping | • Can result in stopping twice, at light and at bus stop |
| **Reliability** | • Greater bus maneuvering area<br>• Allows buses to travel through an intersection before stopping<br>• Signals provide time for buses to reenter traffic<br>• Shorter bus zones as buses use the intersection as part of approach | |

*Source: TriMet Bus Stop Guidelines*

Figure 7: Far-side Intersection Stops




*Source: TransLink Transit Priority Toolkit*

### 3.7.2 Near-side Stops

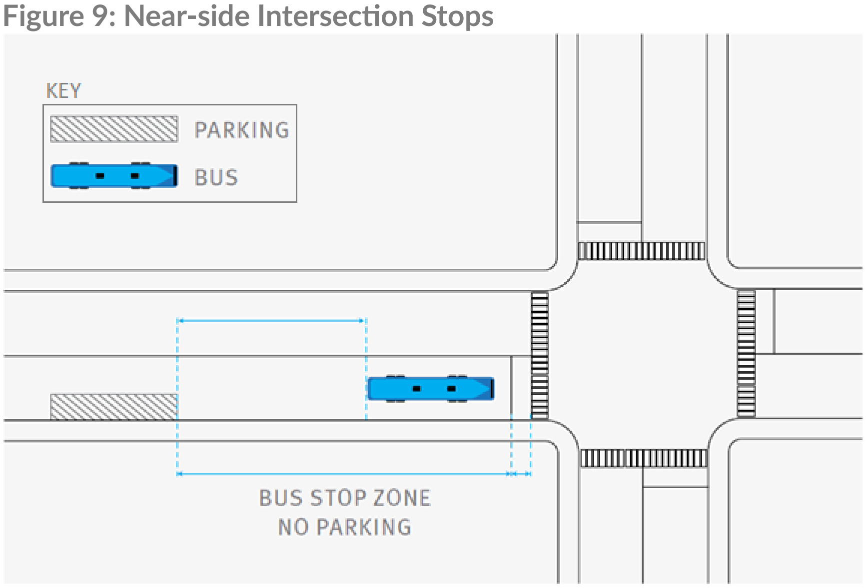
Near-side stops are acceptable when a far-side stop is deemed unsafe or impractical. They may also be used when a stop serves multiple routes that go in different directions after the downstream intersection. Like far-side stops, the stop's location allows passengers multiple crossing locations to access the bus boarding area, due to the location on the intersection corner. **Figure 8** lists the pros and cons of near-side stops, while **Figure 9** provides an example.

Figure 8: Near-side Pros & Cons

| | Near-side Pros | Near-side Cons |
|---|---|---|
| **Safety** | • Allows driver to look for oncoming traffic including other buses for transfers | • Customers cross in front of bus<br>• Conflicts with right-turning vehicles |
| **Travel Time** | • Can be used as queue jump lanes<br>• Customers can board when vehicle is stopped at light | • Potentially longer dwell times<br>• Not as effective for Transit Signal Priority |
| **Customer Experience** | • Customers can load/unload when vehicle is stopped at light or stop sign | |

*Source: TriMet Bus Stop Guidelines*

Figure 9: Near-side Intersection Stops




*Source: TransLink Transit Priority Toolkit*

## 3.8 Mid-block Stops

Mid-block bus stops are generally less desirable than stops at intersections, however they must be considered when suitable near-side and far-side options are unavailable. This stop location generally has poor access due to the lack of formal street crossings near the stop, sometimes inducing passengers to reach the bus boarding area by crossing at undesignated locations. See

