Chapter 1430 Transit Facilities

1430.01 General
1430.02 Bus Stops and Pullouts
1430.03 Passenger Amenities
1430.04 Park and Ride Lots
1430.05 Transfer/Transit Centers
1430.06 Roadway and Intersection Design
1430.07 Documentation
1430.08 References

1430.01 General

This chapter provides general siting and design information for transit facilities. It is intended for Washington State Department of Transportation (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.

The main points covered in this chapter are:

- **Bus Stop Policy:** WSDOT's policy for developing bus stops on state highways is presented. The policy calls for WSDOT and the transit provider to work together to locate stops on state highways. Bus stop placement considerations are also provided.
- **Park and Ride Lots:** Basic guidelines for development of park and ride lots are presented.
- **Transit/Transfer Centers:** Guidance on these centers is provided. Guidance in the Park and Ride section may apply as well.
- **Universal Access:** The requirements of the Americans with Disabilities Act (ADA) apply to bus stops and shelters, park and ride lots, and transit centers. This information is presented in various sections of the chapter, with additional references provided.
- **Tools and Resources:** Additional guidance and criteria are recommended and referenced, such as: other chapters in the *Design Manual* for designing intersections and road approaches; the *Roadside Manual* for parking lot design; the local transit authority's own standards; and AASHTO.

The design and planning information that follows supports the development of public transit infrastructure and services on state highways.

***Design Manual* topics and chapters commonly used in conjunction with this chapter include:**

- Right of way and access control: Chapters 510 through 560.
- Intersections and road approaches: Chapters 1300 through 1370.
- Americans with Disabilities Act (ADA) and sidewalk design: Chapter 1510.
- High-occupancy vehicle (HOV) facilities: Chapters 1410 and 1420.

1430.02 Bus Stops and Pullouts

WSDOT's Modal Integration Goal seeks to optimize existing system capacity through better interconnectivity of all transportation modes. In support of this goal, WSDOT promotes safe and efficient public transportation services on state highways, including transit routes and stops.

On limited access facilities, bus stops are only allowed at designated locations, such as flyer stops. (See Chapters 520, 530, and 540 for access control policy and guidance.)

Bus stops may be approved on non-limited access facilities at the transit agency's request and upon formal review by WSDOT for sight distance and universal access requirements at the proposed location. At a transit agency's option, a bus stop on these highways may be located either within the travel lane, or outside the travel lane in a pullout. Contact the State Traffic Engineer for information on how to process a transit agency proposal for either an in-lane or pullout bus stop and for more information about the approval process.

Refer to WAC 468-46, Transit Vehicle Stop Zones, for additional details.

The bus stop is the point of contact between the passenger and the transit services. The simplest bus stop is a location by the side of the road. The highest quality bus stop is an area that provides passenger amenities and protection from the weather. Bus stops are typically maintained by the transit agency. The bus boarding and alighting pad, the path to the shelter, and the area within the shelter must meet the requirements for universal access. Coordinate with the local transit agency regarding the location and what type of bus stop to use.

For additional information on bus stop treatments, see *Understanding Flexibility in Transportation Design – Washington* and the transit agency's standards for treatment.

1430.02(1) Bus Stop Placement Guidelines

The information in this section is offered as an example of good practice, and is not intended to be binding by either the transit agency or WSDOT.

Placement of bus stops addresses the needs and convenience of transit providers, riders, and highway or street operations. Basic considerations include:

- The need for safe, secure, and convenient service for patrons
- Access for people with disabilities
- Convenient passenger transfers to other intersecting bus routes or transfer points
- Connection to nearby pedestrian circulation systems
- Presence and width of sidewalks, crosswalks, and curb ramps
- Pedestrian activity through intersections
- Ability of the stop to accommodate transit dwell time and the loading/unloading of wheel chairs and bicycles
- Adequate curb space for the number of buses expected at the stop at one time
- Ease of reentering traffic stream (if a pullout)
- Design characteristics and operational considerations of the highway or street
- Presence of on-street automobile parking and truck delivery zones
- Traffic control devices near the bus stop, such as signals or stop signs
- Volumes and turning movements of other traffic, including bicycles

