KING COUNTY METRO TRANSIT FACILITIES GUIDELINES

King County METRO

Parametrix

APRIL 2018

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A2 NACTO Urban Street Design Guide AP-1

A3 NACTO Transit Street Design Guide AP-1

A4 Manual on Uniform Traffic Control Devices (MUTCD) AP-1

A5 Americans with Disabilities (ADA) Act of 1990 ..... AP-1

A6 King County Metro Transit Speed and Reliability Guidelines and Strategies AP-1

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ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
CPTED	Crime Prevention Through Environmental Design
IESNA	Illuminating Engineering Society of North America
L&I	Washington State Department of Labor & Industries
Metro	King County Metro
mph	miles per hour
MUTCD	Manual on Uniform Traffic Control Devices
NACTO	National Association of City Transportation Officials
NCHRP	National Cooperative Highway Research Program
OSHA	Occupational Safety and Health Administration
RTIS	Real Time Information Signs
Sound Transit	Central Puget Sound Regional Transit Authority
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation
ZIBO	Zone Improvements by Others
ZIP	Zone Improvement Project

CHAPTER 1: INTRODUCTION

The Transit Facilities Guidelines are a resource developed by King County Metro (Metro) to help jurisdictions, property owners, developers, architects, landscape architects, and engineers involved with the design, permitting, and construction of Metro's transit facilities. These guidelines are used internally and provide a framework for Metro in development of its facilities.

Metro's transit facilities include, but are not limited to:

1. Bus stops
2. Shelters
3. Lighting
4. Landing pads
5. Benches
6. Off-board fare collection machines
7. Bicycle facilities (racks, hoops, lockers, and cages)
8. Awnings
9. Shelter murals and art work
10. Bus stop signage
11. Layover facilities
12. Bus bulbs
13. Transit centers
14. Park-and-rides
15. Bus-rail station integration

Because each transit facility is located in a unique built environment, each facility is also unique. As a result, the guidelines in this document articulate design guidance and describe a variety of building processes to achieve flexibility, when practical and necessary.

CHAPTER 2: PROJECT DEVELOPMENT AND REVIEW

2.1 HOW TO USE THIS DOCUMENT

It is important to note that much of the content included in this document are guidelines because most of the new or enhanced facilities will be developed within a built environment, in which it is difficult to apply strict standards. These guidelines describe the desired type and location of the diverse facilities with the understanding that flexibility is often needed to work within a given environment. Similarly, many of Metro's transit facilities were built prior to developing this version of these guidelines; therefore, they may not be consistent with this version of the guidelines. This document includes facility descriptions, graphic renderings, design specifications, and technical drawings to help illustrate how various Metro transit facilities are designed. Many of the graphics included herein have been created to explain Metro's interests and needs in developing transit facilities. As new policies, procedures, and/or design standards are developed, these guidelines will be updated accordingly.

These guidelines are not intended to describe all projects that Metro may undertake or that may be developed by others. To that end, other documents are available that describe various policies, procedures, and design standards applied by Metro. These include, but are not limited to, Americans with Disabilities Act (ADA) requirements, Metro's Transit Speed and Reliability Guidelines and Strategies, the Washington State Department of Transportation (WSDOT) Transit Facility Guidelines, the National Association of City Transportation Officials (NACTO) Transit Street Design Guide, National Cooperative Highway Research Program (NCHRP) reports, and the Manual on Uniform Traffic Control Devices (MUTCD). These documents are referenced within these guidelines where applicable. Appendix A includes a description of these documents.

2.2 DEVIATION FROM GUIDELINES

Every transit facility project is designed within the context of its physical space. Facilities are designed with passenger safety and comfort in mind. Facilities should also promote safe, efficient, and reliable transit service. Because this document contains guidelines and not strict standards, Metro does not have a formal process to address deviations. In circumstances where guidelines for a specific project cannot be met, Metro staff and, when applicable, the project applicant, will determine which features should be modified or eliminated. In some cases, the physical site may be modified through the removal of obstructions, such as fences or vegetation. Similarly, projects will be reviewed, designed, and approved in the context of existing agreements that may govern overall design elements at the project site.

2.3 JURISDICTIONAL PERMISSIONS AND APPROVALS

Each jurisdiction in King County has unique permitting procedures and requirements governing use and development of private property as well as the public right-of-way. Depending upon the applicant and the jurisdiction in which a project is located, the permitting process will vary. Metro works with each jurisdiction to ensure compliance with permitting requirements for each project.

2.4 COORDINATION

Development of transit facilities may require coordination with one or more groups within Metro.

2.4.1 Plans Review

The Office of Plans Review coordinates the internal review of development and streetscape projects throughout King County to identify any Zone Improvements by Others (ZIBO) projects. Members of the Office of Plans Review include a core group of Metro staff from various groups within the Service Development and Design and Construction divisions. Metro retains a set of standard design and construction drawings for transit facilities. Standard drawings can be found at: http://www.kingcounty.gov/depts/transportation/metro/design-construction-standards/passenger-facilities/construction.aspx. The Office of Plans Review can be reached at: plansreview@kingcounty.gov.

2.4.2 Construction Information Center

Any construction or installation activities affecting transit operations or facilities must be coordinated through Metro Transit Construction Information Center. Notification information and guidelines can be found at: https://www.kingcounty.gov/transportation/kcdot/MetroTransit/Construction.aspx Construction Coordinators can be reached at: Construction.coord@kingcounty.gov or 206.477.1140.

2.4.3 Trolley Wire

Projects in the vicinity of or affecting overhead trolley wire must be approved by and coordinated with Metro's trolley impacts coordinator. The projects must maintain specific clearances from the contact wire and provide on-site protection for strain poles. Advanced notification is required for trolley wire moves and trolley line deactivations. The Trolley Impacts Coordinator can be contacted at: Trolley.impacts@kingcounty.gov or 206.477.1150.

2.4.4 Comfort Station

New construction and planning efforts that include layover space for operators must also provide comfort station access. The Comfort Station Coordinator must have the opportunity for collaboration on each station's placement, plan reviews, and number of units to ensure compliance with policies of the Occupational Safety and Health Administration (OSHA), Washington State Department of Labor & Industries (L&I), and other related agencies. Any revisions to layovers that affect operator access to the comfort station by distance, hours, or capacity must include early planning review with the Comfort Station Program Coordinator. The Comfort Station Program Coordinator can be reached at: Station.comfort@kingcounty.gov or 206.571.6952.

2.5 Inspection Requirements

As part of the plan review process, Metro will establish inspection requirements for each transit facility project undertaken by others. All inspection requirements must be met prior to final approval of a route facility construction project.

CHAPTER 3: VEHICLE AND STREET DESIGN STANDARDS

3.1 METRO FLEET

Metro's fleet comprises a variety of manufacturers. The vehicles included in each fleet purchase have unique specifications including length, width, door location, road clearance, turning radii, and approach and departure angles. These varying specifications influence facility design because they require different configurations for facility features. Metro's bus design standards are provided in Appendix B.

Metro's fleet primarily comprises 40-foot and 60-foot buses, with some 35-foot buses. Almost all 40-foot buses have two doors for passenger loading and unloading. All of Metro's 60-foot buses have at least two doors. All RapidRide buses and some newer 60-foot buses have three doors. Because Metro operates buses for the Central Puget Sound Regional Transit Authority (Sound Transit), the fleet includes Sound Transit buses that are operated in King County; some of these buses are 45 feet. Some Sound Transit bus routes serve Metro bus stops but are operated by Community Transit or Pierce Transit.

3.2 ROADWAY DESIGN AND VEHICLE TURNING MOVEMENTS

The geometric design of roadways and intersections can influence how a bus is able to maneuver along its route. Additionally, the maneuverability of buses influences bus stop placement and design. The geometric needs are determined by using AutoTURN software. See Section 3.3 for additional information about using AutoTURN.

3.2.1 Intersection Turn Radius

Intersection turn radius is the angle of the curve at a street corner. The intersection's needed turn radii vary among the different types of buses, which can require a shorter or longer distance to complete a maneuver (see Section 3.3). An effective turning radius is influenced by a variety of factors including, but not limited to, lane width, the presence of curbside parking lanes, or buffer distance.

3.2.2 Street Widths

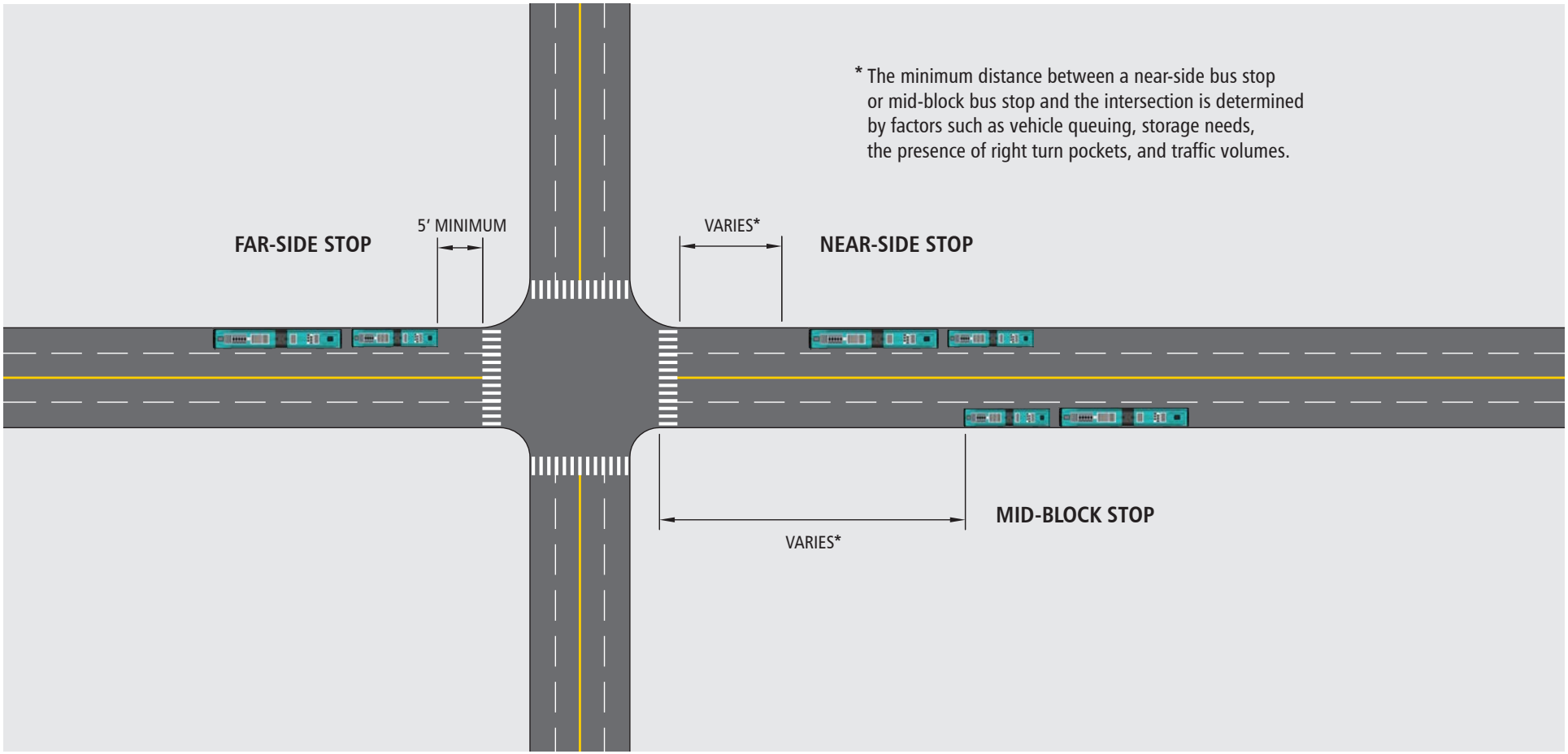
Street transit operations are best accommodated on streets with travel lanes that are a minimum of 11 feet. Narrower lanes can result in more difficult turning movements for buses and/or a need for buses to encroach into the adjacent lane to complete a turn (known as lane splitting).

3.2.3 Bus Stop Lengths and Distances from Intersections

The lengths of bus stops and their distances from intersections vary. Bus stops must be long enough to allow a bus to clear an intersection, align with the loading area, and provide adequate space for bus maneuvers to exit and enter traffic at pull-out stops.

Bus maneuverability also affects the placement of bus stops. Depending on the location of a bus stop in relation to an intersection, buses may need additional length at the zone or a wider curb lane. Figure 3.2-1 shows the required distances from intersections for the various stop locations. Section 4.2 provides additional details regarding bus stop placement in relation to the intersection.

Figure 3.2-1. Bus Stop Distances from Intersections



3.2.4 In-Lane Stops

The development of bus stops as in-lane stops can influence transit travel times and cause delay to transit vehicles, as well as affect general purpose traffic. Placement of bus stops along multi-lane and single-lane streets is detailed below.

- Multi-lane Streets: Where there are two or more vehicle lanes in one direction, in-lane stops are an acceptable consideration for all types of stops (near-side, far-side, and mid-block). Traffic volume, sight distance, and speed of traffic can be factors in bus stop placement.
- Single-lane Streets: Where there is a single vehicle lane in a specific direction, in-lane stops are an acceptable consideration, with some constraints. In addition to traffic volumes, sight distance, and traffic speed, the key to placement is traffic signals operation. Wider lanes can also help traffic pass around a bus at an in-lane stop, or a far-side stop can be moved slightly away from the intersection to provide queue storage for a few vehicles.

3.2.5 Bus Pull-Outs

Where an in-lane stop is not appropriate, a bus stop should be developed as a pull-out. Sufficient space is needed for a bus to maneuver into and out of a pull-out. See Figure 4.5-4 for dimensions of a pull-out.

A pull-out may force a bus to wait a long time to re-enter the travel lane if traffic volumes are high, and the negative impacts on transit speed and reliability should be considered along with other factors when choosing a pull-out.

3.3 AutoTURN

To ensure that buses can maneuver properly within the street and facility space, modeling of turning movements should be performed for design drawings using the AutoTURN software program. AutoTURN identifies the path of travel based on a series of variables, including bus width, axle width, lock-to-lock time (the time taken to turn the primary steering from full left lock to full right lock (or vice versa), and steering angle. Use of the standard bus vehicles is preferred, as specified by the American Association of State Highway and Transportation Officials (AASHTO); however, additional consideration should be given to mirror protrusions and the extended front-end dimensions for deployed bicycle racks on the front of the bus. The following custom dimensions should be considered:

- Side Mirror Clearance: 3 feet (1.5 feet on each side)
- Bicycle Rack: 5 feet

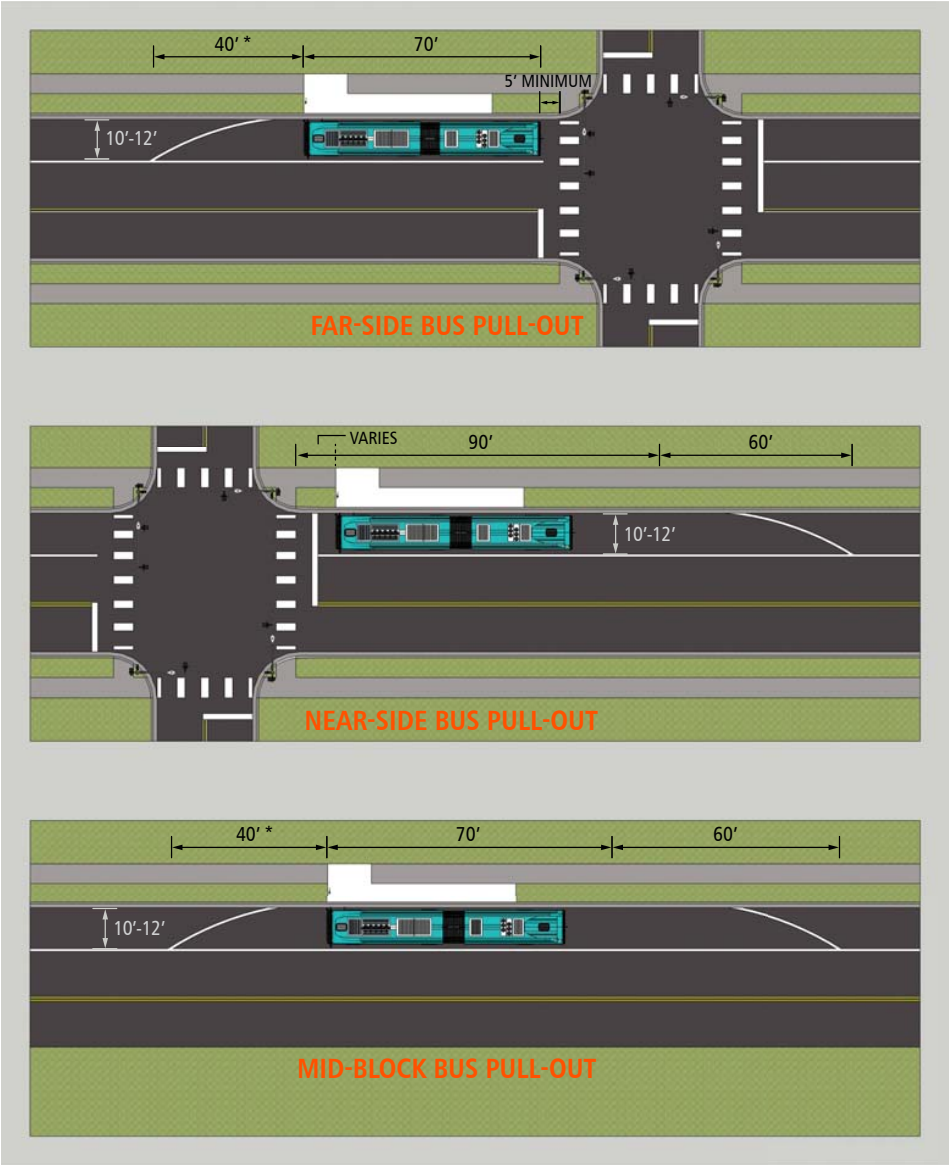
Figure 3.3-1 identifies the custom dimensions that should be input into AutoTURN software for vehicles in the Metro-operated fleet.

The speed of the buses also has an effect on the turn. Higher speeds will require more turning space. It is suggested that most turning movements should be modeled at 10 miles per hour (mph), which represents a slower moving vehicle as it turns through intersections or approaches bus stops. However, many urban areas cannot provide adequate roadway space within the existing lanes and curbs. In these cases, 5-mph modeling can be used.

Figure 3.3-2 shows examples of AutoTURN results. Because each intersection is unique in its design, bus maneuverability and facility placement will vary. Minimum distances shown will vary based upon variables such as intersection turn radius, lane width, and bus length.

The locations of bus stops, including those in pull-outs, will be influenced by variables such as intersection turn radius, lane width, and bus length.

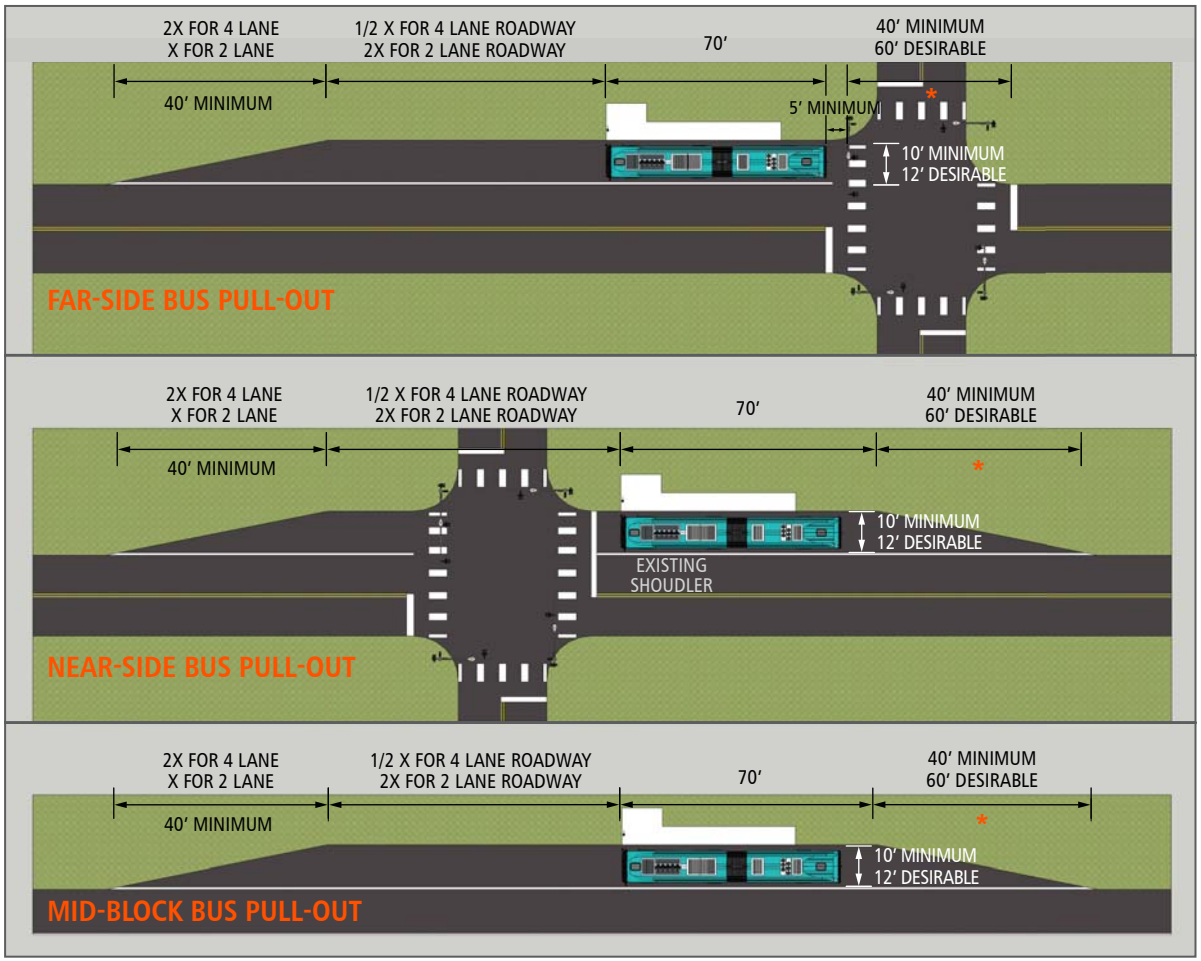
Figure 3.2-2. Bus Pull-out Designs for Streets with Speed Limits of Less than 40 mph