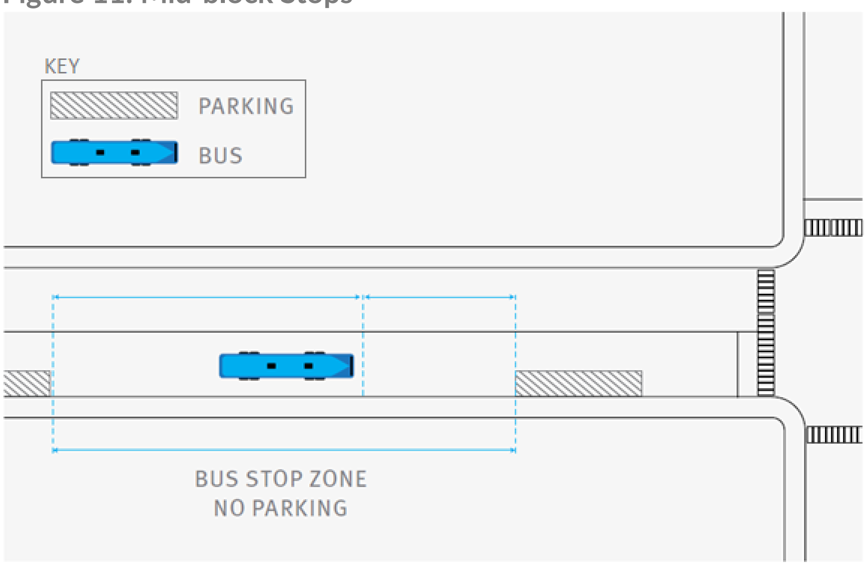
**Figure** 10 for a list of pros and cons, and **Figure 11** for a depiction of a mid-block stop.

Figure 10: Mid-block Pros & Cons

| | Mid-block Pros | Mid-block Cons |
|---|---|---|
| **Travel Time** | • Useful where buses must make left turns at an intersection | • Buses may have to merge to reenter traffic |
| **Customer Experience** | • Less customer congestion<br>• Could potentially decrease walking distance to points of interest for long blocks with mid-block crosswalks | • Increases walking distance to intersections |
| **Safety** | • Useful where traffic conditions would create safety issues at intersections<br>• Reduces sight distance problems | • Encourages jaywalking<br>• Requires a mid-block pedestrian crossing |

*Source: TriMet Bus Stop Guidelines*

Figure 11: Mid-block Stops

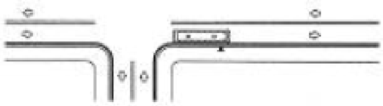
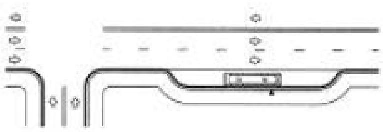
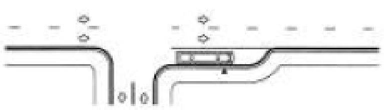
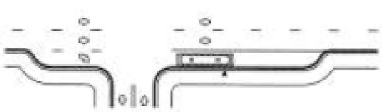
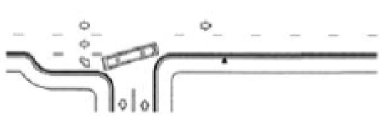



*Source: TransLink Transit Priority Toolkit*

## 3.9 Street Alignment

Aside from block location, it is also important to consider stop location in regard to alignment with the street. The minimum stop requirements for curb-side stops are shown in the designs below. However, the design of individual stops may be modified due to complementary treatments such as a curb-side dedicated lane or a boarding island/bulb out. **Figure 12** provides advantages, disadvantages, and suitability for the different types of side of street stops.

## Figure 12: Side of Street Suitability

| Type | Advantages | Disadvantages | Suitability |
|---|---|---|---|
| **Side of street:** Curbside stop  *Diagram: TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996* | Provides easy access for bus drivers and minimal delay for bus; simple in design, easy to install and relocate. | Traffic can back up behind the bus; auto drivers may make unsafe movements to avoid being caught behind the bus; no parking zone will require loss of on-street parking. | Most common type of stop. |
| **Side of street:** Nub  *Diagram: TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996* | Removes fewer parking spaces; improves pedestrian movements at the intersections; provides additional sidewalk area for pedestrians; results in minimal delay for the bus. | For existing development, there would be some construction cost; traffic can back up behind the bus; auto drivers may make unsafe movements to avoid being caught behind the bus. | Use when there is adequate space in the right-of-way and sidewalk can be altered; nub design also works well for pedestrian crossings at the corner. |
| **Side of street:** Bus bay with acceleration and deceleration lane  *Diagram: TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996* | Passengers get on and off the bus away from the travel lane; minimizes delay to through traffic, | Bus drivers may have problems merging back into traffic, causing delay to bus and potential for accidents; for existing development, there would be some construction cost; alters the street and sidewalk. | Use when there is no on-street parking; there is a high volume of traffic; street traffic speeds are 40 mph; traffic exceeds 250 vehicles during the peak hour; bus needs layover time at end of route. |
| **Side of street:** Open bus bay  *Diagram: TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996* | Has same advantages as bus bay, plus allows bus to decelerate as it moves through the intersection. | Bus drivers may have problems merging back into traffic, causing delay to bus and potential for accidents; for existing development, there would be some construction cost; alters the street and sidewalk. | Use when there is no on-street parking; there is a high volume of traffic; street traffic speeds are 40 mph; traffic exceeds 250 vehicles during the peak hour; bus needs layover time at end of route. |
| **Side of street:** Queue jumper bus bay  *Diagram: TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996* | Has same advantages of bus bay and open bus bay, plus allows bus to bypass traffic queues at a signal, improving bus speed and reliability. | May cause delays to right-turning vehicles; for existing development, there would be some construction cost; alters the street and sidewalk. | Use when right-turn-only lane provides best alternative for bus stop at intersection; there is no on-street parking; there is a high volume of traffic; traffic exceeds 250 vehicles during the peak hour. |
| **Side of street:** Bus stop in right-turn-only lane with queue jumper (no bay)  *Diagram: Modified from TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996* | Provides easy access for bus drivers and minimal delay for bus; allows bus to stop close to intersection to minimize walk to connecting bus stops; can give priority to buses in congested areas; does not block through travel lanes. | May cause delays to right-turning vehicles; for existing development, there would be some construction cost; alters the street and sidewalk. | Use when right-turn-only lane provides best alternative for bus stop at intersection; there is no on-street parking; there is a high volume of traffic; traffic exceeds 250 vehicles during the peak hour. |