* If shoulder is unimproved, ingress taper should be 60′ instead of 40′

Not to Scale

Figure 3.2-3. Bus Pull-outs for Speed Limits of 40 mph and Over

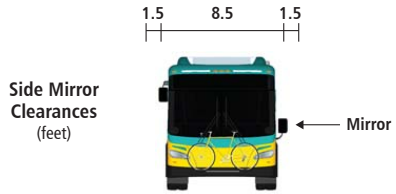


X = Signed Speed Limit

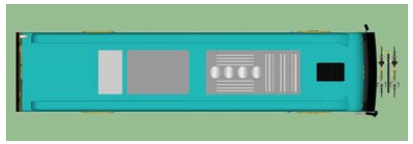
* = For Width Less than 12' Add 30'

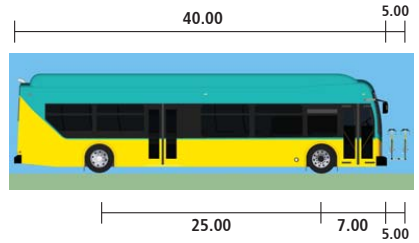
Not to Scale

Figure 3.3-1. AutoTURN Vehicle Modifications with Deployed Bike Racks



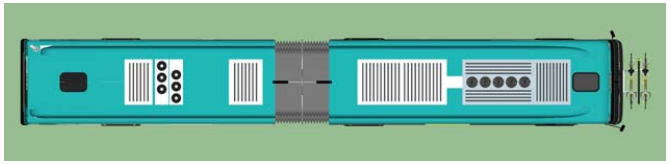
Metro 40ft-Bike
Custom

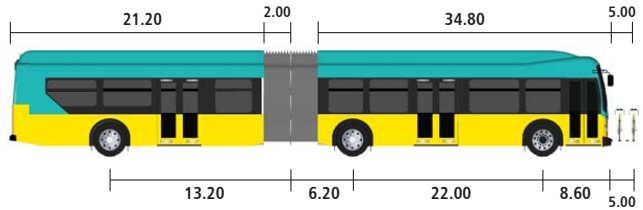




Metro 40ft - Bike	feet
Width	8.50
Track	8.50
Lock to Lock Time	6.0
Steering Angle	41.4

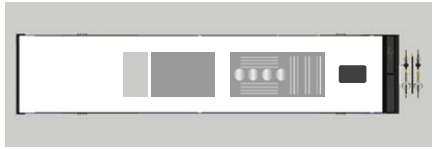
Metro 60ft-Bike
Custom

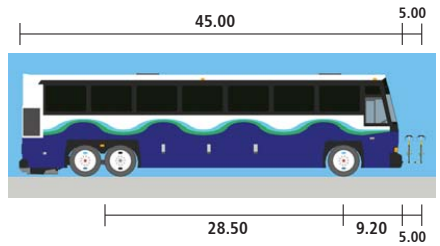




Metro 60ft - Bike	feet
Width	8.50
Track	8.50
Lock to Lock Time	6.0
Steering Angle	38.3
Articulating Angle	50.0

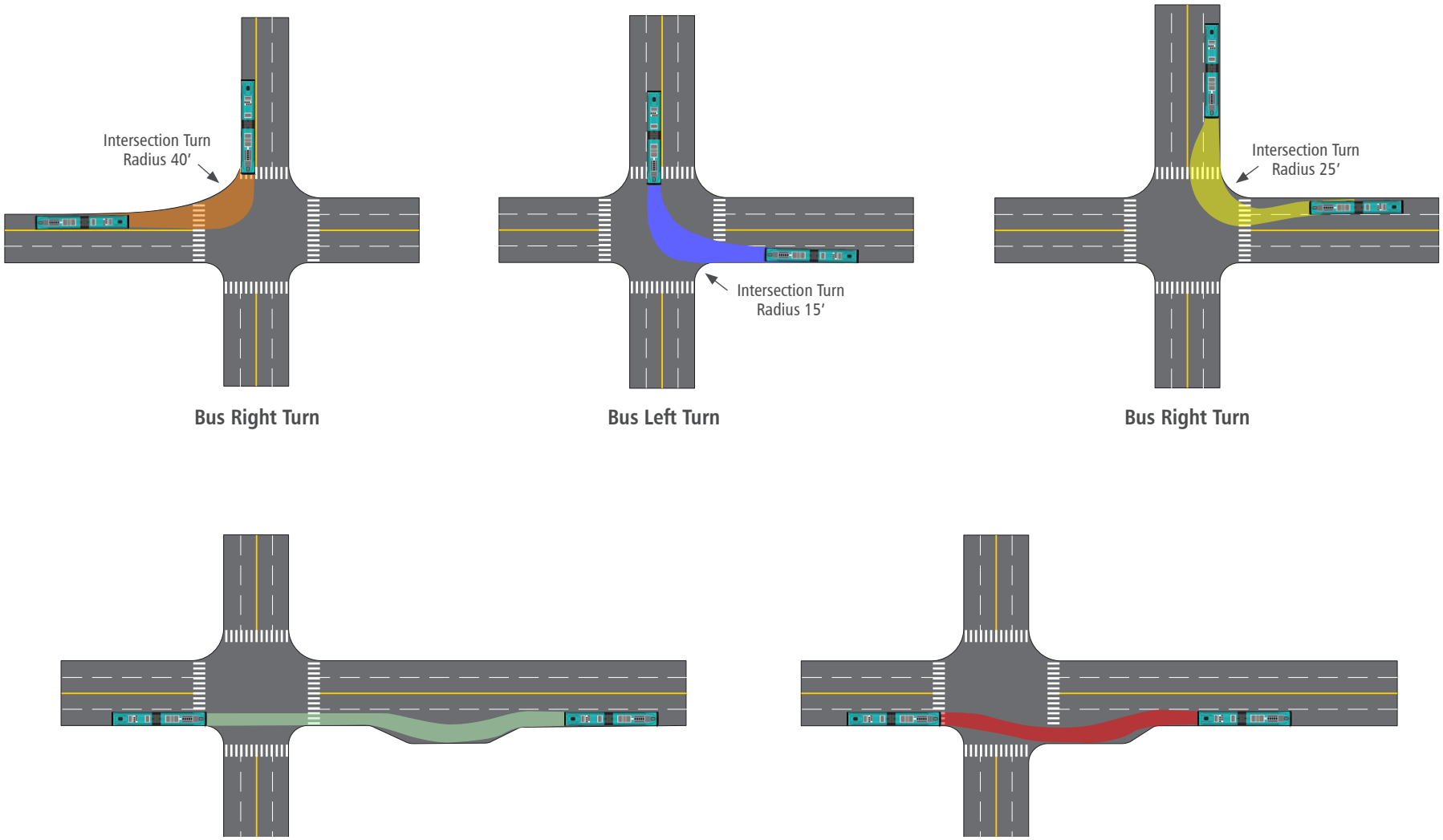
Coach 45ft-Bike
Custom





Coach 45ft - Bike	feet
Width	8.50
Track	8.50
Lock to Lock Time	6.0
Steering Angle	45.2

Figure 3.3-2. Sample AutoTURN Results

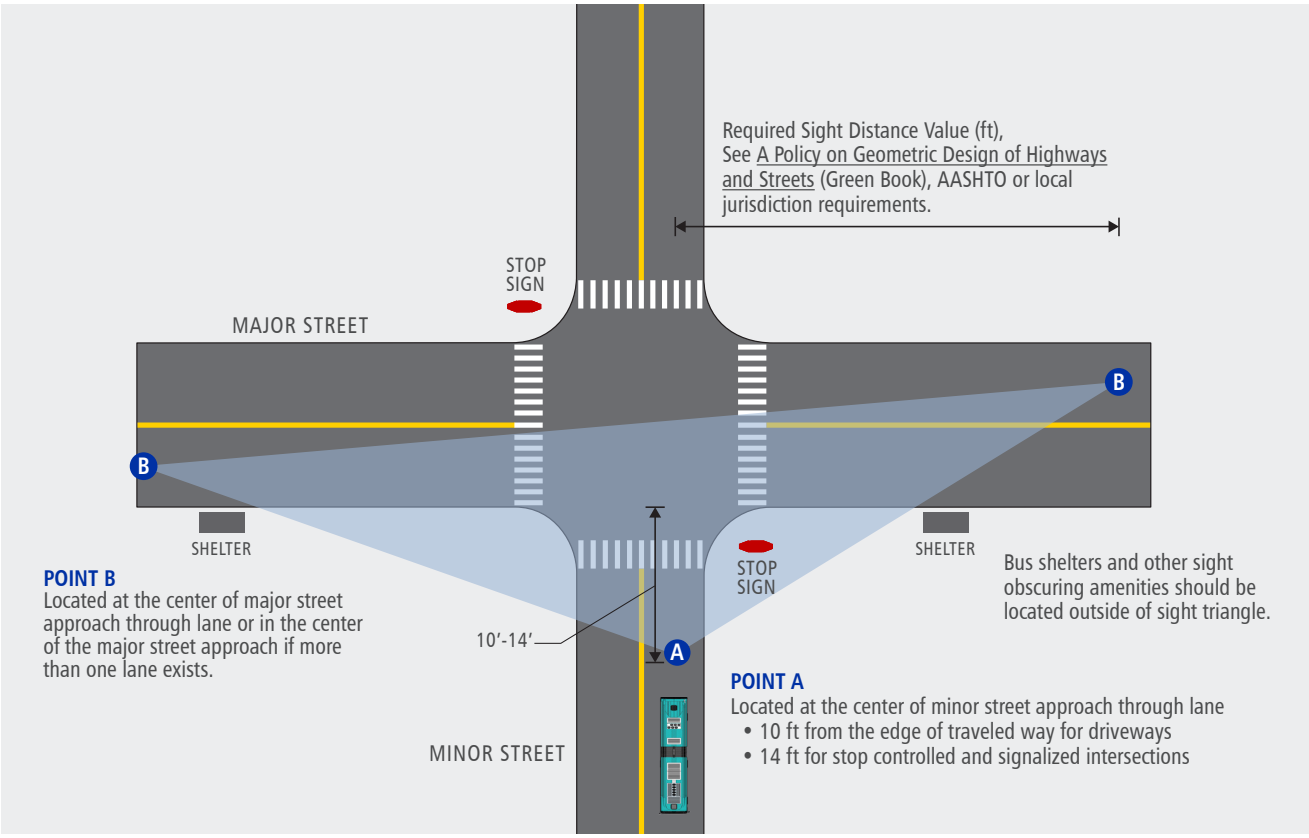


3.4 SIGHT DISTANCE

Bus operators need to see far enough ahead to assess developing situations and take actions appropriate for the conditions. This includes being able to see bus stops and waiting passengers adjacent to a roadway, approaching vehicles, cyclists, and pedestrians. Sight distance calculations for road design should follow AASHTO requirements, such as those outlined in A Policy on Geometric Design of Highways and Streets or Guide for Geometric Design of Transit Facilities on Highways and Streets, or specific local jurisdiction requirements. Sight distance for a bus operator to see passengers waiting inside shelters should be taken into account, but no specific calculations are required. Professional judgment should be used to ensure that the shelters minimize visual obstructions between the approaching operator's view and the shelter location. Typically, these obstructions include trees and vegetation.

When developing transit facilities, bus shelters and other sight-obscuring amenities should be located outside of the sight distance triangle of intersections and driveways. Figure 3.4-1 diagrams how line of sight is calculated given a variety of conditions.

Figure 3.4-1. Sight Distance Triangle for Intersections and Driveways

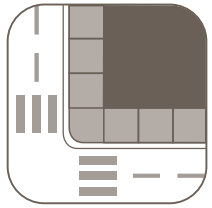


CHAPTER 4: BUS STOP GUIDELINES

A bus stop is defined as a location where transit vehicles stop to load and unload passengers. The bus stop design must consider several factors. The built and natural environments often have fixed objects that will dictate how much space can be used to develop a bus stop. Clear space must be provided for passenger loading and unloading, as well as pedestrian movement. This document outlines options for developing bus stops when these and other factors are present at a potential bus stop site. These guidelines were developed keeping in mind the necessary balance among the following elements:

Safety: Bus stop design should include elements that help to enhance passenger and operational safety.

Context-sensitive design: The siting and design of bus stops should consider the surrounding built and natural environment.



Preservation and maintenance of infrastructure and utility services: Bus stops should be designed in a manner that minimizes impacts and disturbance to the roadway, sidewalks, and nearby utility services.

Accessibility: Bus stops should be convenient to riders and accessible by persons with disabilities and those with mobility devices.

Comfort: Bus stops should be comfortable for riders and composed of human-scale elements.

Operations: Bus stops should facilitate safe and efficient transit vehicle circulation and operation and should be designed for ease of maintenance and durability.

Bus stop design can also be influenced by the installation of transit speed and reliability treatments. For example, bus bulbs extend the curb to align the bus stop with the parking lane. This allows buses to remain in the travel lane, which improves speed and reliability by decreasing the amount of time lost when buses must merge in and out of traffic. Bus bulbs create a larger space for a bus stop and more flexibility with design. Additional information about transit speed and reliability improvements is provided in Metro's Transit Speed and Reliability Guidelines and Strategies.

CHAPTER 4: BUS STOP GUIDELINES

4.1 BUS STOP DEVELOPMENT

The geometric design of roadways and intersections can influence how a bus is able to maneuver along its route. Additionally, the maneuverability of buses influences bus stop placement and design. The geometric needs are determined by using AutoTURN software. See Section 3.3 for additional information about using AutoTURN.

4.1.1 Zone Improvement Project

Zone Improvement Projects (ZIPs) are projects funded and developed by Metro. These projects can include development of new bus stops or enhancement to existing stops. Conditions that trigger a ZIP include bus stop consolidation, service changes or upgrades, an increase or change in ridership at a bus stop, ADA improvements, fleet redesign, and grant initiatives.

4.1.2 Zone Improvements by Others

ZIBOs are projects funded and developed by external stakeholders including cities, other transit agencies, and private developers. ZIBOs are undertaken in partnership with Metro. The Office of Plans Review coordinates the internal review of development and streetscape projects throughout King County to identify any ZIBO projects. Members of the Office of Plans Review include a core group of Metro staff from various groups within the Service Development and Design and Construction divisions.

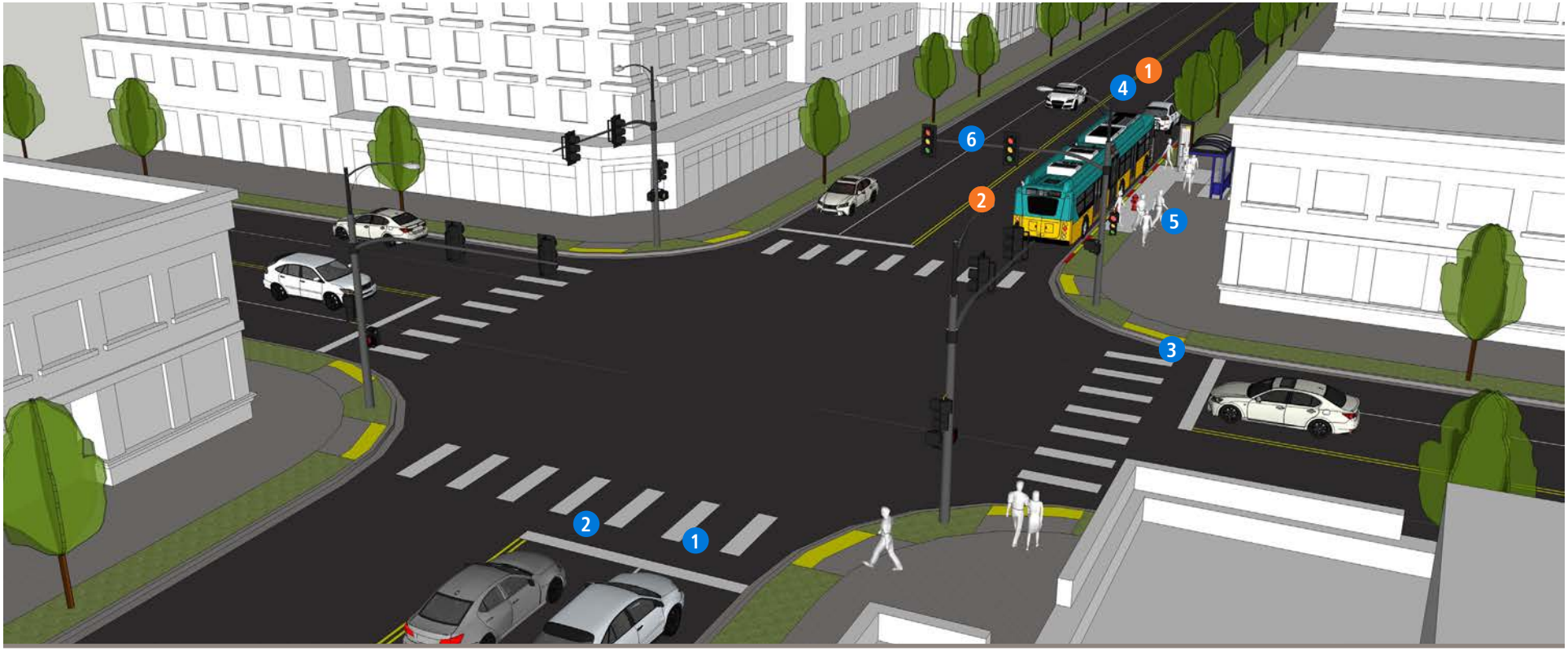
4.2 BUS STOP PLANNING

Bus stop locations can generally be described by their proximity to an intersection or location within a block. The sites can include stops located just prior to an intersection (near-side stop), stops located just past an intersection (far-side stop), and stops located away from intersections (mid-block stop). Stop locations can be determined by a variety of factors including:

- Traffic signals
- ADA considerations
- Stop spacing
- Pedestrian access
- Location of bus stops on connecting streets, especially in high transfer environments
- Availability of right-of-way to locate a stop and/or enhance one in the future
- Presence of buildings
- Location of driveways
- Line of sight restrictions
- Passenger safety

Figure 4.2-1 through Figure 4.2-3 detail the various stop locations and the advantages and disadvantages of each.

Figure 4.2-1. Far-Side Bus Stops



FAR-SIDE STOPS

In general, far-side stops are the preferred location for bus stops. When stops are located at the far side of an intersection, it allows the bus to pass through the intersection during a green phase to load and unload passengers and immediately continue on the route without waiting for the next green phase. Far-side stops are the easiest for buses to pull into.

ADVANTAGES

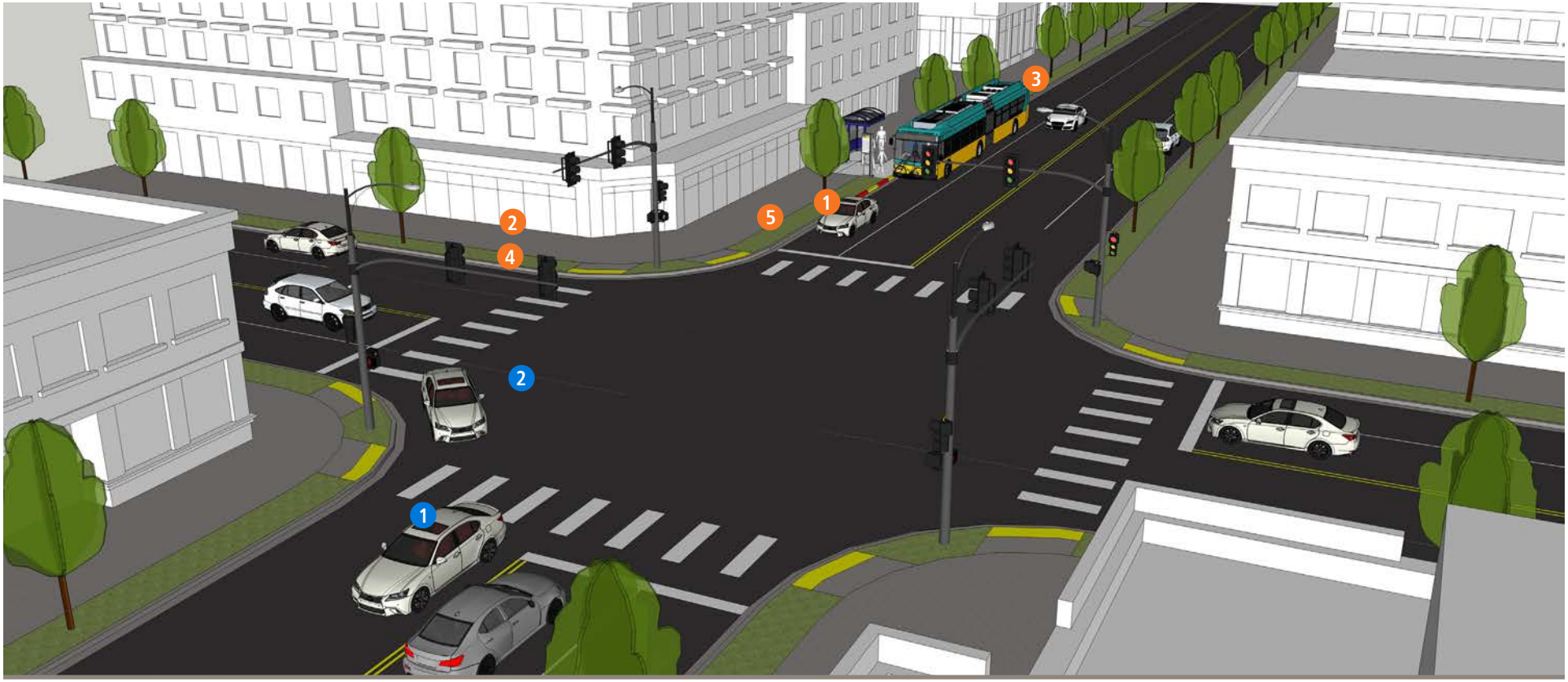
1. Right turns can be accommodated with less conflict.
2. A minimum of interference is caused at locations where traffic is heavier on the approach side of the intersection.
3. Stopped buses do not obstruct sight distance for vehicles turning right from a side street.
4. On busy corridors, the bus can more easily re-enter the travel lane when traffic is stopped during the red phase of the intersection behind the bus, except where there are heavy turning movements onto the street with the bus route.
5. They generally allow for the closest proximity to a cross-walk when passengers exit through the rear door of the bus, which minimizes the number of pedestrians crossing in front of a bus.
6. Buses in the bus stop do not obscure traffic control devices or pedestrian movements at the intersection.

- Buses cause less interference where the cross street is a one-way street from left to right.
- This works well with transit signal priority operations because the amount of delay buses experience at a signal can be reduced and the bus can proceed to the stop.

DISADVANTAGES

1. Intersections may be blocked if other vehicles park illegally in the bus stop or if the stop is too short for occasional heavy demand.
2. Stops on a narrow street or within a traffic lane may block the intersection.

Figure 4.2-2. Near-Side Bus Stops



NEAR-SIDE STOPS

Near-side bus stops provide close proximity to intersections for pedestrians. They may be difficult to access when vehicles stopped at signals prevent the bus from getting to the stop. This can cause delay as an operator must wait for the queue to empty before accessing the stop.