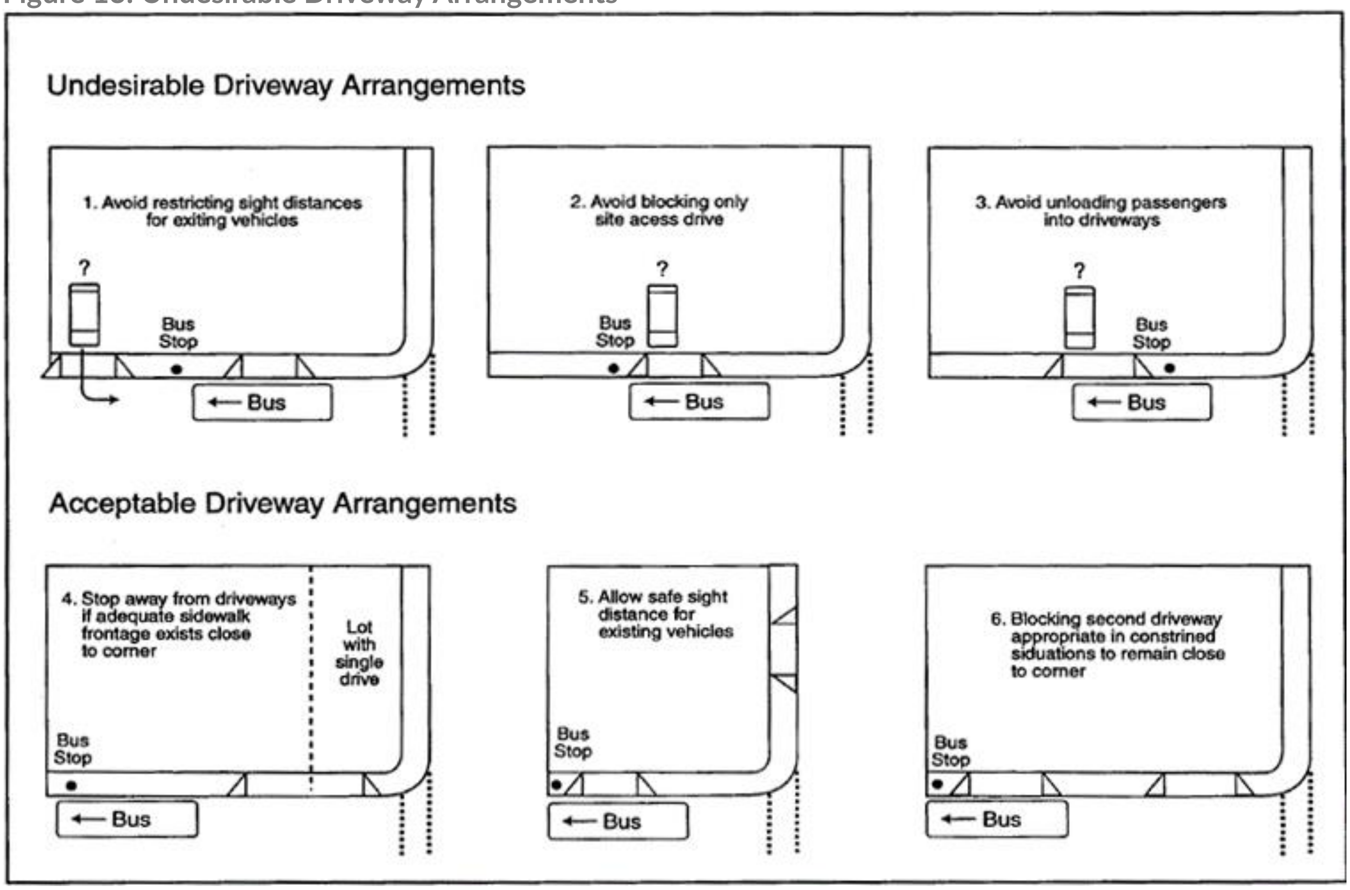
*Source: APTA Design of On-street Transit Stops and Access from Surrounding Areas 2023*

## 3.10 Driveways

Placement of bus stops in relation to driveways should also be considered. It is encouraged to observe the following guidelines outlined in **Figure 13** below:

1. Avoid restricting sight distances for exiting vehicles
2. Avoid blocking a site's only driveway access
3. Avoid unloading passengers into driveways
4. Stop away from driveways if adequate sidewalk frontage exists close to street corner
5. Allow for safe sight distance for existing vehicles
6. Blocking a second driveway can be appropriate in constrained situations in order to remain close to street corner

Figure 13: Undesirable Driveway Arrangements




*Source: TriMet Bus Stop Guidelines*

# 5. ADA Accessibility

All new stop locations need to be ADA accessible. The critical path of travel for passengers at a bus stop is the connection between the landing area and the sidewalk and bus shelters. The ADA requires that there be an accessible route between these points. Sidewalks and bus shelters shall be connected to the landing area by an accessible route. This requirement means that a clear, unobstructed, ADA-compliant path of travel must be provided. A 4-foot wide path is recommended, although the ADA requires a minimum 3-foot wide path, which can be used in extenuating circumstances.

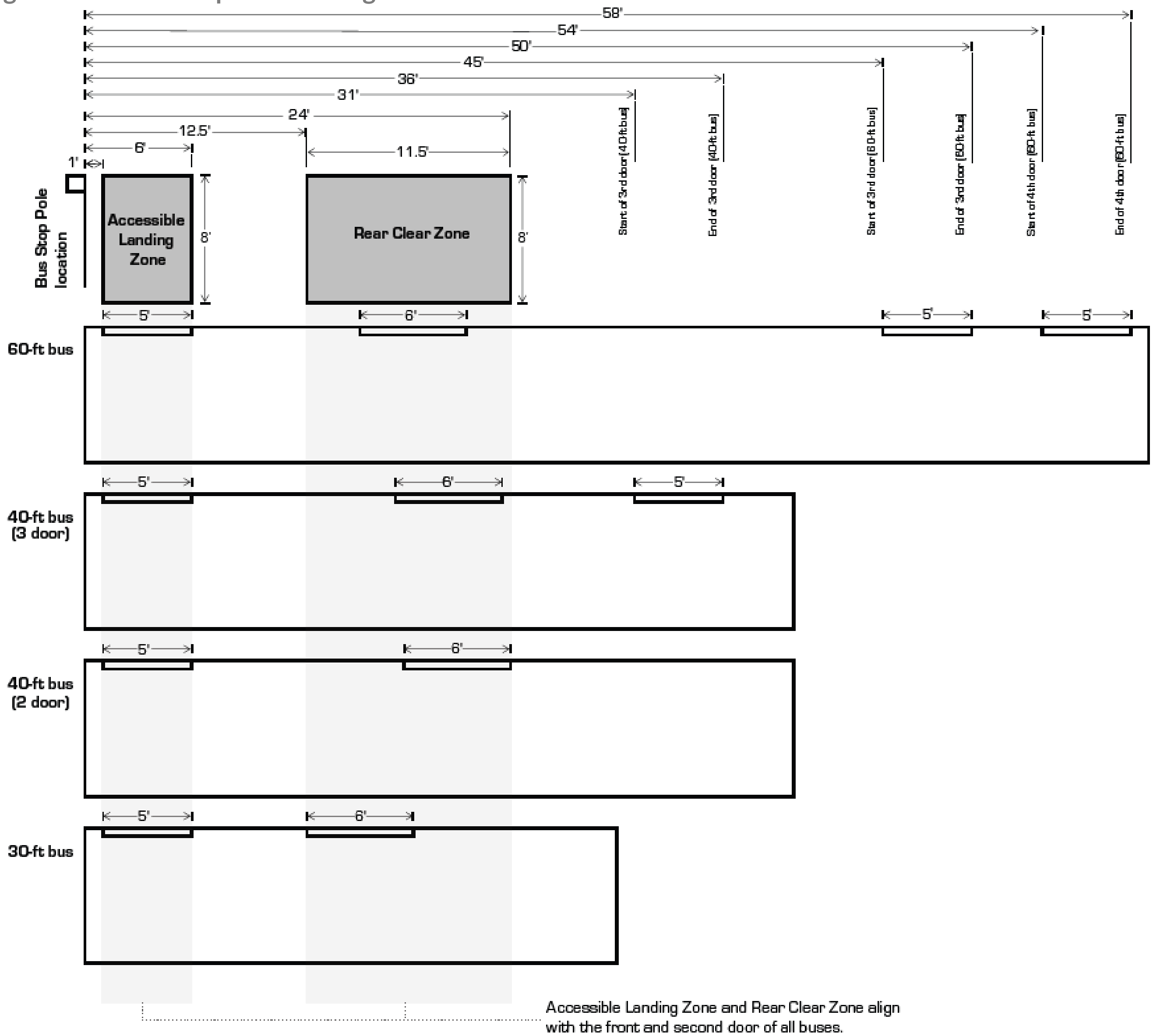
The ADA requires bus stop boarding and alighting areas at the front door landing area, and an accessible route between the landing area, sidewalk, and bus shelters. A clear zone at the first rear door is also encouraged.

If there is a variety of fleet types (e.g., bus lengths, number of doors), landing areas and clear zones should be laid out to accommodate the bus fleet in operation. Landing areas and clear zones should be free of driveways, curb ramps, and obstructions such as utility poles, hydrants, and other street furniture. It is recommended to design all stops with two door landing areas to accommodate the first two doors of all vehicles, regardless of vehicle length or model.