ADVANTAGES

1. A minimum of interference is caused at locations where traffic is heavier on the departure side than on the approach side of the intersection.
2. They cause less interference where the cross street is a one-way street from right to left and there is less interference with traffic turning onto the bus route street from a side street.

DISADVANTAGES

1. Heavy vehicular right turns can cause conflicts, especially where a vehicle makes a right turn from the left side of a stopped bus.
2. Buses often obscure sight distance to stop signs, traffic signals or other control devices, as well as to pedestrians crossing in front of the bus.
3. Where the bus stop is too short for heavy demand, the overflow may obstruct the traffic lane.
4. Buses must stop prior to a signal, potentially missing a traffic signal green phase.
5. Pedestrians have to cross in front of the bus. The bus increases sight distance problems for crossing pedestrians.

Figure 4.2-3. Mid-Block Bus Stops

MID-BLOCK STOPS

Mid-block stops are generally located in areas where there is a long stretch between intersections. They may also be merited due to adjacent land uses that serve as origins and/or destinations for riders. Mid-block stops should be located adjacent to marked pedestrian crossings, preferably with pedestrian refuge islands. This requires additional coordination with and approval from jurisdictions.

ADVANTAGES

1. Buses minimize interference with the sight distance of both vehicles and pedestrians.
2. Stops can be located adjacent to major bus passenger generators.

DISADVANTAGES

1. Pedestrian jaywalking is more prevalent if there is no midblock crosswalk.
2. Pedestrians going to/coming from cross-streets to connect to other transit routes or destinations must walk farther.
3. Buses may have difficulty reentering the flow of traffic.
4. Driveway access may be negatively impacted.

- Buses require additional distances for no-parking restrictions.

4.2.1 Bus Stop Spacing

Bus stops should be spaced to balance the benefit of increased access to a route against the delay that an additional stop would create for all other riders. While close stop-spacing reduces walking times, it may increase total travel time and reduce the reliability of bus service as a result of buses slowing down and stopping more frequently, especially in peak periods, when there is more ridership and traffic.

Table 4.2-1 identifies the average bus stop spacing for Metro bus service. Segments of routes that operate in areas where riders cannot access service, such as along freeways or limited-access roads, should be excluded when calculating average stop spacing. Dense, central business districts and downtown areas may have stops every two blocks, near landmarks, in high use locations, and at transfer points. Rural and/or suburban areas may need different spacing to locate stops at intersections to prevent riders from walking along shoulders on non-lighted streets. Additional considerations for bus stop spacing include traffic operations, pedestrian facilities, the geography or topography of the area around a bus stop, passenger amenities, and major destinations. Table 4.2-2 identifies stop-spacing guidelines for removing, improving, relocating, or installing new bus stops.

Table 4.2-1. Average Bus Stop Spacing

SERVICE	AVERAGE STOP SPACING
RapidRide	1/2 mile (approximately 10 blocks)
All other services	1/4 mile (approximately 5 blocks)

Metro regularly reviews stop spacing for routes. This can occur in conjunction with service restructures, major roadway work, or to improve Metro operations. In some cases, Metro reduces the number of closely spaced stops on a corridor to improve the efficiency and reliability of bus service, reduce energy consumption and emissions, and reduce Metro's operating and maintenance costs. When stop consolidation is undertaken, all stops on a route are evaluated and public input is solicited to help Metro evaluate potential impacts.

Table 4.2-2. Evaluation Guidelines for Bus Stop Spacing (Non-RapidRide Routes)

CRITERIA	KEEP STOP	REMOVE OR RELOCATE STOP
Bus stop spacing	More than ¼ mile (1,320 feet, or 5 blocks) to the closest stop	Less than or about equal to ¼ mile (1,320 feet, or 5 blocks) to the closest stop
Ridership relative to adjacent stops	Relatively high ridership stop in a low ridership area, transfer point, and commercial/employment center	Relatively low ridership in high ridership area; non-transfer point
Traffic control at intersections	Traffic signals, stop signs, marked crosswalks, and established walking paths along the cross street	Unmarked or non-existent crosswalks; difficult or impossible to cross the transit street
Walking conditions	Steep terrain, no sidewalks along the route, no curb ramps, established paths on cross street	Flat terrain, sidewalks, and curb ramps along the route; no established paths on cross street
Lighting and security	Stop is well lit and does not have a history of security problems	Stop is dark or has a history of security problems
Riders with mobility challenges	Known institution (e.g., hospital, retirement home) or individuals that would be seriously affected and/or redirected to Metro's Access services	No known issues, or the individuals can use a different stop with relatively little inconvenience
Topography	Hilly; stop spacing is more than 1/8 mile	Flat; stop spacing is less than ¼ mile
Operations	Stop is in-lane or is easy to pull into and out of lane	Stop is on a curve, near-side, or within a crosswalk or intersection
History	Stop was installed or closure was attempted within the last 3 years or has significance in the community	Stop has no history or removal has been requested
Investment	Stop has transit infrastructure with significant life, including shelter footings, landing pads, concrete bus pads, or lighting improvements; stop is ADA accessible	Stop has little infrastructure improvements and the abandonment cost is low; stop is not ADA accessible
Land use	Adjacent land uses are transit-supportive (e.g., high-density residential, central business district) or are origins/destinations with transit-dependent populations (e.g., low-income housing, retirement home)	Adjacent land uses are not transit-supportive

4.3 TYPES OF BUS STOPS

There are three types of bus stops, as described below.

4.3.1 Regular Stops

Regular stops are designated places for buses to stop to load and unload passengers. Minimum features at regular stops include a bus sign and a landing pad or clear area with a bus stop of sufficient length to accommodate one bus. Additional passenger features and amenities may be present depending upon factors such as location, ridership, and land uses. Bus stops may need to accommodate more than one bus depending upon the number of routes serving a stop and service frequency.

4.3.2 Layover Stops

A layover is the time allotted between scheduled trips for various purposes, such as an operator break, schedule recovery time if the preceding trip was late, or at a time point within a trip. Layover stops are locations where an operator parks a bus to take a break and/or waits until the beginning of the next scheduled trip. These are non-boarding bus stops that are not designed to serve passengers. A layover may occur at any location along the route; however, to maximize operator layover time and reduce operating costs, layover facilities are located as close to the beginning or end of a route as possible. Layover stops do not include bus stop signs with route numbers or passenger information or curb painting but they are signed to indicate their use as layover areas. Signage at these stops, such as a sign directing operators not to idle buses, is often installed by jurisdictions. Layover stops must include comfort stations for operators, either as stand-alone facilities or within buildings accessible to the operators. Lighting should be provided at the space where the bus is parked and along the path to the comfort station.

Layover stops can be located on-street or off-street. The length of layover stops depends on the frequency of the route, coach type, and recovery time (i.e., more frequent routes require more layover spaces).

The guidelines for development of layover facilities are provided in Section 4.5.

Regular Stop

Layover Stop

4.3.3 Regular/Layover Stops

Regular/layover stops are similar to regular stops in their design and function. These are located along bus routes and serve as designated spaces to stop to load and unload passengers. However, these also serve as layover stops for operators and are often located at the beginning or end of a route. These stops can also be located along a route where operators can stop for a short period if they are running ahead of schedule or allow for a "pulse" between interlined trips. Regular/layover stops are typically pull-out stops, have bus stops that are long enough to accommodate two or more buses, and have comfort stations.

Regular/Layover Stop

4.4 SHARED USE OF STOPS

Metro shares stops with other transit providers including Sound Transit, Community Transit, and Pierce Transit. The region's transit agencies have a "good neighbor" policy, which states that each agency covers the cost of stops in its primary service area (daily operation and maintenance, mid-life costs, asset replacement, etc.) even though others may use them.

School buses can use Metro stops when contracted through Metro's Real Estate Division. Special use permits can be obtained to allow for use of Metro stops in off-street locations. Private transportation operators including, but not limited to, transportation network companies (e.g., Uber, Lyft), private employer shuttles, taxis, and private carriers, are not allowed to use Metro stops because this can conflict with bus operations and affect passenger safety. The City of Seattle has adopted regulations prohibiting persons from stopping, standing, or parking a vehicle at bus stops.

Shared Stop for Buses and Seattle Streetcar

4.5 LAYOVER FACILITY DEVELOPMENT GUIDELINES

Layover facilities are where operators can take a break between ending and starting their scheduled runs and use restrooms. Time allotted for layover also allows operators to recover trip time loss caused by traffic congestion and therefore ensure transit reliability throughout the system. Layover facilities include layover bays and layover spaces. A layover space provides an area for one bus. A layover bay comprises one or more layover spaces. It can be used by one single bus route but is long enough to accommodate one or multiple buses of the same route.

Total dependent operation means that a bus cannot enter and/or exit the layover facility without relocation of another bus. Figure 4.5-1 displays dependent operation wherein a bus cannot enter at the front of the layover facility if a bus is parked in the rear due to insufficient maneuvering space. Figure 4.5-2 displays dependent operation wherein a bus cannot enter the front of the layover facility if a bus is parked in the rear due to insufficient maneuvering space and the bus parked in the rear cannot exit if a bus is parked immediately in the front of the bus.

Total dependent operation is not preferred; it presents challenges because Metro is required to provide operators with the opportunity to access a comfort station during all scheduled layovers, and operators are not required to remain on board their coach during scheduled layovers. When a layover bay is used by multiple routes, it cannot be guaranteed that operators will be available to move their bus during a scheduled layover.

Independent operation allows for buses to enter and exit a layover facility without requiring the relocation of other buses in order to do so, as shown in Figure 4.5-3. Independent layover facilities ensure that operators can deboard from their buses during all scheduled layovers without interfering with the opportunity for other buses to use layover space.

Layover for a single bus route at any route terminus can be operated in a dependent manner, meaning the first bus to arrive is the first bus to leave, and the second bus then pulls forward to allow the next bus to use the rear bus stop. If space allows, adequate room should be provided for a second bus to pull out independent of the first bus, as buses may arrive out-of-sequence.

The basic assumption for multiple route layover facilities is independent operation, meaning buses can pull in and pull out of the layover spaces independent of other buses. The independency of layover spaces allows maximum operational flexibility.

The guidelines for development of layover facilities are detailed below.

Figure 4.5-1. Dependent Bus Operation in a Layover Facility—Independent Out Only

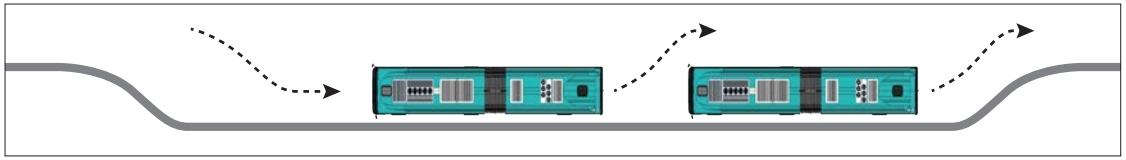


Figure 4.5-2. Dependent Bus Operation in a Layover Facility—No Independency

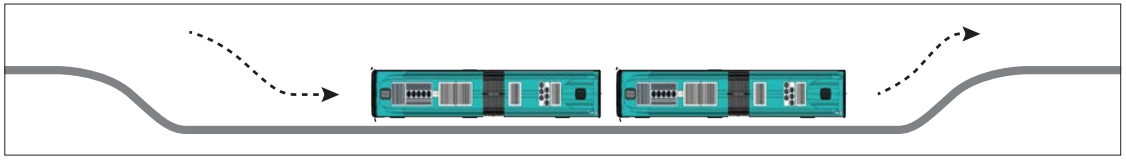
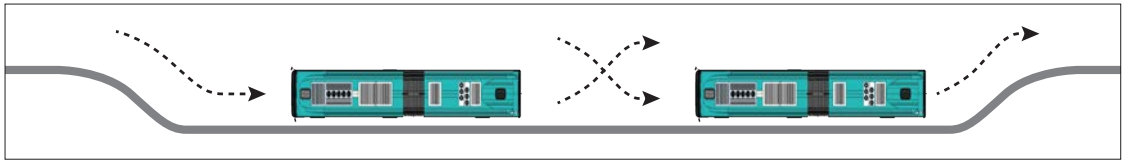


Figure 4.5-3. Independent Bus Operation in a Layover Facility



4.5.1 General Considerations

a. **Distance from route.** In order to maximize operator layover time and reduce operating costs, layover facilities are located as close to the beginning or end of a route as possible. Metro tries to minimize the distance between the first/last stop served by a route and the layover facility. A common stop for both functions is ideal if space permits. If a layover facility is not located at the last stop, the layover should be beyond, rather than on, the revenue service portion of the route so that operators can take uninterrupted breaks. Additionally, the extra time for buses to circulate between the last stop, the layover facility, and the first stop would result in increased operating costs. At transit hubs, it is preferred not to require buses to "double-loop" between the last stop and first stop in order to use the layover facility.

b. **Turnaround routing.** Because layover facilities are needed at the beginning and ending of all routes, the adjacent street system must have room for buses to turn around. Factors that would restrict turnaround operations include street width, pavement condition, street corner radii, and sight clearance at intersections.

c. **Paving.** Concrete paving at layover facilities is preferable to asphalt.

d. **Comfort stations.** The layover facility must include comfort stations for operators, either as stand-alone facilities or within buildings accessible to the operators. To minimize service interruptions, it is best to locate the comfort station at the beginning or end of the line layover. Additional detail about the siting and development of comfort stations is included in Section 5.17.

e. **Lighting.** Lighting should be provided at the space where the bus is parked and along the path to the comfort station. Lighting design should be according to the light levels recommended by the Illuminating Engineering Society of North America (IESNA) for the pathway as well as adjacent to the comfort station.

f. **Engine cool down and shut off.** Diesel engines should be idled for 3 minutes upon arrival at a layover facility to allow cooling of the engine, which would then be shut off. In some locations, idling is not permitted. Signage directing operators not to idle buses is often posted by jurisdictions.

g. **Incorporation of Crime Prevention Through Environmental Design (CPTED) strategies.** Selection and design of layover facilities shall be according to CPTED principles and best practices because some routes may use them until early morning hours so that operators may not be subjected to safety threats. Additional information about CPTED strategies is provided in Section 6.2.

h. **Roadway longitudinal slopes.** Layover facilities should not be located at a location where the roadway longitudinal slope is higher than 10 percent.

4.5.2 Location Considerations

Metro's buses begin and end route runs in both residential and commercial neighborhoods. Layover facilities may be located in either type of neighborhood. Layover facilities can be located on-street or off-street. They should be located in a manner to avoid blocking sight distance that is critical for local traffic and the safety of pedestrians.

a. **Residential neighborhoods.** To minimize impacts in residential areas, siting of layover facilities should consider the locations of private residences including locations of doors, windows, and driveways. The preferred lane width for residential streets is 11 feet or greater.

b. **Commercial neighborhoods.** In commercial areas, Metro attempts to avoid blockage of signs as well as preemption of economically important short-term parking space adjacent to commercial property. In congested areas, several routes are usually scheduled into each layover facility. This complicates estimation of the stop length and requires more intensive management by bus operators and supervisors.

c. **Orientation.** On one-way streets, buses should layover on the right, to avoid requiring drivers to exit the bus into a traffic lane.

d. **Comfort Station Access.** The walking path between the layover facility and operator comfort station cannot exceed 1,020 feet. The pathway should be well lit with adequate pedestrian facilities and safe crossings.

4.5.3 Dimensions

a. The appropriate length of a layover facility is determined by the number of routes sharing the stop, the scheduled overlap of layovers (if any), any special sight distance problems for nearby driveways or intersections, and whether there is a need for independent pullouts. Layover facilities are generally long enough to accommodate two buses. This is all determined on a case-by-case basis.

b. The basic assumption for use of layover facilities serving a single route is dependent operation, meaning the first bus to arrive is the first bus to leave, and the second bus then pulls forward to allow the next bus to use the rear half of the layover facility. Locations that serve multiple routes may need layover facilities that accommodate independent operation.

c. The typical component of a layover facility for multiple buses should be 60 feet straight curb line for each bus intended. In addition to this curb line required to park the bus, space must also be provided for buses to pull in and pull out.

   i. When the adjacent travel lane is 12 feet wide or greater, 60 feet should be provided for buses to pull in and at least 25 feet for buses to pull out. Additional space is needed if the lane width is less than 12 feet.

   ii. An adequate pull-out length must be provided whenever buses are expected to merge back into travel lanes with competing general traffic. This length is dependent on the posted speed and the level of service of the roadway. For a high-traffic and high-speed roadway, the MUTCD is used to determine the length of the pull-out to provide adequate space for acceleration to the traffic speed.

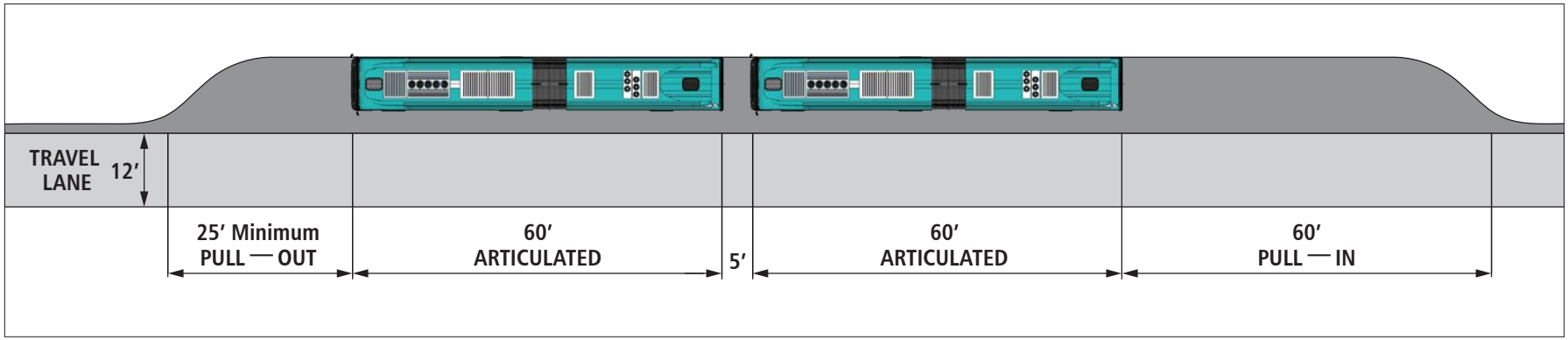
   iii. Within a total dependent bus parking area, 5 feet should be provided between coaches along the curb line, recognizing that the buses would not actually park bumper-to-bumper and that space should factor into the bike rack mounted on the front of the bus.

   iv. With independent bus parking, 60 feet should be provided between coaches.

   v. The parking lane used for parking, pull-in, and pull-out should be 12 feet wide.

Figure 4.5-4 details how these guidelines might be applied to specific situations.

Figure 4.5-4. Typical Dimensions for Parking Multiple Coaches at Layover Facilities and Transit Centers



CHAPTER 5: BUS STOP ELEMENTS

Each bus stop is unique and is designed with several physical and operational features in mind. Bus stops must be accessible to all riders, including persons with disabilities, and provide designated locations for ingress to and egress from buses. Bus stops need to fit the space in which they are located, taking into consideration the built and natural environments. Stops need to be appropriately sized to accommodate the daily number of riders as well as passenger volumes during peak periods. The curb length and design must have enough capacity for the maximum number of buses that will be using the stop at peak usage.

This section identifies the various elements that are used in the design of bus stops. It details the purpose of the elements and provides guidelines for the location and installation of each. Each stop will be designed using an appropriate and unique combination of these elements to create the appropriate design for a given location.

Where applicable, a reference to Metro's approved Standard Design and Construction Drawings is provided. All links are listed in Appendix C.

5.1 LANDING PADS AND CLEAR AREAS

Landing Pad Construction Plans

Landing pads and clear areas are the locations where passengers board and alight from buses. They allow for bus ramp deployment or accessible lift operation and must be large enough to accommodate maneuvering of wheelchairs or other mobility devices. They can be integrated into a sidewalk or be freestanding in areas where there is not a sidewalk present. Landing pads and clear areas must be constructed in compliance with ADA standards. Landing pads and clear areas are generally constructed of concrete, asphalt, or similar material.

A high vertical step in entering or exiting a bus can be difficult for children and/or passengers with mobility challenges. Landing pads that are incorporated into sidewalks or raised from ground level can reduce this vertical distance and allow for quicker boarding and alighting, which in turn results in shorter dwell times at stops. By reducing dwell times, buses can improve operating speeds, travel times, and reliability.

5.1.1 Landing Pad and Clear Area Locations and Design

At least one landing pad or clear area must be provided at each bus stop. It is installed at the stopping location of the front door of the bus.

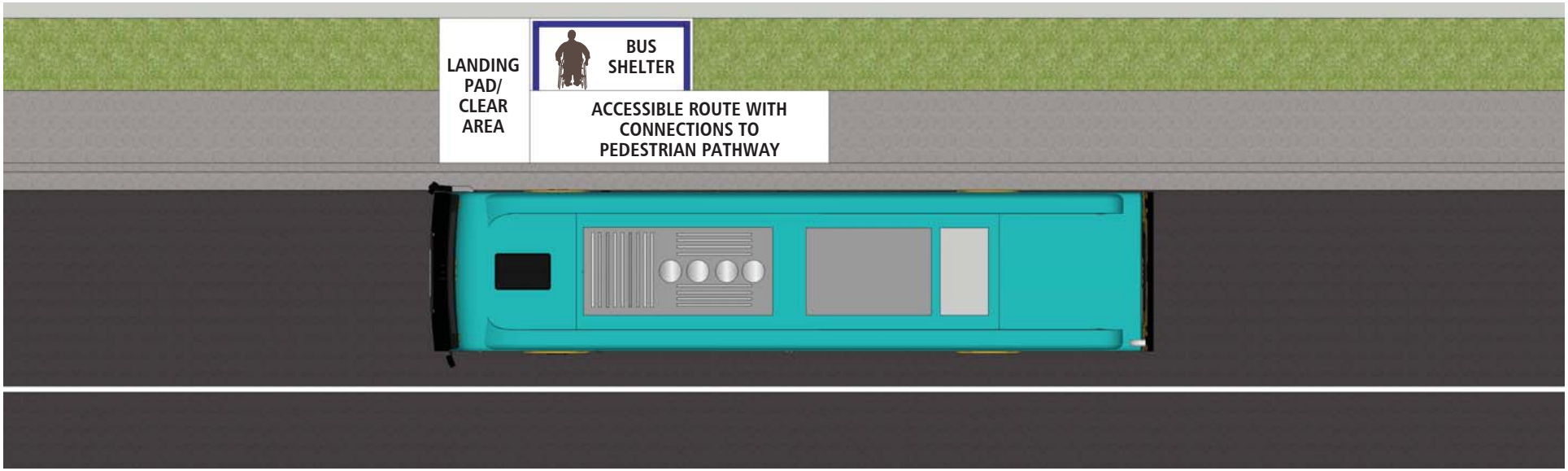
5.1.1.1 Landing pads and clear areas must be free of all obstructions, including sign posts, street furniture, and overhangs.

5.1.1.2 Landing pads and clear areas should be constructed of an approved firm, stable, and slip-resistant surface. This can include concrete, asphalt, or similar material.

5.1.1.3 When a shelter is located at a bus stop, the route from the shelter to the landing pad/clear area at the front door should meet ADA accessibility requirements, as shown in Figure 5.1-1.

Landing Pad

Figure 5.1-1. ADA Accessibility Requirements



5.1.2 Landing Pad and Clear Area Layouts

The preferred layout for landing pads and clear areas is a 48-foot-long continuous concrete pad without planting strips, trees, or other vertical features. This allows for the maximum space for passenger circulation when buses are loading and unloading.

5.1.2.1 When development of a continuous landing pad or clear area is not an option, the preferred dimensions for landing pads and clear areas are:

- Front door: 11 feet wide x 10 feet deep
- Middle door: 10 feet wide x 5 feet deep
- Rear door: 11 feet wide x 5 feet deep

5.1.2.2 In circumstances where right-of-way is limited or a site is otherwise significantly constrained, landing pads or clear areas can be 5 feet wide by 8 feet deep. This is the absolute minimum allowed by ADA guidelines and should only be used where construction of larger landing pads or clear areas is not reasonably feasible.

5.1.2.3 Landing pads and clear areas can be developed to provide single-, two-, and three/all-door access.

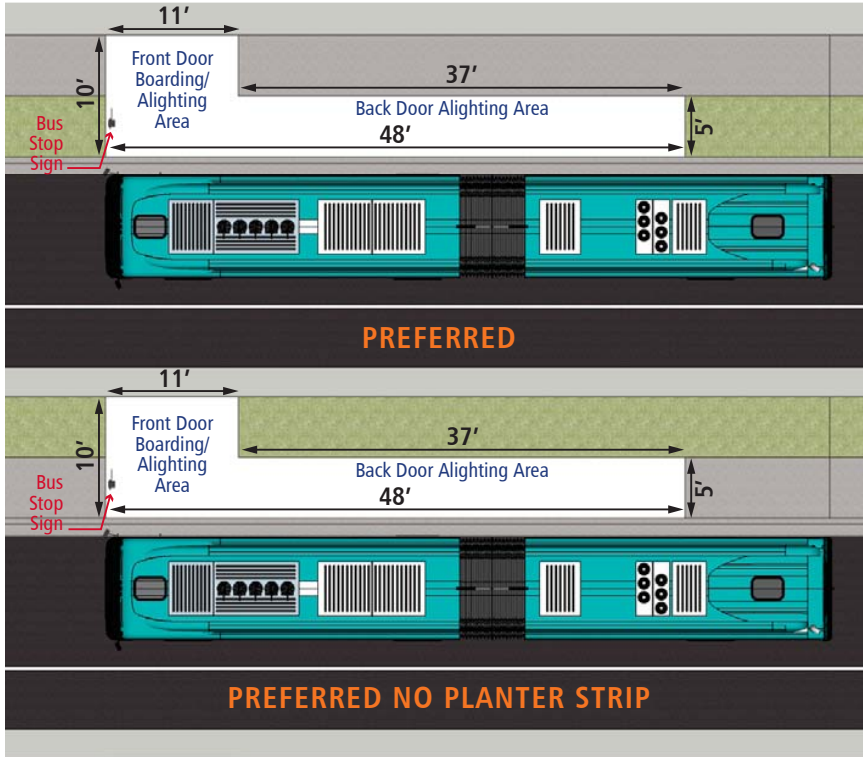
5.1.2.4 The number of landing pads and clear areas at a stop primarily depends on the routes serving an area. Three-door landing pad/clear area configurations are preferred because they allow for all-door access at a stop.

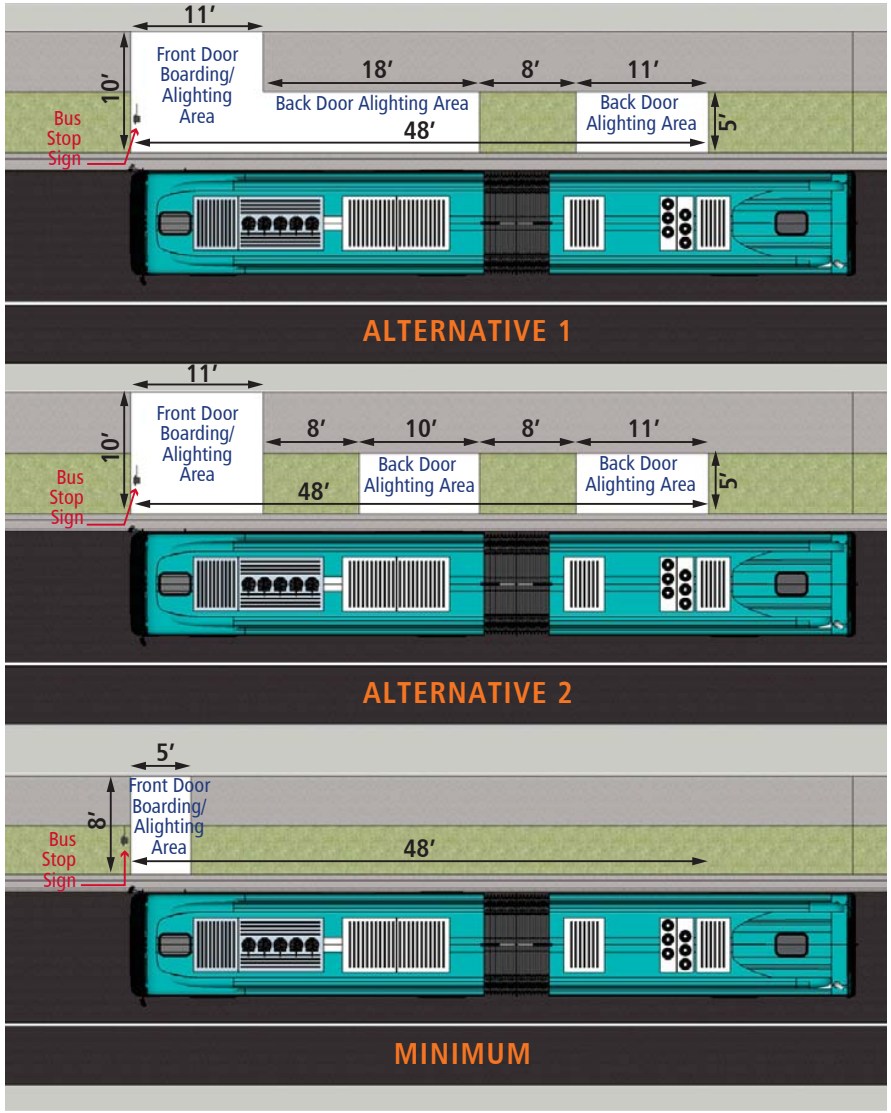
5.1.2.5 In areas that are only served by 40-foot coaches, two landing pads or clear areas may be installed.

5.1.2.6 Because Metro has a number of different bus lengths and styles, the location for multi-door landing pads can vary. A single stop may be served by multiple buses of varying lengths and/or styles. The dimensions of the landing pads shown in Figure 5.1-2 will accommodate access to all doors on all Metro coach types.

Continuous Landing Pad

Figure 5.1-2. Landing Pads for all Metro Coaches





5.1.3 Raised Landing Pads

A raised landing pad may be developed where sidewalks are not present to provide a space that reduces the vertical distance needed for boarding and alighting.

5.1.3.1 Raised landing pads include a 6-inch-high concrete platform, with no more than a 2 percent cross slope. They are large enough to allow for maneuvering of wheelchairs and other mobility devices.

5.1.3.2 The platform resembles a short section of sidewalk, with curb and gutter.

5.1.3.3 ADA-accessible ramps are included at one or both sides of the platform.

5.1.3.4 Depending upon the surrounding grade, additional curbing or guardrails may be installed to prevent falls from the platform. Other bus stop features or amenities, such as benches, shelters, or trash receptacles, may be present.

Raised Landing Pad

5.2 SIGNS

Sign Footing Details
Tech Pylon Footing and Foundation Details and Sections

A bus stop sign must be located at every stop. Bus stop signs indicate where buses are recommended to stop. They identify the route or routes serving a particular stop and contain additional information including the stop number, contact information for Metro, and indicate if a wheelchair ramp or lift can be deployed at the stop. Some signs indicate destinations of a specific route, such as a light rail station or the airport. The type of sign installed is dependent upon the number of routes served at a stop. Figure 5.2-1 and Figure 5.2-2 show Metro's signage family and terminology.

5.2.1 Bus Stop Sign Locations

A bus stop sign must be located at every stop. Bus stop signs are installed at the head of the stop as an indication to operators where to stop to load and unload passengers, as shown in Figure 5.1-2.

5.2.1.1 The location of the bus stop sign is placed adjacent to the landing pad or clear area. This indicates to passengers where the front door will be located when the bus stops and, if needed, where a wheelchair ramp or lift will be deployed.

5.2.1.2 Bus stop signs are installed on individual posts, utility poles, or other vertical elements, as authorized by the local agency.

5.2.1.3 Bus stop signs should be visible to drivers from a distance to allow them sufficient time to decelerate and pull the bus to stop.

5.2.1.4 Bus stop sign and post must be located a minimum of 3 feet behind the face of curb, depending on the local jurisdiction's requirements.

5.2.2 Bus Stop Signs at Stops Serving Multiple Routes

At stops served by multiple routes, bus stop signs are installed only at the head of the bus stop. Additional transit signs or painted delineations may be used to identify other locations where a bus may stop.

Bus Stop Sign Showing Multiple Routes

5.2.3 Bus Stop Signs in Transit Centers and Along Transit Corridors

Transit centers and busy transit corridors, such as Third Avenue in downtown Seattle, or at flyer stops have large signs displaying the routes serving a stop.

5.2.3.1 One sign displaying multiple routes should be installed at each individual stop or bay.

5.2.3.2 The route numbers are displayed on modular components, allowing for easy removal and replacement as the routes serving the stop change.

Bus Stop Sign on a Transit Corridor

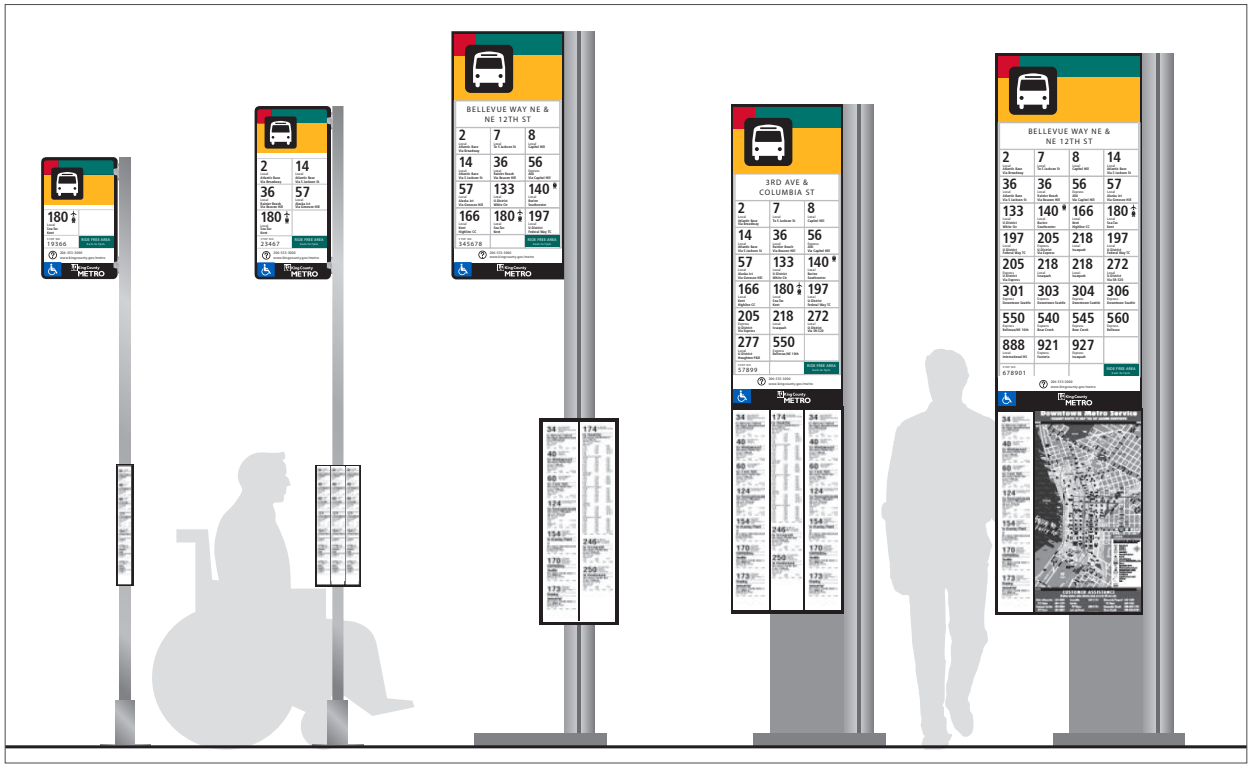
5.2.4 Bus Stop Signs (Type A, B, and C)

Type A, B, and C signs display the numers of routes serving a stop. They may also include additional information such as schedules, maps, and fare information. Sign foundations vary for these three families of signs. Type A signs are typically bolted to the sidewalk; however, when they are placed in planter strips, a small concrete foundation must be used. Type B and C signs both typically use a 4½-foot-square concrete foundation, but can also be installed on a round circular foundation 2½ feet in diameter. Type A, B, and C signs are shown in Figure 5.2-1.

5.2.5 Customer Information Signs (Type D Signs)

Customer information signs provide transit-related material to passengers such as maps, fare information, bus tunnel information, and current events. They are generally located in areas with high ridership, such as downtown Seattle stops and transit centers. Type D signs typically use a 3 ¼-foot-square concrete foundation, but can also be installed on a round circular foundation 2½ feet in diameter. A Type D sign is shown in Figure 5.2-2.

Figure 5.2-1. Type A, B, and C Signs



Sign Type A.1
1-2 Routes

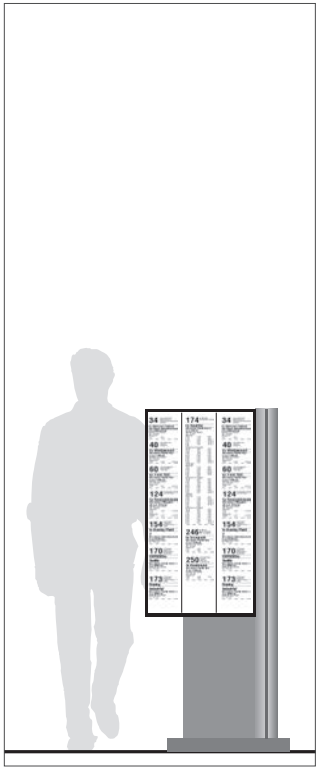
Sign Type A.2
3-6 Routes

Sign Type B.1
6-12 Routes

Sign Type C.1
6-18 Routes

Sign Type C.2
18-32 Routes

Figure 5.2-2. Type D Sign



Sign Type D.1

5.2.6 RapidRide Signage

RapidRide stops and stations include unique signage that reinforces the RapidRide brand and provides information to passengers. RapidRide stations include a Real Time Information Sign (see Section 5.2.7 for details).

5.2.6.1 All RapidRide stops and stations must have a bus stop sign.

5.2.6.2 Bus stop signs may be installed on individual posts, utility poles, or other vertical elements.

5.2.6.3 Blade markers should be installed at all RapidRide stops and stations. They can be free-standing or located on the roof of a shelter. Blade markers can be integrated with other signs to minimize the number of vertical elements at a stop.

5.2.6.4 Signage is integrated into RapidRide shelters.

5.2.6.5 Each shelter is labeled with a "RapidRide" sign.

5.2.6.6 Shelters include signs that identify the RapidRide route or routes that serve a stop.

5.2.7 Real Time Information Signs

Metro Real Time Information Signs (RTIS) are integrated with a RapidRide tech pylon[1].

5.2.7.1 In addition to RTIS, tech pylons include a map of the RapidRide route or routes that provide service at a stop.

5.2.7.2 ORCA card readers are affixed to tech pylons.

5.2.7.3 RTIS require a 120-volt power supply to supply continuous power to the system. Solar energy is not a reliable source of power for this technology.

[1]Other jurisdictions and private partners post RTIS information via their own kiosk or other infrastructure.

RapidRide Blade Marker

Real Time Information Sign

5.3 CURBS

Bus Zone Curb Painting

Curbs serve multiple purposes at bus stops. They delineate separate spaces between the roadway and people waiting for the bus. They also control stormwater by keeping it in the street and away from the pedestrian waiting area.

A high vertical step can be difficult for children and/or passengers with mobility challenges. This can require longer dwell times at stops, resulting in reduced operating speeds, slower travel times, and less reliable service. Curbs reduce the vertical distance a passenger must step to enter or exit the bus. Additionally, all of Metro's buses are equipped with ramps or lifts to provide for wheelchair boarding and assist with passenger comfort. Many of Metro's buses are able to "kneel" in order to reduce the height of the step into or out of the bus.

5.3.1 Curb Location and Design

5.3.1.1 Curbs and sidewalks at bus stops are preferred.

5.3.1.2 A 6-inch curb is a typical sidewalk height throughout King County.

5.3.1.3 Catch basins should be located out of the bus stop.

5.3.1.4 Painted curbs at bus stops indicate the area where the bus will stop. Curbs are painted with a red and yellow repeating pattern to indicate a no parking area for automobiles.

5.3.1.5 Metro does not install truncated domes at curbs.

5.3.2 Stops Without Curbs

5.3.2.1 Bus stops without curbs may be necessary or appropriate in some circumstances or locations such as:

- Temporary stops, including those in construction zones
- Rural areas
- Areas with no formal curb, gutter, and sidewalk

Bus Zone Curb Painting

Bus Stop with No Curb

5.3.3 Use of Bus Ramps at Curbs

All of Metro's low-floor buses have a floor height of 13 inches. Raised curbs (higher than 6 inches) further reduce the height a passenger must step to enter or exit a bus.

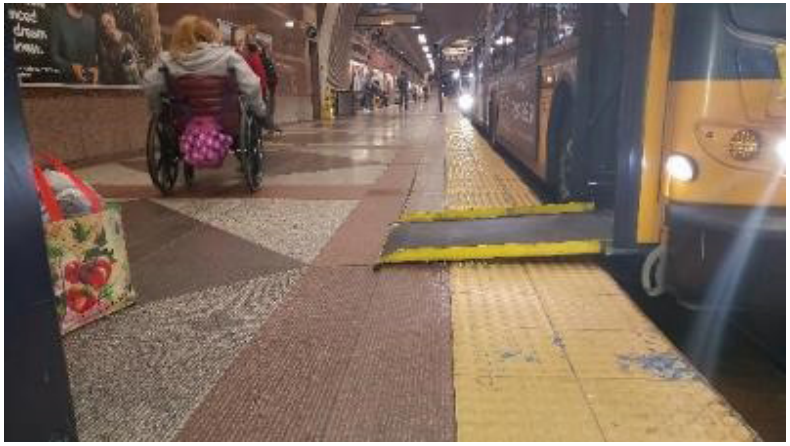
5.3.3.1 When deployed, the bus ramp results in a low-slope ramp, which is easier to use for passengers with mobility challenges and results in faster boarding and alighting.

5.3.3.2 Bus ramps can be deployed on curbs that are up to 10 inches high. Curbs higher than 10 inches do not allow the ramp to be deployed properly, resulting in a vertical gap between the sidewalk and the edge of the ramp.

5.3.3.3 Level boarding without use of a ramp is challenging. Unless a bus can hug the curb using a guide, such as a rubber rail, it can be difficult for operators to consistently maneuver close enough to the curb without scraping the vehicle wheels or lugnuts, and to provide level boarding without a horizontal gap.

5.3.4 Curbs at RapidRide Stops and Stations

Curbs and landing pads/clear areas at RapidRide stops and stations should be raised as close as possible to the level of the bus floor. Providing raised curbs and landing pads/clear areas will not be feasible at all RapidRide stops or stations due to increased cost, ADA-compliant transition slopes, and conflicts with utilities and other below-ground and above-ground obstacles.



Bus Ramp Deployed at Curb

Curb at a RapidRide Stop

5.4 STANDARD SHELTERS

Shelter Architectural Drawings
Shelter Construction Plans
Shelter Structural Drawings

Shelters provide a covered area for passengers to wait for the bus. They protect passengers from the elements of nature. In general, shelters are installed at standard bus stops with 50 or more daily boardings in Seattle, and standard bus stops with 25 or more daily boardings outside Seattle. Special consideration for installation of shelters outside these thresholds may be given in areas where high numbers of transfers are expected, where waiting times for riders may be longer, or where stops are close to facilities such as schools, medical centers, or senior centers. Other considerations include the physical constraints of bus stop sites, preferences of adjacent property owners, and construction costs. Information regarding the installation of custom shelters can be found in Appendix D.

5.4.1 Shelter Design

Metro has a variety of standard shelter frames that are installed at standard bus stops. As shown in Table 5.4-1, standard shelter frames vary by size, roof structure, and size and type of panels. Metro has several footing designs to support standard shelter frames. The standard shelter frames can be matched to footing designs in a variety of combinations (Table 5.4-2). Some standard shelter frames can be installed on footings designed for RapidRide shelters. If a standard shelter is installed on a footing designed for a RapidRide shelter, it allows for an easy switch from standard to RapidRide shelters in the event that a route is converted.

5.4.1.1 The various shelter sizes allow for flexibility in locating shelters in the right-of-way. In areas that are more constrained, a smaller footing may be used. The footing size does not necessarily represent the total size of the shelter because some have a roof that extends beyond the foundation.

5.4.1.2 Standard bus shelters are available in five colors: black, brown, blue, green, and teal. This limited palette of colors keeps maintenance simple while expanding aesthetic options for Metro planners, jurisdictions, or neighborhoods. Colors can be selected to complement the immediate surroundings or identify a community. Shelters can be painted any available color, regardless of size or design.

5.4.1.3 Shelters have a domed, translucent roof with a solar panel to provide power for internal lighting. Shelter roofs must maintain a vertical clearance of 7 feet. This allows them to overhang sidewalks in areas where right-of-way is limited but installation of a shelter footing is feasible.

5.4.1.4 Shelters should be located in areas that have the least amount of adverse impact on the adjacent property and on traffic safety while still providing good service to riders.