For the first door landing area, ADA guidelines require that a minimum width of 5 feet along the curb, and a minimum depth of 8 feet perpendicular to the curb, be provided at the landing area. The location of the landing area is primarily dependent on the siting of the stop relative to the intersection, and secondarily, on the availability of sidewalk space to accommodate an ADA-compliant landing area. The first door landing area should begin one foot behind the bus stop pole.

See Figure 1**Figure 14** for an example of ADA compliant landing areas.

**Figure 14: ADA Compliant Landing Areas**




*Source: AC Transit Multimodal Corridor Guidelines*

# 6. Conclusion

This Guide provides direction on the spacing of bus stops and guidance on dealing with the many factors that impact the exact location of each bus stop. The guide should be used for whenever a new stop is needed due to new or changed route alignments or in response to requests for new stops. It should also inform an audit of existing bus stops bus stops that should take place as resources allow and inform corridor studies.

# Appendix A. References

AC Transit. 2018. *Multimodal Corridor Guidelines*. Oakland, CA. https://www.actransit.org/website/uploads/AC_Transit_Multimodal_Corridor_Guidelines_Final.pdf

APTA Sustainability and Urban Design Program, American Public Transportation Association. 2012. *Design of On-street Transit Stops and Access from Surrounding Areas*. Washington, DC: APTA Standards Development Program Recommended Practice. https://www.apta.com/research-technical-resources/standards/sustainability/apta-suds-ud-rp-005-12/

National Academies of Sciences, Engineering, and Medicine. 2013. *Transit Capacity and Quality of Service Manual, Third Edition*. Washington, DC: The National Academies Press. https://doi.org/10.17226/24766

Texas A&M Research Foundation. 1996. *Guidelines for the Location and Design of Bus Stops*. Transit Cooperative Research Program (TCRP) Report 19, published by Transportation Research Board, Washington. https://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_19-a.pdf

TransLink. *Transit Priority Toolkit*. New Westminster, BC. https://www.translink.ca/resources/translink/plans%20and%20projects/bus%20projects/bus%20speed%20and%20reliability/transit_priority_toolkit

TriMet. 2010. *Bus Stops Guidelines*. Portland, OR. https://nacto.org/docs/usdg/bus_stop_guidelines_trimet.pdf

Valley Transit Authority. 2020. *Bus Stop & Passenger Facility Design Criteria and Standards.* San Jose, CA. https://www.vta.org/sites/default/files/2022-03/Bus%20Stop%20and%20Facility%20Criteria%20and%20Standard%202021.pdf

# Appendix B. Average Stop Spacing

The following table of inventoried routes includes total mileage, average distance between stops, and average number of stops per mile.

| Route | Direction | Pattern | Total Mileage (mi) | Average Distance Between Stops (mi) | Average Number of Stops per Mile |
|---|---|---|---|---|---|
| 1 | SOUTH | SB2 | 5.27 | 0.18 | 5.50 |
| | NORTH | NB2 | 4.89 | 0.16 | 6.13 |
| 4 | LOOP | LP3 | 2.22 | 0.13 | 7.66 |
| | | LP1 | 1.97 | 0.13 | 7.61 |
| | | LP2 | 2.20 | 0.13 | 7.73 |
| 5 | SOUTH | SB1 | 1.60 | 0.15 | 6.88 |
| | NORTH | NB1 | 1.52 | 0.14 | 7.24 |
| 6 | EAST | EB1 | 7.81 | 0.23 | 4.35 |
| | WEST | WB1 | 7.74 | 0.21 | 4.78 |
| | | LP3 | 1.16 | 0.29 | 3.45 |
| 7 | LOOP | LP1 | 4.83 | 0.22 | 4.55 |
| 9 | SOUTH | SB1 | 4.82 | 0.18 | 5.60 |
| | NORTH | NB1 | 4.90 | 0.19 | 5.31 |
| 10 | EAST | EB3 | 2.78 | 0.14 | 7.19 |
| | | EB1 | 5.11 | 0.16 | 6.07 |
| | WEST | WB3 | 3.60 | 0.15 | 6.67 |
| | | WB1 | 3.78 | 0.16 | 6.08 |
| 11 | EAST | EB1 | 4.23 | 0.16 | 6.15 |
| | WEST | WB1 | 4.07 | 0.16 | 6.14 |
| 14 | SOUTH | SB1 | 5.07 | 0.17 | 5.92 |
| | NORTH | NB1 | 5.04 | 0.18 | 5.56 |
| 15 | EAST | LP1 | 1.61 | 0.23 | 4.35 |
| | | EB2 | 6.32 | 0.18 | 5.54 |
| | WEST | WB2 | 5.97 | 0.16 | 6.20 |
| 16 | NORTH | NB1 | 7.09 | 0.17 | 5.78 |