5.4.1.5 The physical environment can influence options for shelter installation because of limited right-of-way or other inadequate conditions. Shelter placement needs to allow for pedestrian clear space, clearance from overhead and underground utilities and fixed objects, and line of sight distances (Figure 3.4-1).

5.4.1.6 Topography can increase the cost and complexity of installing a shelter. Sloping ground presents a variety of issues including specialized footings, difficult bench installation, interior drainage issues, and reduced weather coverage as effective roof height increases.

5.4.1.7 A public or private party desiring to install and/or utilize a custom bus stop shelter must coordinate design specifications and location placements with Metro, as well as the local jurisdiction if the shelter is located in the public right-of-way. Custom shelters must be maintained by the jurisdiction or private party.

5.4.1.8 Shelters are single or double units in length. They are 8 feet, 8 inches long or 17 feet long, respectively. Shelter frame names ending in “1” are 8 feet, 8 inches long, and those ending in “2” are 17 feet long.

Table 5.4-1. Shelter Types and Site Area Requirements

SHELTER LENGTH 8'8"	SHELTER LENGTH 17'0"	SITE REQUIREMENTS
Shelter Frame F11 (Color Shown: Black)	**Shelter Frame F12 (Color Shown: Blue)**	Large area with no slope to moderate slope and little if any restrictions due to private property. Wide side panels provide greatest level of protection in windy locations.
Shelter Frame F21 (Colors Shown: Blue)	**Shelter Frame F22 (Color Shown: Black)**	Used where depth of shelter is restricted by private property, narrow sidewalk, or any type of structure such as a rockery or retaining wall. Because of the cantilever design, these shelters do not offer as much protection in windy and rainy conditions as F11 and F12 shelters.

Table 5.4-1. Shelter Types and Site Area Requirements (Continued)

SHELTER LENGTH 8'8"	SHELTER LENGTH 17'0"	SITE REQUIREMENTS
Shelter Frame F21T (Color Shown: Green)	**Shelter Frame F22S (Color Shown: Black)**	Large area with no slope to moderate slope and few, if any, restrictions due to private property. Minimal roof area outside the side panels limits opportunities for weather protection.
Shelter Frame F31 (Color Shown: Black)	**Shelter Frame F32 (Color Shown: Black)**	Used where depth of shelter is restricted by private property, narrow sidewalk, or any type of structure such as a rockery or retaining wall. Because of the cantilever design and narrow side panels, these shelters offer minimal protection in windy and rainy conditions.

Table 5.4-1. Shelter Types and Site Area Requirements (Continued)

SHELTER LENGTH 8'8"	SHELTER LENGTH 17'0"	SITE REQUIREMENTS
Shelter Frame F50 (Color Shown: Blue)	NA	Used where depth of shelter is the most restricted by private property, narrow sidewalk, or any type of structure such as a rockery or retaining wall. The canopy depth is shallower to allow for minimum separation between the edge of the canopy and the curb. Because of the cantilever design and lack of side panels, these shelters offer the least protection in windy and rainy conditions.
Shelter Frame F51 (Color Shown: Blue)	**Shelter Frame F52 (Color Shown: Black)**	Used where depth of shelter is restricted by private property, narrow sidewalk, or any type of structure such as a rockery or retaining wall. The canopy depth is shallower to allow for minimum separation between the edge of the canopy and the curb. Because of the cantilever design and narrow side panels, these shelters offer minimal protection in windy and rainy conditions.

Table 5.4-2. Shelter Frame and Footing Design Compatibility

	SHELTER FRAME												
	F11	F12	F21	F21T	F22	F22T	F22S	F31	F32	F50	F51	F52	
Shelter Post Dimensions	8′8″ x 6′0″	17′0″ x 6′0″	8′8″ x 3′4″	8′8″x 3′4″**	17′0″ x 3′4″	17′0″x 3′4″**	17′0″ x 3′4″	8′8″ x 2′0″	17′0″ x 2′0″	8′8″ x 0′4″	8′8″ x 2′0″	17′0″ x 2′0″	
Shelter Roof Dimensions	8′8″ x 6′0″	17′0″ x 6′0″	8′8″ x 6′0″	8′8″ x 6′0″	17′0″ x 6′0″	17′0″ x 6′0″	17′0″ x 6′0″	8′8″ x 6′0″	17′0″ x 6′0″	8′8″ x 5′0″	8′8″ x 5′0″	17′0″ x 5′0″	
Footing Design (Length x Width x Slab Thickness)													
B11 9′8″ x 7′0″ x 7½ ″	X												
B12 18′0″ x 7′0″ x 7½″		X											
B21 9′8″ x 4′4″ x 1′2″			X	X				X			X		
B22 18′0″ x 4′4″ x 1′2″					X	X	X		X			X	
B30 Series*	X	X	X		X			X	X		X	X	
B50 10′0″ x 4′4″ x 1′2″										X			
RR-10 9′8″ x 4′4″ x 1′2″			X										
RR-20 20′0″ x 5′0″ x 1′6″					X		X						

*B30 series footings are used in areas where a shelter will be installed on a slope and the footing must be constructed to meet the slope. The length, width, slab thickness, and wall height dimensions for the B30 footing series vary accordingly.
**F21T shelters have a roof overhang on the front and back sides. Shelter posts are located within the roof overhang footprint.

5.5 RAPIDRIDE SHELTERS

RapidRide Shelter Standards

RapidRide enhanced stops and stations have unique shelter designs that help to distinguish them from standard stops. The shelters include RapidRide branding, colors, and signage. RapidRide shelters include signage with the letter of the route or routes serving the stop, as well as the stop name. RapidRide blade markers are installed on the roof of the shelter. All panels on RapidRide shelters are translucent or transparent, allowing for enhanced visibility for passengers and bus operators.

5.5.1 Enhanced Stop Shelters

5.5.1.1 Enhanced stop shelters are installed at stops with 50 to 149 daily boardings.

5.5.1.2 RapidRide enhanced stop shelters include a leaning rail and a small bench, both of which are integrated into the shelter frame.

5.5.1.3 Enhanced stop shelters can be installed on RR-10, RR-15, and RR-20 footings. Some standard shelters can be installed on these footings as well, which allows Metro to replace existing standard shelters with RapidRide shelters. Table 5.5-1 identifies compatible shelter and footing designs.

5.5.2 RapidRide Station Shelters

5.5.2.1 RapidRide station shelters are installed at stops with 150 or more daily boardings.

5.5.2.2 RapidRide station shelters include a leaning rail and 4-foot bench, both of which are integrated into the shelter frame.

5.5.2.3 In some circumstances, RapidRide stations may include two enhanced stop shelters rather than a station shelter. This may occur when a stop that was previously served by regular fixed route service will be served by RapidRide, and the new shelters replace standard shelters that have compatible footings.

RapidRide Shelter at an Enhanced Stop

RapidRide Shelter at a Station

Table 5.5-1. RapidRide Shelter Frame and Footing Design Compatibility

	SHELTER FRAME					
	RR-124	RR-125	RR-126	RR-206	RR-208	RR-208B
Shelter Post Dimensions	6′6½″ x 1′6¾″	6′6½″ x 1′6¾″	6′6½″ x 1′6¾″	12′2½″ x 1′7¼″	12′2½″ x 1′7¼″	12′2½″ x 1′7¼″
Shelter Roof Dimensions	12′0″ x 4′0″	12′0″ x 5′0″	12′0″ x 6′0″	20′0″x 6′0″	20′0″ x 8′0″	20′0″x 10′0″
Footing Design (Length x Width x Slab Thickness)						
RR-10 9′8″ x 4′4″ x 1′2″	X	X	X			
RR-15 15′0″ x 8′0″ x 1′6″				X	X	X
RR-20 20′0″ x 5′0″ x 1′6″				X	X	X

5.6 BENCHES

Benches provide a place for passengers to sit while waiting for the bus. In general, benches are installed at standard stops with 15 or more daily riders and at all RapidRide stops. They can be installed within shelters and can also be free-standing.

5.6.1 Bench Sizes and Design Features

5.6.1.1 Metro's preferred bench design is a 4-foot-wide Wabash either with or without a back for the bench. Benches located inside a shelter do not have a back.

5.6.1.2 Benches may be free-standing or located within a shelter. The bench design fits within all standard shelters and still allows for ADA accessibility within the shelter.

5.6.1.3 A standard bench design is easier and less costly to maintain than uniquely designed benches.

5.6.1.4 A back may be installed upon request.

5.6.1.5 Benches must be mounted on concrete.

5.6.1.6 Metro standard benches have adjustable legs to compensate for slight slopes.

5.6.1.7 Benches should be located in a manner in which they do not become difficult to see at night and result in being a trip hazard or "knee banger."

5.6.1.8 Benches should be placed adjacent to another taller object or set back from any other object that may also be in the pedestrian pathway, such as a litter container, utility pole, or bus stop sign post.

5.6.1.9 The 4-foot length discourages reclining or sleeping.

Bus Stop Bench

5.6.2 Benches in Standard Shelters

5.6.2.1 Benches should be installed in all shelters.

5.6.2.2 Benches may not be installed in a shelter or may be removed from a shelter if there is a compelling reason, such as implementation of CPTED guidelines (see Section 6.2).

5.6.2.3 In some cases, a leaning rail is installed in place of a bench (see Section 5.11).

5.6.2.4 Benches may also be placed outside a shelter for additional seating.

5.6.3 Benches in RapidRide Shelters

5.6.3.1 Benches within shelters at RapidRide enhanced stops and stations are integrated into the shelter frame.

5.6.3.2 RapidRide stops should have a free-standing bench.

5.6.3.3 RapidRide enhanced stops and stations may have a free-standing bench in addition to the bench within the shelter.

5.6.4 Benches in Place of Shelters

5.6.4.1 Benches may be installed at stops where a shelter is warranted but will not fit.

Freestanding Bench

Bus Stop Bench in a Standard Shelter

Bench in RapidRide Shelter

5.7 LIGHTING AND POWER

Bus Zone Light Pole Foundation
Internal Solar Shelter Lighting Electrical Details
Handhole Conduit Details – Standard Shelter
Poulsen Light Pole Foundation – D107

Metro provides lighting at bus stops with internally lit bus shelters or by externally lighting the bus stop. Metro prefers to install internally lit shelters at all new or refurbished bus stops. Lighting can assist operators in seeing waiting passengers in areas that are very dark or are on routes where bus travel speeds are higher.

5.7.1 Power

5.7.1.1 Shelter lighting can be provided with hard-wired infrastructure or via solar power.

5.7.1.2 Stops should be designed and developed to accommodate hard-wired infrastructure because it is easier to install electrical components, such as RTIS, in the future once the infrastructure is in place.

5.7.1.3 In instances where hard-wired infrastructure is challenging to install, Metro installs solar-powered lighting. Solar-powered lighting is generally easier to install. However, its use can be limited by tree canopies, which prevent proper solar recharging.

5.7.1.4 RapidRide Stations and bus stops with RTIS must include 120-volt power and a power pedestal.

Standard Shelter with Lighting

Power Pedestal at a Bus Stop

5.7.2 External Lighting

5.7.2.1 External lighting can include streetlights, pedestrian lights, or floodlights.

5.7.2.2 It is preferred that bus stops be located adjacent to existing lighting sources. Shelters and other furniture should be located within the flood of existing lights.

5.7.2.3 If external lighting is added to a bus stop, the preferred method is for the new light to be a part of the street light system. In order to do so, operations and maintenance agreements are needed with the street light owner.

5.7.2.4 All RapidRide stops and stations include considerations for pedestrian-scale lighting. This lighting can be connected to the power supply for the stations.

5.7.3 Operator Notification Lighting

5.7.3.1 Metro installs free-standing light fixtures for operator notification.

5.7.3.2 Operator notification beacons are passenger-activated lights that signal to an operator that someone is waiting at a bus stop.

5.7.3.3 Operator notification beacons also provide minimal down lighting at a stop.

5.7.4 Use of Standard Lighting Fixtures

5.7.4.1 Metro prefers to use standard lighting fixtures at bus stops because they are easier and less costly to maintain than uniquely designed fixtures.

5.7.5 Lighting in Awnings

5.7.5.1 Lighting can also be integrated with awnings. Maintenance of this lighting is the responsibility of the property or awning owner.

Externally Lit Bus Shelters

Operator Notification Lighting

Standard Lighting Fixture in a Standard Shelter

5.8 LITTER RECEPTACLES

Litter receptacles are installed at Metro stops that have a shelter. Metro provides litter removal services at these locations.

5.8.1 Litter Receptacle Size and Locations

5.8.1.1 35-gallon litter receptacles are most commonly installed at shelters.

5.8.1.2 The preferred location for litter receptacles is near the shelter so that they are easily accessible for waiting passengers.

5.8.2 Tipper Cans

5.8.2.1 Tipper cans are installed at all RapidRide stops and some standard stops. Because their design includes an internal can that can be tipped out, they are easier for Metro staff to empty. Their square design also allows for wrapping with Metro information and/or art.

Litter Receptacle

5.9 BICYCLE FACILITIES

5.9.1 Bicycle Facility Types and Locations

5.9.1.1 Bicycle hoops are typically installed at RapidRide stations.

5.9.1.2 When installed, bicycle hoops should be placed at the head of the bus stop. This allows the rider to quickly lock their bicycle if the bicycle rack on the bus is full, and keeps the landing pads free of obstacles. If space is not available at the head of the stop, bicycle hoops should be placed clear of the back door landing pad. Bicycle hoops must always be located outside of ADA-compatible landing pads, clear areas, and travel paths.

Bicycle Hoop

5.10 OFF-BOARD FARE COLLECTION

Off-board fare collection allows ORCA card users to pay their fare in advance of boarding the bus at RapidRide stations. Fare enforcement on board RapidRide buses accompanies off-board fare collection.

5.10.1 ORCA Card Readers

5.10.1.1 Off-board fare collection is currently provided at RapidRide stations only. ORCA card readers are attached to the tech pylons at RapidRide stations.

ORCA Card Reader

5.11 LEANING RAILS

Leaning rails are structures that provide resting opportunities for passengers at bus stops. They can be located inside a shelter, under an awning, or be uncovered. They can be integrated into a structure or be free-standing.

5.11.1 Leaning Rail Function and Installation

5.11.1.1 Leaning rails provide a space for bus riders to rest without leaning against the windows of buildings that are located adjacent to bus stops.

5.11.1.2 Leaning rails are generally installed by private property owners, often in conjunction with awnings.

5.11.1.3 Metro only installs leaning rails when they are part of shelters.

Freestanding Leaning Rails

5.12 GUARDRAILS

Pedestrian Guardrail Detail

Guardrails are installed to prevent falls from a raised bus stop or transit island. They can also be installed to provide a physical barrier between riders and adjacent properties, such as a gas station or parking lot with significant vehicle traffic, or the roadway.

Guardrail at Transit Island

Guradrail at a Raised Landing Pad

5.13 ARTWORK

Metro installs artwork at bus shelters in the form of photo murals, volunteer-painted murals, commissioned artwork, and custom shelters. Metro reviews and approves artwork to ensure compatibility with shelters and shelter maintenance practices. Metro maintains all artwork in accordance with standard shelter maintenance procedures. Artwork installed at shelters can serve as a deterrent to vandalism. It may also help to further link transit service to the community served.

5.13.1 King County Metro Photo Mural Program

5.13.1.1 Panoramic photographs are installed on shelter panels.

5.13.1.2 Metro issues an annual call for submittals to solicit photographs for consideration.

5.13.1.3 Photographs are selected by Metro and installed on new and refurbished shelters throughout King County.

5.13.2 Bus Stop Volunteer Mural Program

5.13.2.1 Volunteers create the majority of painted murals in Metro bus shelters. They are painted on shelter panels.

5.13.2.2 Volunteers interested in painting a mural must submit a proposed design to Metro.

5.13.2.3 Metro approves mural designs and provides pre-primed mural panels and paint.

5.13.2.4 Once painted, Metro applies a protective clear-coat on the panels and installs them at the shelter.

Shelter with Photo Mural

Shelter with Volunteer Painted Mural

5.13.3 Commissioned Artwork

5.13.3.1 Commissioned artwork is artwork for which an artist was paid to produce by an arts organization, Metro, a jurisdiction, or private party.

5.13.3.2 It can include shelters as well as free-standing artwork.

5.13.3.3 Metro develops agreements with the artists and often has contractual obligations that address future modifications or other impacts to the art pieces.

5.13.4 Custom Shelter Artwork

5.13.4.1 Metro occasionally installs custom shelter artwork or free-standing pieces. This often takes the form of laser-cut steel, tile, or other durable materials.

5.13.4.2 This artwork is primarily requested by a jurisdiction or neighboring property owner but may also be developed by volunteers.

5.13.4.3 The requesting party or volunteer works with Metro to determine the design.

Shelter with Commissioned Artwork

Shelter with Customer Artwork

5.14 AWNINGS

5.14.1 Awning Functions

5.14.1.1 Awnings serve similar functions to bus shelters, with features such as weather protection, lighting, or seating.

5.14.1.2 Awnings can be a preferred option at bus stops when they help to achieve CPTED goals. This is because they often have fewer structural elements that can block lines of sight or interfere with the ability for others to see activity at the bus stop.

5.14.2 Awning Installation and Design

5.14.2.1 Awnings are installed by a property owner or business adjacent to a bus stop. They can be structurally integrated into a building or externally attached.

5.14.2.2 Metro prefers that awnings have a depth of 8 feet, with a minimum of 6 feet.

5.14.2.3 Awning height is often subject to the development standards of the jurisdiction in which it is located. Those that are higher offer less weather protection for persons waiting at bus stops.

5.14.2.4 Awnings should be designed in a manner that allows for free movement of passengers at the stop.

5.14.2.5 Metro often requires the installation of a bus shelter footing at stops where awnings are located, especially when the awning is externally attached and can be easily removed. This limits the need for Metro to disturb the sidewalk if a shelter is needed in the future. A shelter can be installed in conjunction with an awning.

Bus Stop with an Awning

5.15 LANDSCAPING

5.15.1 Use of Landscaping at Bus Stops

5.15.1.1 Landscaping at bus stops is primarily installed and maintained by municipalities or adjacent property owners.

5.15.1.2 Bus stop retrofits are generally designed around existing vegetation.

5.15.1.3 It is preferred that new bus stops have a continuous landing pad rather than individual landing pads with landscaping between them (see Section 5.1).

5.15.1.4 Trees located at bus stops have the potential to interfere with bus operations. Section 6.3 provides direction regarding placement of trees at bus zones.

5.16 NEWSPAPER BOXES

5.16.1 Installation of Newspaper Boxes at Bus Stops

5.16.1.1 Vendors need to coordinate placement of newspaper boxes with Metro.

5.16.1.2 Newspaper boxes need to be located in a manner that does not interfere with passenger ingress or egress or the ADA-compatible clear zone.

Landscaping between Landing Pads

Newspaper Box

5.17 COMFORT STATIONS

Comfort stations are restroom facilities provided for use by Metro employees, most commonly for operators. They are a required feature to meet worker protection requirements as outlined by OSHA. Comfort stations are for Metro employees only and are not open to the public.

5.17.1 Comfort Station Features and Design

5.17.1.1 Comfort stations should include the following features:

- Heating (to provide both freeze protection as well as user comfort).
- Hot water system, soap, and towels (and/or hand air dryers) for hand washing.
- Lighting, both interior and exterior, including the path from the layover facility.
- 200-degree peep hole for operator safety.
- Connection to the local water system for hand washing and toilet flushing unless the site requires the design of alternate facilities.
- Connection to the local sewer system unless unusual site attributes require the consideration of a stand-alone septic system.
- Power connection for electrical equipment.
- A lock for privacy and safety.

5.17.1.2 A single restroom unit is provided at each comfort station. Multiple units may be required in larger facilities or layovers that have a high frequency of use. The quantity of units is to be determined in collaboration with the Comfort Station Coordinator.

5.17.1.3 Comfort stations can either be Metro-owned stand-alone buildings or can be owned by a private entity with an agreement for Metro operators to use the site.

5.17.1.4 Comfort stations must meet building code requirements, which includes ADA-compatible access to the entrance as well as ADA requirements inside the building.

5.17.1.5 Portable restrooms should be used as minimally as possible. They are only appropriate where a reroute is in place due to construction or other temporary circumstances that prevent access to comfort stations.

Comfort Station

5.17.2 Comfort Station Locations and Maintenance

5.17.2.1 Comfort stations are located at layover facilities where operator breaks are scheduled. They may also be located at non-layover facilities throughout the system.

5.17.2.2 Comfort stations should be a reasonable walking distance from the layover facility. The minimum scheduled layover time should be related to the walking time to/from the closest comfort station. The walking distance to a comfort station from the layover facility cannot exceed 1,020 feet.

5.17.2.3 Accessibility to the layover facility should also consider safety of the operators including accessible routes and lighting.

5.17.2.4 Metro cleans and maintains Metro-owned facilities. Facilities not owned by Metro are maintained by external parties in accordance with the agreement between Metro and the facility owner.

5.17.2.5 Some vendor comfort stations have been fitted with locks to allow operators comfort station access after hours. With few exceptions, the locks or lock boxes are installed and maintained by Metro.

CHAPTER 6: EXAMPLE BUS STOP LAYOUTS

6.1 FORWARD LOOKING DESIGN

Bus stops are often designed to accommodate current features such as bus routing, ridership, and/or adjacent land uses. However, Metro, cities, and King County have long-range plans that provide a framework for how land uses and the transportation network are anticipated to evolve over time. Given those plans, it is wise to consider the potential for future improvements. For example, if a new stop is developed that currently has fewer than 25 boardings per day but ridership is anticipated to grow over time, a footing could be constructed to facilitate easier shelter installation in the future. Similarly, if stop enhancements are made at a location that will be a future RapidRide station, electrical conduit could be installed during earthwork to accommodate future electric and fiber optic lines.

6.2 CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED) CONSIDERATIONS

CPTED is a multi-disciplinary approach to deterring criminal behavior through environmental design. CPTED strategies focus on characteristics of the built, social, and administrative environments to influence offender decisions that precede deviant activity or criminal acts, thereby deterring these activities. CPTED principles range from focusing on small-scale aspects of the built environment, such as locations of shrubbery and vegetation, to broader, large-scale design elements of an entire neighborhood.

CPTED focuses on three design strategies to help limit the opportunity for crime and deviant activities:

- Natural surveillance improves the visibility of a site to the public through the placement of physical items, activities, and people in a way that allows for more "eyes on the street." Strategies to enhance natural surveillance at bus stops can include addition of lighting, removal of opaque windows or panels at shelters, and orientation of shelters to increase the ability to see people and activities.
- Natural territorial reinforcement uses defined space to increase concern about property usage. This helps to create a sense of ownership at a location and make "strangers" or "intruders" stand out. The locations of objects and features help to define the space.

In addition to design strategies, regular maintenance of a space indicates that it is being monitored and can serve as a crime deterrent. Activity support in an area, such as the placement of signs advertising nearby events, help to foster involvement of nearby citizens and encourage them to monitor a site.

Shelter without Side Panels

6.3 DESIGN CONSIDERATIONS ASSOCIATED WITH FIXED OBJECTS

Bus stops are generally designed around fixed objects. As with other constraints that influence bus stop design, such as limited right-of-way, fixed objects will influence the type and location of amenities included at a bus stop. If the fixed objects present too many constraints at a site, the bus stop location may be moved. Common fixed objects at bus stops include:

- **Fire hydrants:** Fire hydrants must be accessible to fire fighters. A clear zone of 4 feet around a fire hydrant is required.
- **Trees and vegetation:** Trees often present maintenance and operational issues at bus stops. Tree and large shrub canopies can interfere with access to solar panels, block signage, or interfere with the effectiveness of lighting. Shallow tree roots can cause buckling of sidewalks, landing areas, and other improvements. Some jurisdictions have separation requirements from trees and many have requirements regulating the removal and replacement of trees. Metro generally does not install or maintain vegetation at stops but may restore damage incurred during the installation of bus stop improvements. In order to avoid conflicts with buses, such as mirrors and the roof of the bus, trees must be located at least 3 feet from the face of the curb, and the canopy height must be 8 feet or greater above the sidewalk and 14 feet or greater above the street.
- **Utility poles:** Utility poles must be accessible to utility providers. A clear zone of 4 feet around a utility pole is required. Offsets from guy wires can often be readjusted to accommodate bus stop amenities and pedestrian access.
- **Utility vaults:** Utility vaults must be accessible to utility providers. This requires consideration of vault location when designing bus stops, as well as the means of access to a vault. The areas around vaults must be kept clear to allow for opening and removal of lids or doors.
- **Irrigation systems:** Irrigation systems may be integrated into the bus stop design if piping can be relocated and/or capped to keep the system intact.

6.4 INSTALLATION THRESHOLDS

The thresholds for installation of bus stop elements vary depending on a variety of factors. Installation of elements is considered on a stop-level basis. Elements may be installed when they do not meet thresholds based upon site-specific conditions. Similarly, elements may not be desirable or feasible at a location. Table 6.4-1. details these thresholds.

Table 6.4-1. Bus Stop Amenity Installation Thresholds

ELEMENT	INSTALLATION THRESHOLD
Signs	A bus stop sign located at each bus stop; type of sign installed contingent on the number of routes at the stop and stop location
Standard shelter	Standard stops with 50 or more average daily boardings within the city of Seattle Standard stops with 25 or more average daily boardings outside the city of Seattle
RapidRide standard stop	RapidRide stops with 0 to 49 average daily boardings
RapidRide enhanced stop	RapidRide stops with 50 to 149 average daily boardings
RapidRide station	RapidRide stops with 150 or more average daily boardings
Lighting	All stops should have external lighting; all shelters should be internally lit, either via solar power or hard wired
Litter receptacles	35-gallon receptacle installed at all stops with a shelter; may include tipper cans
Off-board fare collection	All RapidRide stations
Leaning rails	As-needed, depending upon adjacent land use and available right-of-way
Artwork	Painted murals are installed as requested; panoramic photographs are installed in accordance with King County solicitation for submittals
Awnings	Installed by private developers with new projects
Landscaping	Not installed by Metro
Bench	Standard stops with 15 or more average daily boardings; all RapidRide stops and stations

6.5 EXAMPLE LAYOUTS BY CATEGORY

Figure 6.5-1 through Figure 6.5-5 identify elements for six examples of bus stops. They show the elements that may be present at each type of stop and their relationship to each other. It is important to note that every bus stop will be designed in the context of the built and natural environments, and it is not expected that each stop will directly resemble what is shown in the graphic.

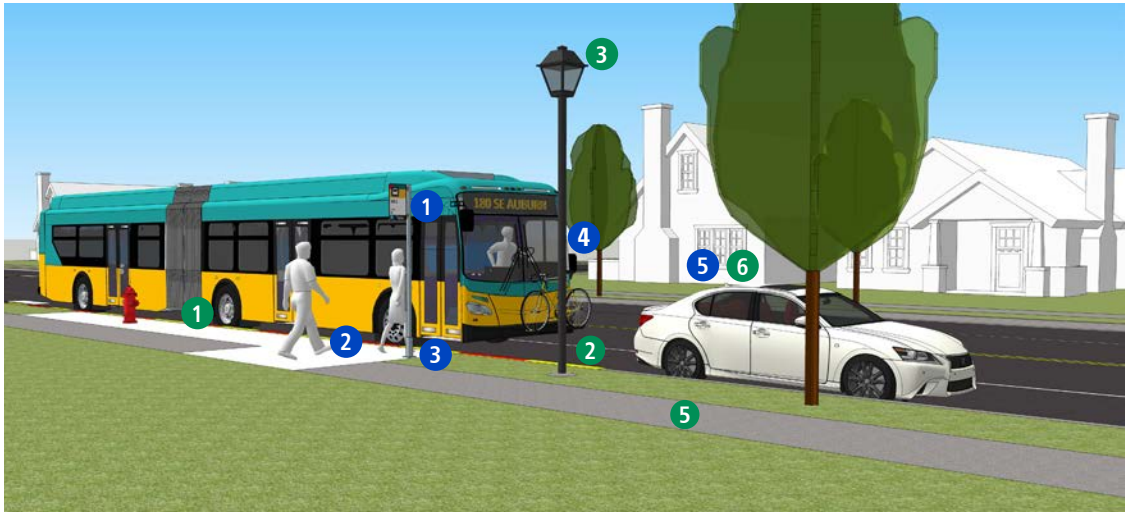
For each example bus stop, there are three levels of guidance:

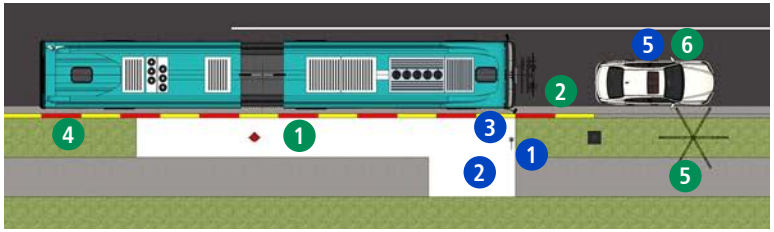
- Critical: These elements are deemed absolutely necessary.
- Preferred: These elements are preferred by Metro.
- Variation: These elements identify options for features or amenities when the recommended elements cannot be accommodated or an alternative is a possibility.

General guidance for all stops:

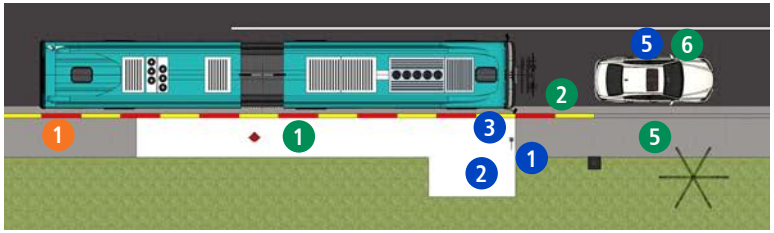
- All features at a bus stop should maintain a horizontal clearance of 3 feet from the curb face or the area where buses stop to load passengers and to avoid interference with bus mirrors and similar features.
- Whenever possible, shelters should be located within the right-of-way. When it is necessary to place part or all of a shelter on private property, a written agreement must be received from the property owner. If placed on private property, the property owner can require the removal of a shelter and footing, and return of the property to its original condition by giving 90 days' written notice.
- When possible to determine, bus stops should not be located in areas where street improvements that will require the permanent removal of stops are planned in the near future. This requires coordination with the jurisdiction in which the stop is located.
- Bus stops should be sited to minimize impacts on adjacent properties.
  - In residential areas, stop placement should consider the location and orientation of private residences, including positions of doors, windows, and driveways.
  - In commercial areas, shelters should minimize interference with commercial establishments. Shelter locations should consider entrances or exits, commercial signs, windows, or displays. They should be sited to minimize impedance or blockage of through movements of pedestrians along sidewalks.
- Shelter site selection should afford maximum accessibility for maintenance crews both in and around shelter areas.
- Bus stop design should ensure waiting passengers are visible to operators.
- Bus stops should include passenger waiting areas. They provide a space for riders that are waiting for a bus to arrive and should maintain a clear pedestrian pathway through the waiting areas at the bus stop to the boarding area.

Figure 6.5-1. Basic Stop





Plan View with amenity zone/planter strip



Plan View without amenity zone/planter strip

A basic stop is generally installed in locations with low ridership (fewer than 50 daily boardings within the city of Seattle and fewer than 25 daily boardings outside the city of Seattle). Passenger amenities are very limited and include a bus stop flag, a landing pad or clear area, and where possible, lighting. A bench may be installed if there are sufficient daily boardings or pursuant to special request. In areas with significant physical constraints, a basic stop may be the only option for a stop.

CRITICAL

1. A bus stop sign must be installed at the head of the bus stop.
2. An ADA accessible landing pad or clear area is required at the head of the bus stop in the location of the front door of the bus.
3. A bus ramp must be deployable at the front landing pad/ clear area.
4. All vertical features, such as sign posts, must be 3′ 0″ from the curb face or area where buses stop to load passengers.
5. 10′ 0″ of separation is provided from allowed on-street parking.

- The bus stop must be long enough to accommodate the number and types of buses utilizing it.

PREFERRED

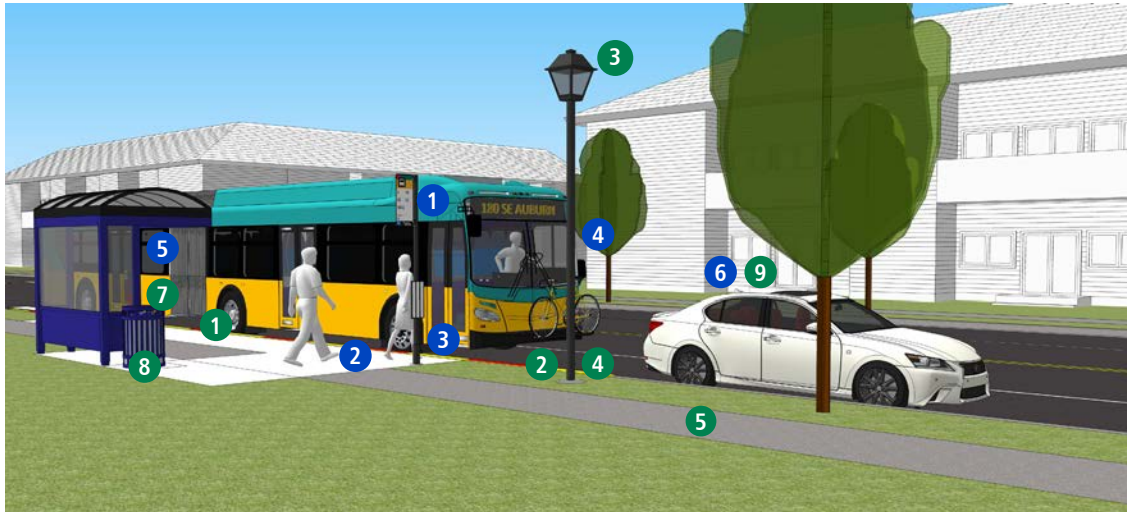
1. The landing pad area is a continuous concrete pad (48′ long) without trees or landscaping.
2. The bus stop has a curb and sidewalk and the curb is painted red and yellow to indicate the bus stop.
3. The bus stop is externally lit, either by street lighting or pedestrian-scale lighting.
4. An amenity zone/planter strip is located between the curb and the sidewalk provide space for landing pads and minimize conflicts between boarding/alighting riders and pedestrians
5. Access to bus stops is provided via ADA-accessible pedestrian facilities, such as sidewalks or paths.
6. 20′ of separation is provided from allowed on-street parking.

VARIATION

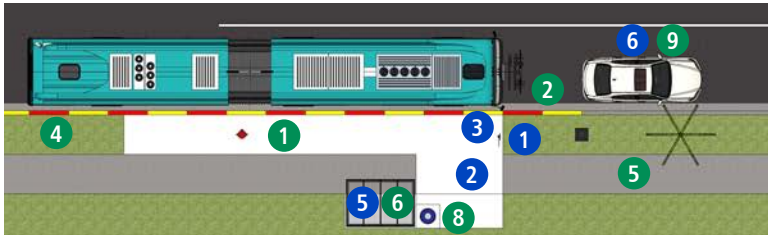
1. There is no amenity zone between the curb and sidewalk.

- Landing pads can be separated by trees or landscaping (see Figure 5.1-2).
- A bus stop may have only two landing pads in areas where a 60′ articulated bus is not expected to provide service.
- A bench may be installed if ridership thresholds are met or pursuant to special request.

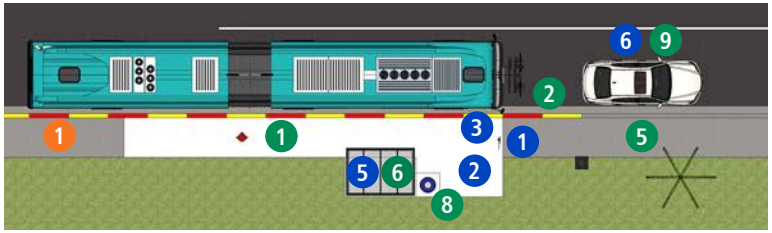
Figure 6.5-2. Basic Stop with Shelter



A basic stop with a shelter includes a shelter, a bus stop flag, a landing pad or clear area, lighting, and a litter receptacle. This type of stop generally has 50 or more daily boardings within the city of Seattle or 25 or more daily boardings outside the city of Seattle.



Plan View with amenity zone/planter strip



Plan View without amenity zone/planter strip

CRITICAL

1. A bus stop sign must be installed at the head of the bus stop.
2. An ADA-accessible landing pad or clear area is required at the head of the bus stop in the location of the front door of the bus.
3. A bus ramp must be deployable at the front door landing pad/clear area.
4. All vertical features, such as sign posts, should be 3′ 0″ from the curb face or area where buses stop to load passengers.
5. A shelter with a bench is installed. Shelter roofs must maintain a vertical clearance of 7′0″.
6. 10′ 0″ of separation is provided from allowed on-street parking.

- The bus stop must be long enough to accommodate the number and types of buses utilizing it.

PREFERRED

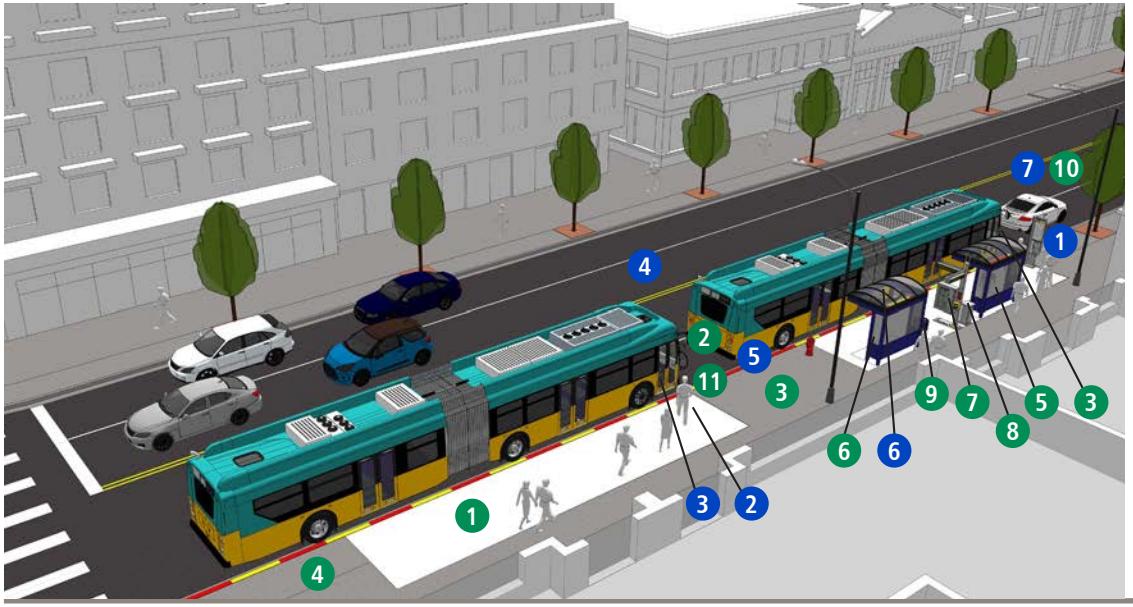
1. Landing pads are continuous concrete pads (48′ long) immediately adjacent to the curb, without trees or landscaping.
2. The bus stop has a curb and sidewalk and the curb is painted red and yellow to indicate the bus stop.
3. The bus stop is lit with internal shelter lighting as well as street lighting or pedestrian-scale lighting.
4. An amenity zone/planter strip is located between the curb and the sidewalk that provides space for landing pads and minimizes conflicts between boarding/alighting riders and pedestrians.
5. Access to bus stops is provided via ADA-accessible pedestrian facilities, such as sidewalks or paths.
6. Bus shelter is placed behind the sidewalk to maintain a clear walkway for pedestrians.
7. Shelters are installed open to the sidewalk and landing pads.
8. Litter receptacle is placed near the shelter to provide easy access for waiting passengers.
9. 20′ of separation is provided from allowed on-street parking.

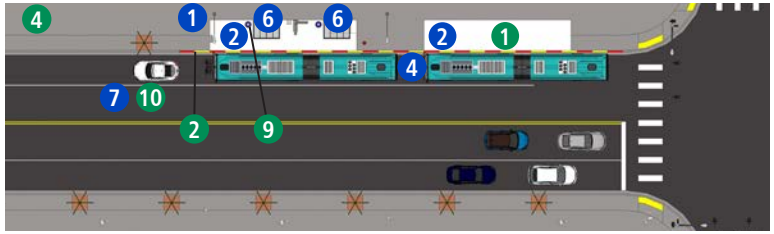
VARIATION

1. There is no amenity zone between the curb and sidewalk.

- Landing pads can be separated by trees or landscaping (see Figure 5.1-2).
- Bus stop may have only two landing pads in areas where a 60′ articulated bus is not expected to provide service.
- Shelter design and size will be determined based upon available space and daily boardings.
- The front door landing pad may be partially located within the interior of the shelter, as long as it remains unobstructed and complies with ADA requirements.
- A bench may be installed instead of a shelter in locations with constraints such as limited right-of-way or slopes.
- Shelters may be placed reverse to the curb

Figure 6.5-3. Transit Hub





A transit hub is located in areas with high ridership and served by more than one bus route. They typically consist of 4-6 adjacent bus stops where passengers are likely to transfer between routes. Transit hubs are typically located in areas such as central business districts and commercial areas. They are often located at a planned or existing Link light rail station, Sound Transit BRT station, or Sounder station. Figure 6.5-3a displays the transit hub at the University of Washington Link light rail station.

Passenger amenities at transit hub stops include shelters, a real time information sign, a bus stop flag, a landing pad or clear area, lighting, and a litter receptacle(s). A transit hub bus stop is long enough to accommodate at least two buses at a time, as it is likely to serve multiple routes. A transit hub stop may include a combination of RapidRide and non-RapidRide stops.

CRITICAL

1. A single bus stop sign must be installed at the head of the bus stop.
2. An ADA-accessible landing pad or clear area is required at the head of the bus stop in the location of the front door of the bus and to the shelter.
3. A bus ramp must be deployable at the front door landing pad/clear area.
4. 10′ of space is required between buses to allow for buses to maneuver out of spaces independent of the front bus.
5. All vertical features, such as sign posts, should be 3′0″ from the curb face or area where buses stop to load passengers.
6. Shelters with benches are installed. Shelter roofs must maintain a vertical clearance of 7′0″.
7. 10′ 0″ of separation is provided from allowed on-street parking.

❖ The bus stop must be long enough to accommodate the number and types of buses utilizing it.

PREFERRED

1. Landing pads are continuous concrete pads (48 feet long) immediately adjacent to the curb, without trees or landscaping.
2. The bus stop has a curb and sidewalk and the curb is painted red and yellow to indicate the bus stop.
3. The bus stop is lit with internal shelter lighting as well as street lighting or pedestrian-scale lighting.
4. Access to bus stops is provided via ADA-accessible pedestrian facilities, such as sidewalks or paths.
5. Bus shelters are placed between the landing pads and the sidewalk to minimize conflicts between passengers boarding and deboarding buses and pedestrians on the sidewalk.
6. Shelters are installed open to the sidewalk and landing pads.
7. RTIS is placed near the head of the bus stop.
8. A power pedestal is installed near the RTIS.
9. Litter receptacle is placed near the shelter to provide easy access for waiting passengers.
10. 20′ of separation is provided from allowed on-street parking.

❖ Wayfinding to help passengers connect between bus stops, light rail stations, and other areas within the hub, such as taxi or kiss-and-ride loading areas.

VARIATION

- ❖ Landing pads can be separated by trees or landscaping.
- ❖ A bus stop sign must be installed at the head of each bus bay if buses are assigned to specific bays.
- ❖ The front door landing pad may be partially located within the interior of the shelter, as long as it remains unobstructed and complies with ADA requirements.
- ❖ Shelters may be placed reverse to the curb.
- ❖ Short- and/or long-term bicycle parking.