| Route | Direction | Pattern | Total Mileage (mi) | Average Distance Between Stops (mi) | Average Number of Stops per Mile |
|---|---|---|---|---|---|
| | SOUTH | SB1 | 6.71 | 0.16 | 6.26 |
| 17 | NORTH | NB1 | 2.99 | 0.15 | 6.69 |
| | SOUTH | SB1 | 3.43 | 0.16 | 6.12 |
| 18 | SOUTH | SB1 | 9.18 | 0.16 | 6.10 |
| | NORTH | NB1 | 9.21 | 0.15 | 6.62 |
| 19 | SOUTH | SB1 | 5.44 | 0.25 | 4.04 |
| | NORTH | NB1 | 5.47 | 0.25 | 4.02 |
| 20 | EAST | EB1 | 2.14 | 0.21 | 4.67 |
| | WEST | WB1 | 2.06 | 0.21 | 4.85 |
| 21 | SOUTH | SB1 | 7.97 | 0.17 | 5.77 |
| | NORTH | NB1 | 7.87 | 0.18 | 5.72 |
| 28 | SOUTH | SB1 | 7.49 | 0.20 | 5.07 |
| | NORTH | NB1 | 7.96 | 0.22 | 4.52 |
| 35 | SOUTH | SB2 | 6.03 | 0.32 | 3.15 |
| | | SB1 | 7.44 | 0.34 | 2.96 |
| | | LP3 | 3.86 | 0.21 | 4.66 |
| | NORTH | NB2 | 6.06 | 0.34 | 2.97 |
| | | NB1 | 7.46 | 0.34 | 2.95 |
| 91X | EAST | EB1 | 3.28 | 0.22 | 4.57 |
| 92X | SOUTH | SB2 | 1.47 | 0.37 | 2.72 |
| | | SB1 | 3.19 | 0.21 | 4.70 |
| | NORTH | NB2 | 1.46 | 0.49 | 2.05 |
| | | NB1 | 3.26 | 0.27 | 3.68 |
| 93X | EAST | EB1 | 5.66 | 0.20 | 4.95 |
| | WEST | WB1 | 5.29 | 0.21 | 4.73 |
| 95X | LOOP | LP2 | 2.03 | 0.20 | 4.93 |
| | | LP1 | 2.03 | 0.20 | 4.93 |
| 96X | LOOP | LP1 | 1.30 | 0.65 | 1.54 |
| | | LP2 | 1.32 | 0.66 | 1.52 |

| Route | Direction | Pattern | Total Mileage (mi) | Average Distance Between Stops (mi) | Average Number of Stops per Mile |
|---|---|---|---|---|---|
| | | LP3 | 1.31 | 0.66 | 1.53 |
| 97X | LOOP | LP1 | 1.40 | 0.47 | 2.14 |
| 98X | SOUTH | SB1 | 3.41 | 0.19 | 5.28 |
| | NORTH | NB1 | 3.34 | 0.18 | 5.69 |
| 99X | WEST | WB2 | 6.23 | 0.48 | 2.09 |
| | | WB1 | 3.60 | 0.51 | 1.94 |
| | EAST | EB3 | 1.36 | 0.34 | 2.94 |
| | | EB2 | 4.84 | 0.35 | 2.89 |
| | | EB1 | 3.61 | 0.40 | 2.49 |