Figure 6.5-3a. Transit Hub at the University of Washington Link Light Rail Station

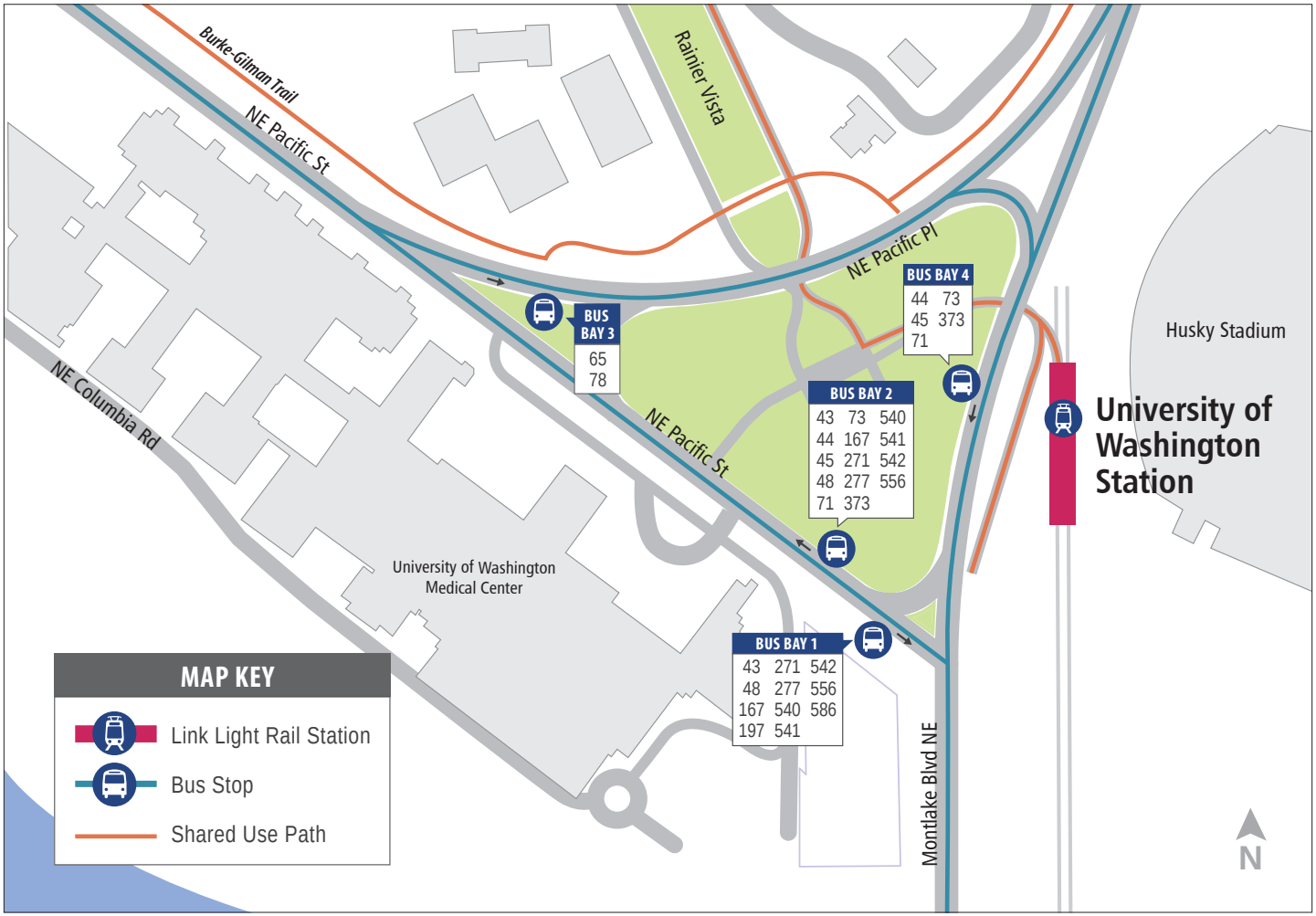
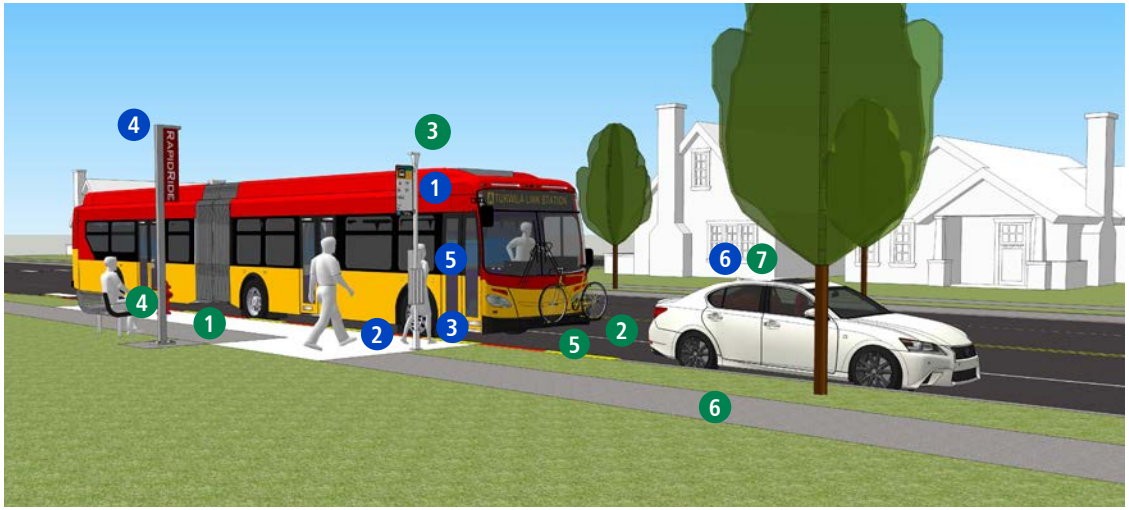
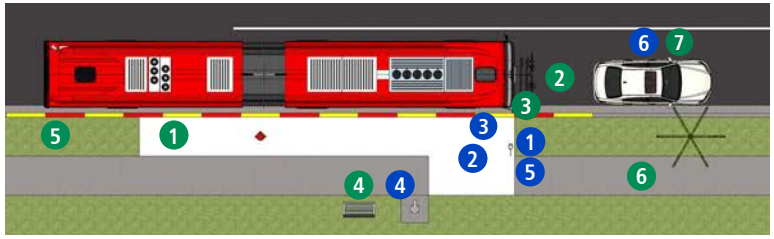
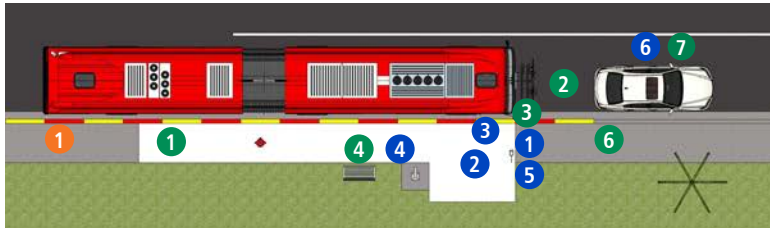


Figure 6.5-4. RapidRide Standard Stop





Plan View with amenity zone/planter strip



Plan View without amenity zone/planter strip

A RapidRide standard stop is generally installed in locations with fewer than 50 daily boardings. Passenger amenities are very limited and include a bus stop flag, a landing pad or clear area, a bench, a RapidRide blade marker, and, where possible, lighting. In areas with significant physical constraints, a RapidRide standard stop may be the only option for a stop.

CRITICAL

1. A bus stop sign must be installed at the head of the bus stop.
2. An ADA-accessible landing pad or clear area is required at the head of the bus stop in the location of the front door of the bus and to the shelter.
3. A bus ramp must be deployable at the front door landing pad/clear area.
4. A RapidRide blade marker must be installed at the bus stop.
5. All vertical features, such as sign posts, should be 3'0" from the curb face or area where buses stop to load passengers.
6. 10' 0" of separation is provided from allowed on-street parking.

❖ The bus stop must be long enough to accommodate the number and types of buses.

PREFERRED

1. Landing pads are continuous concrete pads (48' long) immediately adjacent to the curb, without trees or landscaping.
2. The bus stop has a curb and sidewalk and the curb is painted red and yellow to indicate the bus stop.
3. The bus stop is lit with street lighting or pedestrian-scale lighting.
4. A bench is installed at the bus stop.
5. An amenity zone/planter strip is located between the curb and the sidewalk that provides space for landing pads and minimizes conflicts between boarding/alighting riders and pedestrians.
6. Access to bus stops is provided via ADA-accessible pedestrian facilities, such as sidewalks or paths.
7. 20' 0" of separation is provided from allowed on-street parking utilizing it.

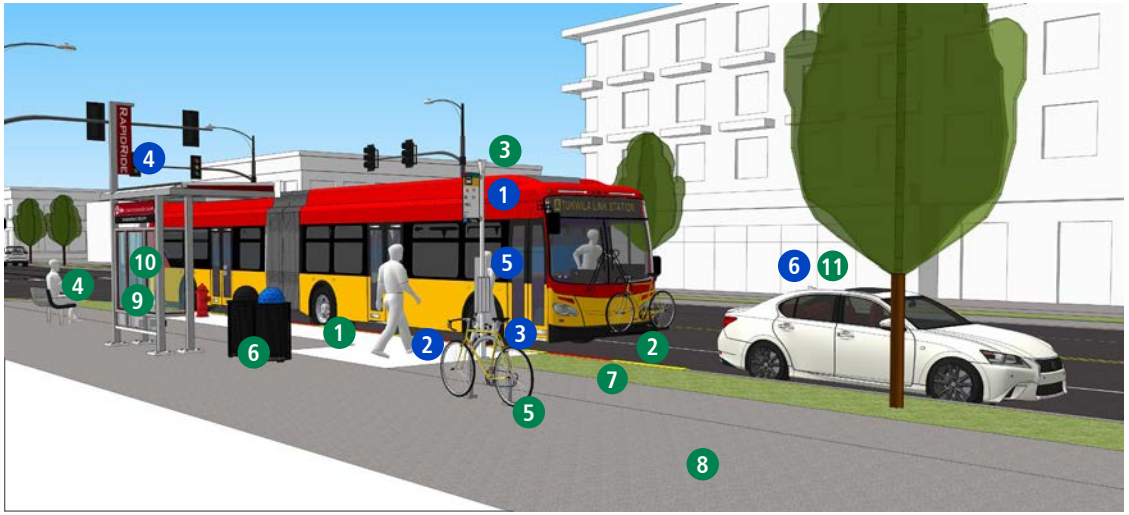
❖ Curbs and landing pads/clear areas should be raised a close as possible to the level of the bus floor, as described in Section 5.3.4.

VARIATION

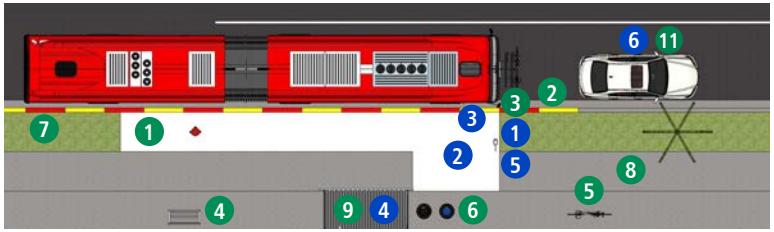
1. There is no amenity zone between the curb and sidewalk.

❖ Landing pads can be separated by trees or landscaping (see Figure 5.1-2).

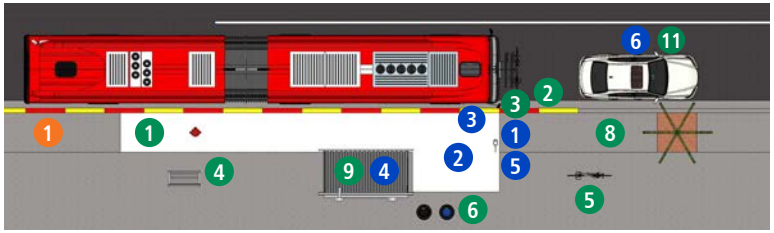
Figure 6.5-5. RapidRide Enhanced Stop



A RapidRide enhanced stop includes a RapidRide shelter, a bus stop flag, a landing pad or clear area, lighting, and a litter receptacle. This type of stop generally has 50 to 149 daily boardings.



Plan View with amenity zone/planter strip



Plan View without amenity zone/planter strip

CRITICAL

1. A bus stop sign must be installed at the head of the bus stop.
2. An ADA-accessible landing pad or clear area is required at the head of the bus stop in the location of the front door of the bus and to the shelter.
3. A bus ramp must be deployable at the front door landing pad/clear area.
4. A shelter with a bench is installed at the bus stop. Shelter roofs must maintain a vertical clearance of 7′0″.
5. All vertical features, such as sign posts, should be 3′ 0″ from the curb face or area where buses stop to load passengers.
6. 10′ 0″ of separation is provided from allowed on-street parking.

- The bus stop must be long enough to accommodate the number and types of buses utilizing it.

PREFERRED

1. Landing pad area is a continuous concrete pad (48 feet long) without trees or landscaping.
2. The bus stop has a curb and sidewalk and the curb is painted red and yellow to indicate the bus stop.
3. The bus stop is lit with internal shelter lighting as well as street lighting or pedestrian-scale lighting.
4. An additional bench is installed at the bus stop.
5. A bicycle hoop is installed at the bus stop.
6. A litter receptacle is placed near the shelter to provide easy access for waiting passengers.
7. An amenity zone/planter strip is located between the curb and the sidewalk that provides space for landing pads and minimizes conflicts between boarding and alighting riders and pedestrians.
8. Access to bus stops is provided via ADA-accessible pedestrian facilities, such as sidewalks or paths.
9. Bus shelter is placed behind the sidewalk to maintain a clear walkway for pedestrians.
10. Shelters are installed open to the sidewalk and landing pad.
11. 20′ 0″ of separation is provided from allowed on-street parking.

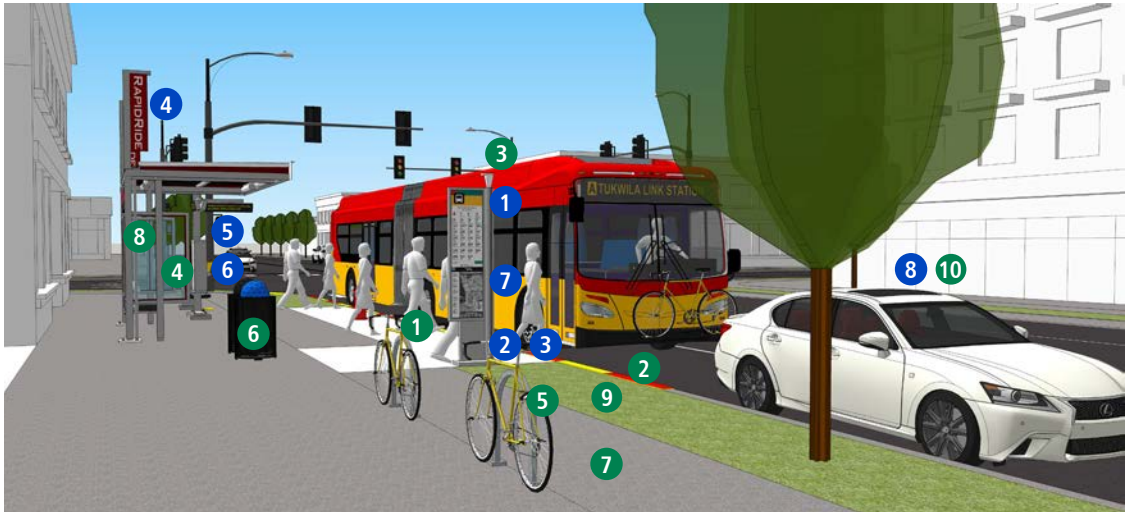
- Curbs and landing pads/clear areas should be raised as close as possible to the level of the bus floor, as described in Section 5.3.4.

VARIATION

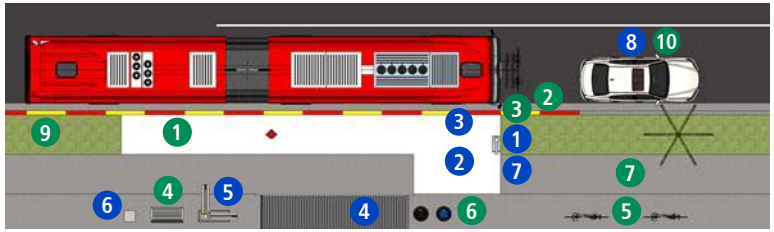
1. There is no amenity zone between the curb and sidewalk.

- Landing pads can be separated by trees or landscaping (see Figure 5.1-2).
- Shelter design and size will be determined based upon available space and daily boardings.
- The front door landing pad may be partially located within the interior of the shelter, as long as it remains unobstructed and complies with ADA requirements.

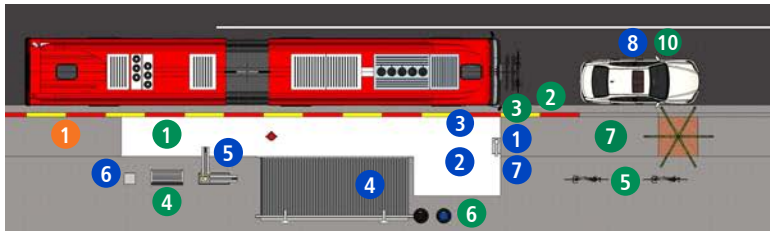
Figure 6.5-6. RapidRide Station



A RapidRide station includes a RapidRide shelter, a bus stop flag, a landing pad or clear area, a tech pylon with an ORCA card reader and route map, a real time information sign, lighting, and a litter receptacle. This type of stop generally has more than 150 daily boardings.



Plan View with amenity zone/planter strip



Plan View without amenity zone/planter strip

CRITICAL

1. A bus stop sign must be installed at the head of the station.
2. An ADA-accessible landing pad or clear area is required at the head of the station in the location of the front door of the bus and to the shelter.
3. A bus ramp must be deployable at the front door landing pad/clear area.
4. A shelter with a bench is installed at the station. Shelter roofs must maintain a vertical clearance of 7′0″.
5. A tech pylon is installed at the station.
6. A power pedestal is installed between the power source and the bus stop.
7. All vertical features, such as sign posts, should be 3′0″ from the curb face or area where buses stop to load passengers.
8. 10′ 0″ of separation is provided from allowed on-street parking.

❖ The station must be long enough to accommodate the number and types of buses utilizing it.

PREFERRED

1. Landing pads are continuous concrete pads (48 feet long) immediately adjacent to the curb, without trees or landscaping.
2. The station has a curb and sidewalk and the curb is painted red and yellow to indicate the bus stop.
3. The station is lit with internal shelter lighting as well as street lighting or pedestrian-scale lighting.
4. An additional bench is installed at the station.
5. Bicycle hoops are installed at the station.
6. A litter receptacle is placed near the shelter to provide easy access for waiting passengers.
7. Access to stations is provided via ADA-accessible pedestrian facilities, such as sidewalks or paths.
8. Shelters are installed open to the sidewalk and landing pads.
9. An amenity zone/planter strip is located between the curb and the sidewalk that provides space for landing pads and minimizes conflicts between boarding and alighting riders and pedestrians.
10. 20′ 0″ of separation is provided from allowed on-street parking.

❖ Curbs and landing pads/clear areas should be raised as close as possible to the level of the bus floor, as described in Section 5.3.4.

VARIATION

1. There is no amenity zone between the curb and sidewalk.

❖ Landing pads can be separated by trees or landscaping.

❖ The front door landing pad may be partially located within the interior of the shelter, as long as it remains unobstructed and complies with ADA requirements.

GLOSSARY

Americans with Disabilities Act (ADA):
A civil rights law that prohibits discrimination against individuals with disabilities in all areas of public life, including jobs, schools, transportation, and all public and private places that are open to the general public.

Awning:
A roof-like cover extending over or in front of a place as a shelter.

Bus:
A rubber-tired passenger transportation vehicle designed for carrying more than 10 persons. Also referred to as a "coach."

Bus Bulb:
A curb extension that aligns the transit stop with the parking lane, allowing for an in-lane stop.

Bus Ramp:
A ramp deployed from a bus to reduce the vertical height needed to board the bus and help facilitate boarding and alighting for persons using mobility aids or those with difficulty climbing steps.

Bus Stop:
An on-street location where transit vehicles stop to load and unload passengers. Also referred to as "bus zone" when describing Zone Improvement Projects (ZIPs) and Zone Improvements by Others (ZIBOs).

Bus Stop Sign:
A sign posted at the head of a bus stop indicating the location for an operator to stop a bus to load and unload passengers.

Clear Area:
A location, generally constructed of compacted gravel or similar material, where passengers board and alight from buses.

Crime Prevention Through Environmental Design (CPTED):
A multi-disciplinary approach to deterring criminal behavior through environmental design that focuses on characteristics of the built, social, and administrative environments to influence offender decisions that precede deviant activity or criminal acts; therefore, deterring these activities.

Comfort Station:
Restrooms established for operator use containing toilet and hand-washing facilities.

Curb:
A rim, generally of concrete or asphalt, along a street or roadway, forming part of a gutter.

Dependent Operation:
Bus operation at stops that require the first bus in the queue to depart in order for the next bus in the queue to pull forward.

Far-Side Stop:
A bus stop located immediately following an intersection.

Fixed Object:
An item that is fastened, attached, or placed so as to be firm and not readily movable.

Guardrail:
A protective railing along a roadway, sidewalk, transit island, or raised landing pad.

Independent Operation:
Bus operation at stops that allows for operation of multiple buses without reliance on the operation of any bus at the stop or within a queue.

Landing Pad:
A location, generally constructed of concrete, asphalt, or similar material, where passengers board and alight from buses.

Layover:
The time allotted between scheduled trips for various purposes, either for a driver break, schedule recovery time, or at a time point within a trip.

Layover Facility:
A location, outside of a traffic lane, approved by a local jurisdiction to stop a bus for a layover.

Leaning Rail:
A structure that provides a resting opportunity for passengers at a bus stop.

Mid-Block Stop:
A bus stop located between intersections that is not a far-side or near-side stop.

Near-Side Stop:
A bus stop located immediately before an intersection.

Off-Board Fare Collection:
An electronic ORCA card reader that allows passengers to pay a bus fare prior to boarding the bus.

Operator:
An individual responsible for driving a Metro transit vehicle. Also referred to as "driver."

ORCA Card:
Acronym for One Regional Card for All. A cashless fare payment mechanism used by eight transit agencies in the Puget Sound Region.

Passenger:
An individual who rides a transit vehicle. Also referred to as "rider."

Pulse:
A form of scheduling that ensures that all routes with coordinated schedules converge at a common point with a brief layover, to allow for transfers between any of the routes.

Raised Landing Pad:
A free-standing landing pad resembling a small section of sidewalk constructed to provide a space that provides improved accessibility and closer to level boarding on low-floor buses.

RapidRide:
Bus rapid transit service provided by King County Metro.

Real Time Information Signs (RTIS):
Signs that provide information to riders about transit operations including, but not limited to, arrival of the next bus, service delays, and Metro contact information.

Regular Stop:
A bus stop used for boarding and deboarding passengers.

Regular/Layover Stop:
A bus stop used for boarding and deboarding passengers as well as operator layover.

Right-of-way:
A type of easement granted or reserved over the land for transportation purposes.

Shelter:
A covered area at bus stops installed for passengers to use while waiting for a bus.

Sight Distance:
The length of roadway visible to an operator.

Standard Bus Stop:
A King County Metro bus stop that is not a RapidRide stop.

Standard Design and Construction Drawings:
Design and construction drawings for Metro's transit facilities including, but not limited to, architectural, construction, civil, and structural plans.

Stopping Sight Distance:
The distance needed for an operator to stop a vehicle traveling at design speed based on design conditions.

Transit Signal Priority:
An alteration to traffic signal timing in response to a request from a bus so that the bus experiences no delay or reduced delay passing through an intersection.

Transit Speed and Reliability Treatments:
Traffic control and infrastructure improvements that improve the ability of transit vehicles to move along their routes in a reasonable amount of time and arrive at stops at predictable times.

Trolley Bus:
A bus that is electrically powered and draws its power from a pair of overhead trolley wires.

Truncated Dome:
A detectable warning surface comprising small, flattened domes that provide a surface that is distinguishable underfoot and by walking cane by pedestrians with visual impairments.

Zone Improvements by Others (ZIBO):
A bus stop improvement project funded and developed by one or more external stakeholders including Cities, other transit agencies, and private developers.

Zone Improvement Project (ZIP):
A bus stop improvement project funded and developed by King County Metro.

APPENDIX A: REFERENCES

A1 WSDOT Design Manual – Transit Facilities (Division 14 – HOV and Transit)

http://www.wsdot.wa.gov/Publications/Manuals/M22-01.htm

The WSDOT Design Manual provides general siting and design information for transit facilities. They are intended for use by WSDOT engineering and planning staff, local transit providers, developers, and local agencies engaged in the collaborative development of transit facilities on or adjacent to state highways. They include:

- WSDOT's policy for developing bus stops on state highways
- Basic guidelines for development of park-and-ride lots
- Guidance on the development of transit/transfer centers
- Requirements addressing universal access at bus stops and shelters, park-and-ride lots, and transit centers
- Additional guidance and criteria for project design

A2 National Association of City Transportation Officials (NACTO) Urban Street Design Guide

https://nacto.org/publication/urban-street-design-guide/

The NACTO Urban Street Design Guide includes a toolbox and tactics applicable in the design of city streets, with an emphasis on making streets safer, more livable, and more economically vibrant.

A3 NACTO Transit Street Design Guide

https://nacto.org/publication/transit-street-design-guide/

The NACTO Transit Street Design Guide provides design guidance for the development of transit facilities on city streets and for the design and engineering of city streets to prioritize transit, improve transit service quality, and support other goals related to transit.

A4 Manual on Uniform Traffic Control Devices (MUTCD)

https://mutcd.fhwa.dot.gov/

The MUTCD contains the national standards governing all traffic control devices. By setting minimum standards and providing guidance, it ensures uniformity of traffic control devices across the nation.

A5 Americans with Disabilities (ADA) Act of 1990

https://www.ada.gov/

The ADA is broad legislation intended to make American society more accessible to people with disabilities. Titles II and III of the act affect bus stop planning, design, and construction. Revised regulations for Titles II and II are called the ADA Standards for Accessible Design.

A6 King County Metro Transit Speed and Reliability Guidelines and Strategies

http://kingcounty.gov/~/media/depts/transportation/metro/about/planning/speed-reliability-toolbox.pdf

The Speed and Reliability Guide and Toolbox is a guidance document developed by Metro to be used by the agency, local jurisdictions, and other stakeholders to improve the speed and reliability of transit service. It aims to refine and strengthen the partnerships Metro has built with local jurisdictions on speed and reliability improvements. The document also seeks to broaden the reach of transit partnerships to a wider range of local jurisdictions and provide a diversity of tools to implement speed and reliability improvements.
This guide:

- Defines speed and reliability and their benefits
- Introduces transit-supportive strategies that increase speed and reliability
- Establishes a framework for how Metro, local jurisdictions, and other agencies and stakeholders will work together to plan, design, implement, and monitor speed and reliability improvements
- Provides details on the benefits, tradeoffs, and implementation of specific speed and reliability strategies

A7 National Cooperative Highway Research Program (NCHRP) Reports

http://www.trb.org/NCHRP/NCHRP.aspx

The NCHRP addresses issues integral to the state Departments of Transportation (DOTs) and transportation professionals at all levels of government and the private sector. The NCHRP provides practical, ready-to-implement solutions to pressing problems facing the industry. The NCHRP publishes reports as a product of research projects. They are often written as guidebooks or manuals.

A8 American Association of State Highway and Transportation Officials (AASHTO) Guide for Geometric Design of Transit Facilities on Highways and Streets

https://bookstore.transportation.org/collection_detail.aspx?ID=133

This guide provides a comprehensive reference of current practice in the geometric design of transit facilities on streets and highways, including operations in mixed traffic, high-occupancy vehicle lanes, and bus-only facilities within street and freeway environments.

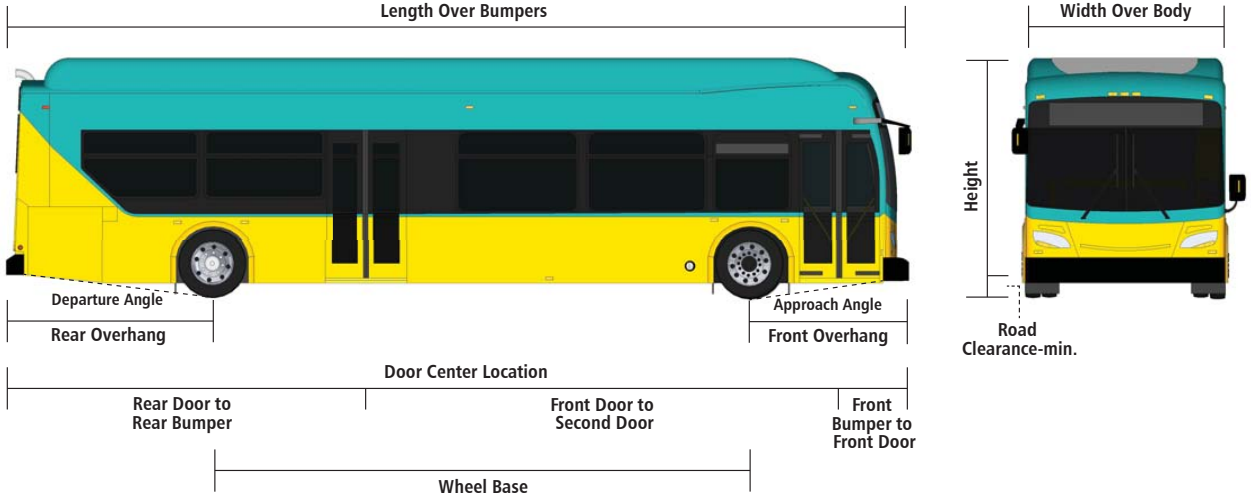
A9 AASHTO: A Policy on Geometric Design of Highways and Streets

https://bookstore.transportation.org/collection_detail.aspx?ID=110

This document provides guidance to highway engineers and designers who strive to make unique design solutions that meet the needs of highway users while maintaining the integrity of the environment. It is also intended as a comprehensive reference manual to assist in administrative, planning, and educational efforts pertaining to design formulation. Design guidelines are included for freeways, arterials, collectors, and local roads, in both urban and rural locations, paralleling the functional classification used in highway planning.

APPENDIX B: METRO BUS DESIGN SPECIFICATIONS

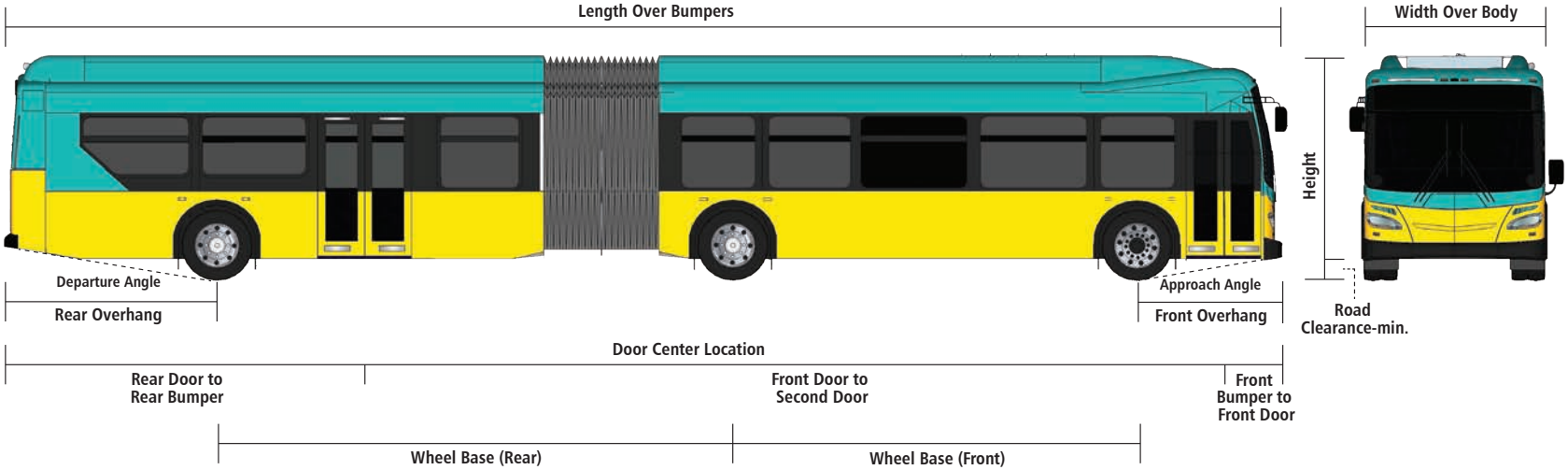
Figure B-1. 40-Foot Buses



Fleet Numbers	1100-1194	3185-3199	3200-3594	3600-3699	3700-3759	4100-4199	4300-4409	4601-3603	7001-7155; 7170-7199; 7156-7169 (UPA)	7200-7259	9000-9089	9200*
Year Built	1999-2000	1997	1996-97;1998-99	2003	2014	2001-2002	2015-2016	2016	2011	2014	1999; 2001	2003
Make	Gillig	Gillig	Gillig	New Flyer	New Flyer	Gillig	New Flyer	Proterra	Daimler	New Flyer	Gillig	New Flyer
Model	C18A096N4	M11-T35-102	M11-T40-102; C21D102N4	D40LF	XCELSIOR DE35LF	Trolley	XT40	XT40	40′ ORION VII Hybrid	XCELSIOR DE40LF	C21D102N4	DE40LF
Length Over Bumpers	31′ 6″	35′ 6″	40′ 9.5″	40′ 9.75″	36′ 3.0″	40′ 9.5″	41′	42′	41′ 3″	41′ 0″	40′ 9.5″	40′ 9.75″
Width Over Body	96″	102″	102″	102″	102″	102″	102″	120″	102″	102″	102″	102″
Height	118″	125″	125″	111″	133″	142″ (poles down)	140″	135″	132″	133″	125″	133″
Wheel Base	170″	219″	279″	293″	226.75″	279″	283.75″	295.″	286″	283.75″	279″	293″
Overhang												
Front	84.5″	89″	89″	84.12″	87.35″	89″	87.5″	103″	90.8″	87.35″	89″	84.12″
Rear	116″	119″	119″	112.89″	121″	119″	121″	113″	118″	121″	119″	112.89″
Road Clearance-min.	8.75″	8.75″	8.75″	7.75″	5.6″	?	5.6″	6″	6″	5.6″	8.75″	7.75″
Approach Angle	9°	9°	9°	9.01°	9°	9°	9°	8.7°	9.1°	9°	9°	9°
Departure Angle	10°	10°	9°	9.7°	9°	9°	9°	9°	9.1°	9°	10°	9.7°
Turning Radius-Body Corner	30′ 6″	35′ 11″	43′ 9″	45′ 3″	39′	43.9″	44′	41′11.5′	43.3″	44′	43′ 9″	45′ 3″
Door Center Location												
Front Bumper to Front Door	33″	28.5″	28.5″	36.76″	37.9″	28.5″	37.9″	?	41.5″	37.9″	28.5″	36.76″
Front Door to Second Door	---	207″	267″	254.03″	197″	267″	197″	?	250.2″	197″	267″	254.03″
Rear Door to Rear Bumper	345″**	184″	184″	199.20″	202.46″	184″	202.46″	?	203″	202.46″	184″	199.20″

* Sound Transit bus ** Front door to rear bumper

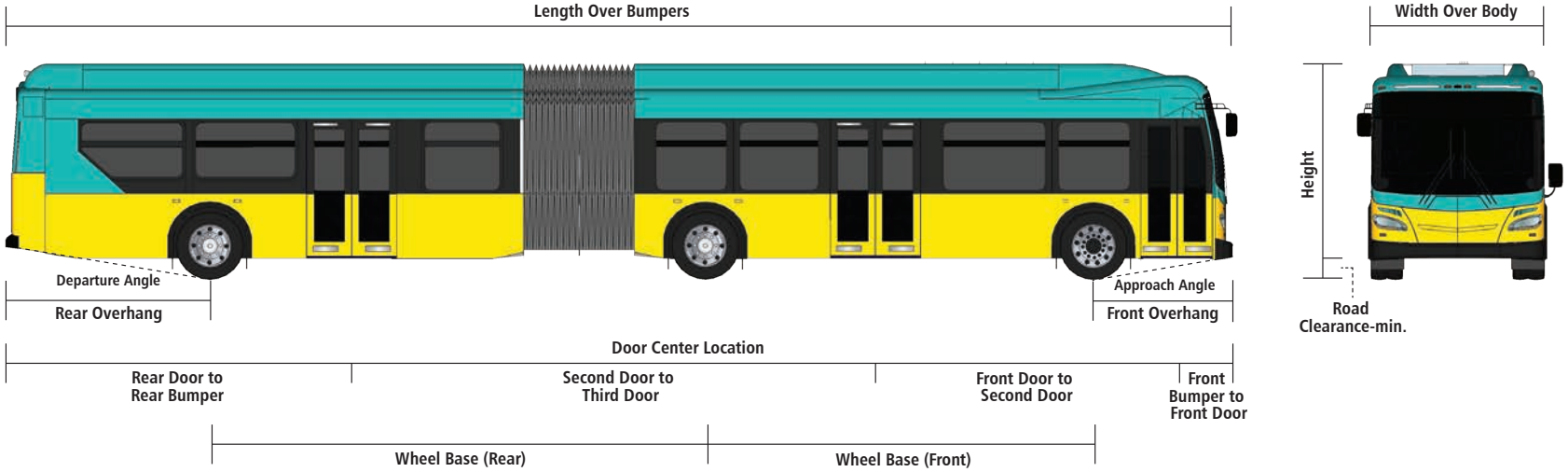
Figure B-2. 60-Foot, 2-Door Buses



Fleet Numbers	2300-2573	2599	2600-2812	2870-2899	4500-4569	6813-6834 (Built as 2813-2834); 6835-6850 (AWV); 6851-6864 (AWV); 6865-6921; 6922-6935 (UPA); 6936-6999+6800	9622-9623; 9624-9636; 9637-9647; 9584-9586; 9648-9651*	9500-9536	9537-9552	9600-9621	9652-9659	9800-9813*
Year Built	1998-2000	2002	2004	2004	2015; 2016	2008; 2008; 2009; 2011; 2011; 2012	2008; 2010; 2010; 2011	1999; 2000	2004	2004	2014	201X
Make	New Flyer	New Flyer	New Flyer	New Flyer	New Flyer	New Flyer	New Flyer	New Flyer	New Flyer	New Flyer	New Flyer	New Flyer
Model	D60HF	DE60LF	DE60LF	D60LF	XT60	DE60LF	D60LFR	D60LF	D60LF	DE60LF	D60LFR	D60LFR
Length Over Bumpers	61′ 1″	60′ 8.4″	60′ 8.4″	60′ 8.4″	60′ 10″	61′ 3″	61′ 6″	61′ 9.75″	61′ 8.4″	60′ 8.4″	61′ 6″	61′ 6″
Width Over Body	102″	102″	102″	102″	132″	102″	132″ (with mirrors)	102″	102″	102″	132″ (with mirrors)	132″ (with mirrors)
Height	138″	133″	133″	131″	130″	132″	132″	122″	122″	133″	132″	132″
Wheel Base	F: 208.38″ R: 309.25″	F: 228.22″ R: 302.77″	F: 228.22″ R: 302.77″	F: 228.22″ R: 302.77″	F: 229.2″ R: 292.8″	F: 228.5″ R: 302.9″	F: 228.22″ R: 302.77″	F: 228.19″ R: 306.35″	F: 228.22″ R: 302.77″	F: 228.22″ R: 302.77″	F: 229.22″ R: 292.8″	F: 228.22″ R: 302.77″
Overhang												
Front	91.7″	84.13″	84.13″	84.13″	87.5″	83.98″	83.98″	84″	84.13 ″	84.13″	83.98″	83.98″
Rear	124.1″	112.87″	112.87″	112.87″	121″	119.8″	119.8″	109.8″	112.87″	112.87″	119.8″	119.8″
Road Clearance-min.	6″	6″	5″	5″	5.6″	5.42″	5.42″	5″	5″	5″	5.42″	5.42″
Approach Angle	9.7º	9º	9º	9º	9º	9º	9º	9º	9º	9º	9º	9º
Departure Angle	9.1º	9.1º	9.1º	9.1º	9º	9º	8.76º	9º	9.1º	9.1º	9º	9º
Turning Radius-Body Corner	40′ 8″	42′ 6″	42′ 6″	42′ 6″	44″	38′ 5.6″	38′ 5.6″	43″	42′ 6″	42′ 6″	44″	38′ 5.6″
Door Center Location												
Front Bumper to Front Door	40.5″	39.5″	39.5″	39.5″	?	36.8″	Not Available	39.5″	39.5″	39.5″	39″	Not Available
Front Door to Second Door	494″	479″	479″	479″	?	486.8″	Not Available	478.61″	479″	479″	184″	Not Available
Rear Door to Rear Bumper	198.5″	208″	208″	208″	?	211.4″	Not Available	208.26″	208″	208″	216″	Not Available

* Sound Transit buses

Figure B-3. 60-Foot, 3-Door Buses



Fleet Numbers	6000-6049 (BRT)	6020-6035 (BRT); 6040-6073 (BRT); 6075-6107; 6108-6117 (BRT)	6200-6219; 8000-8084	9814
Year Built	2009	2011; 2012; 2013; 2013	2016	2016
Make	New Flyer	New Flyer	New Flyer	New Flyer
Model	DE60LFA	DE60LFR+	XDE60	XD60
Length Over Bumpers	63′ 1″	61′ 8″	61′ 8″	61′ 8″
Width Over Body	102″	102″	102″	102″
Height	132″	132″	132″	132″
Wheel Base	F: 228.5″	F: 228.5″	F: 228.5″	F: 228.5″
	R: 302.9″	R: 302.9″	R: 302.9″	R: 302.9″
Overhang				
Front	83.98″	83.98″	83.98″	83.98″
Rear	119.8″	119.8″	119.8″	119.8″
Road Clearance-min.	5.42″	5.42″	5.42″	5.42″
Approach Angle	9º	9º	9º	9º
Departure Angle	9º	9º	9º	9º
Turning Radius-Body Corner	38′ 5.6″	38′ 5.6″	38′ 5.6″	38′ 5.6″
Door Center Location				
Front Bumper to Front Door	39″	39″	39″	39″
Front Door to Second Door	184″	184″	184″	184″
Second Door to Third Door	216″	216″	216″	216″
Rear Door to Rear Bumper	215″	215″	215″	215″

APPENDIX C: LINKS TO STANDARD PLANS

Landing Pads and Clear Areas:
ftp://ftp.kingcounty.gov/dcs/Standards/PassFac/Construction/D108.pdf

Sign Footing Details:
ftp://ftp.kingcounty.gov/dcs/Standards/PassFac/Construction/D104A.pdf

RapidRide Blade Marker Footing and Foundation Details and Sections:
ftp://ftp.kingcounty.gov/dcs/Standards/PassFac/Construction/D102.pdf

Tech Pylon Footing and Foundation Details and Sections:
ftp://ftp.kingcounty.gov/dcs/Standards/PassFac/Construction/D102.pdf

Curbs:
ftp://ftp.kingcounty.gov/dcs/Standards/PassFac/Construction/D108.pdf

Shelter Architectural Drawings:
http://www.kingcounty.gov/depts/transportation/metro/design-construction-standards/passenger-facilities/architecture.aspx

Shelter Construction Plans:
http://www.kingcounty.gov/depts/transportation/metro/design-construction-standards/passenger-facilities/construction.aspx

Shelter Structural Drawings:
http://www.kingcounty.gov/depts/transportation/metro/design-construction-standards/passenger-facilities/structure.aspx

RapidRide Shelter Standards:
http://www.kingcounty.gov/~/media/depts/transportation/metro/design-construction-standards/passenger-facilities/RapidRide_C-D-E_Lines_Standards.ashx?la=en

Bus Zone Light Pole Foundation:
ftp://ftp.kingcounty.gov/dcs/Standards/PassFac/Construction/D107.pdf

Internal Solar Shelter Lighting Electrical Details:
ftp://ftp.kingcounty.gov/dcs/Standards/PassFac/Construction/D111.pdf

Handhole Conduit Details – Standard Shelter:
ftp://ftp.kingcounty.gov/dcs/Standards/PassFac/Construction/D112.pdf

Poulsen Light Pole Foundation:
http://www.kingcounty.gov/~/media/depts/transportation/metro/design-construction-standards/passenger-facilities/RapidRide_C-D-E_Lines_Standards.ashx?la=en; Page D-107

Pedestrian Guardrail Detail:
ftp://ftp.kingcounty.gov/dcs/Standards/PassFac/Construction/D107.pdf

APPENDIX D: CUSTOM SHELTERS

In some circumstances, a property owner adjacent to an existing or future bus zone may elect to provide a custom bus shelter instead of a standard or RapidRide shelter. This may occur when property owners want the adjacent shelter to have the same look and feel of their building or reflect the planned land use. Custom shelter projects are reviewed and approved by Metro staff on a case-by-case basis.

A bus stop with a custom shelter must provide all elements specified in Chapter 5 of these guidelines.

D.1 Custom Shelter Design

D.1.1 Custom shelters must provide roof, back, and side weather coverage similar in dimension to standard or RapidRide shelters, as described in Section 5.4, consistent with what Metro would provide at the same bus stop.

D.1.2 Custom shelters must meet all structural load requirements in the International Building Code. They must also be able to accommodate a separate loading condition of an additional 300 pounds, added to the dead load at the worst case location on the custom shelter. This accounts for the possibility of a person sitting on top of or hanging onto a shelter.

D.1.3 Custom shelters must be internally lit, either with hard-wired infrastructure or via solar power. Each custom shelter must include the same level of interior lighting as a standard Metro shelter. Refer to Section 5.7 for more information on lighting and power.

D.1.4 Custom shelters must include benches and/or leaning rails, consistent with what Metro would provide at the same location. Refer to Sections 5.6 and 5.11 for additional information on benches and leaning rails, respectively.

D.2 Custom Shelter Construction and Maintenance

D.2.1 Custom shelter construction, including construction of footings, is the responsibility of the party requesting and installing the shelter.

D.2.2 All applicable permits related to construction of custom shelters, including traffic control plans, are the responsibility of the party requesting and installing the shelter.

D.2.3 Custom shelter maintenance and liability are the responsibility of the party requesting and installing the shelter.

D.2.4 Custom shelter design and construction are subject to review by Metro planners and engineers.

Custom Shelter at NE Campus Pkwy and 12th Ave NE