- Proximity and traffic volumes of nearby driveways
- Street grade
- Proximity to rail crossings
- Accommodating transit priority equipment at signalized intersections
- Transit queue bypass at signalized intersections
- Often stops are paired on each side of a highway or street
- Proximity to intersections

Where blocks are exceptionally long or where bus patrons are concentrated well away from intersections, midblock bus stops and midblock crosswalks may be beneficial. Contact the Region Traffic Engineer when a midblock bus stop is being considered on a multilane roadway to determine crossing design details and treatments that may be required. (See Chapter 1510 and the *Traffic Manual* for more information on midblock crossings.)

It is common to clearly mark the bus stop as a NO PARKING zone or as a BUS ONLY zone with signs and/or curb painting.

The remainder of this section discusses three types of bus stops:

- Far-side, with a stop located just past an intersection
- Near-side, with a stop located just prior to an intersection
- Midblock, with a stop located away from an intersection

Exhibit 1430-1 illustrates these three types of stops and provides some general dimensions. Consult the AASHTO *Guide for Geometric Design of Transit Facilities on Highways and Streets* for additional guidelines on bus stop spacing, including information on these types of stops.

Examine each case separately and determine the most suitable location, giving consideration to service and safety of patrons, efficiency of transit operations, and traffic operation in general.

1430.02(1)(a) Far-Side Bus Stops

Sight distance conditions generally favor far-side bus stops, especially at unsignalized intersections. A driver approaching a cross street on the through lanes can see any vehicles approaching from the right. With near-side stops, the view to the right may be blocked by a stopped bus. Where the intersection is signalized, the bus may block the view of one of the signal heads.

Advantages:

- Right turns can be accommodated with less conflict.
- Minimum interference is caused at locations where traffic is heavier on the approach side of the intersection.
- Stopped buses do not obstruct sight distance for vehicles entering or crossing from a side street.
- At a signalized intersection, buses can often find a gap to enter the traffic stream, except where there are heavy turning movements onto the street with the bus route.
- Waiting passengers assemble at less-crowded sections of the sidewalk away from the intersection corners.
- Buses in the bus stop do not obscure traffic control devices or pedestrian movements at the intersection.

Disadvantages:

- Intersections may be blocked if other vehicles park illegally in the bus stop or if more buses than the stop can accommodate arrive at the same time.
- If signal priority is not used, the bus stops at the red light and again at the far-side stop, interfering with traffic and efficient bus operations.

1430.02(1)(b) Near-Side Bus Stops

Advantages:

- May be considered in cases where a far-side bus stop location does not provide a secure, convenient, or feasible boarding location for passengers.
- Minimum interference is caused where traffic is heavier on the departure side than on the approach side of the intersection.
- Less interference is caused where the cross street is a one-way street from right to left.
- Passengers generally exit the bus close to the crosswalk.
- There is less interference with traffic turning onto the bus route street from a side street.

Disadvantages:

- Can cause conflicts with right-turning traffic.
- 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.
- Where the bus stop is too short to accommodate buses arriving at the same time, the overflow may obstruct the traffic lane.
- If a queue bypass or bus lane is not used at a signalized intersection, then vehicles waiting at a red signal may block buses from accessing the bus stop, which will require the bus to wait through multiple signal cycles to enter and then depart the bus stop.

1430.02(1)(c) Midblock Bus Stops

Midblock stop areas are desirable under the following conditions: where traffic or physical street characteristics prohibit a near- or far-side stop adjacent to an intersection, or where large factories, commercial establishments, or other large bus passenger generators exist. Locate a midblock stop at the far side of a pedestrian crosswalk (if one exists), so that standing buses do not block an approaching motorist's view of pedestrians in the crosswalk.

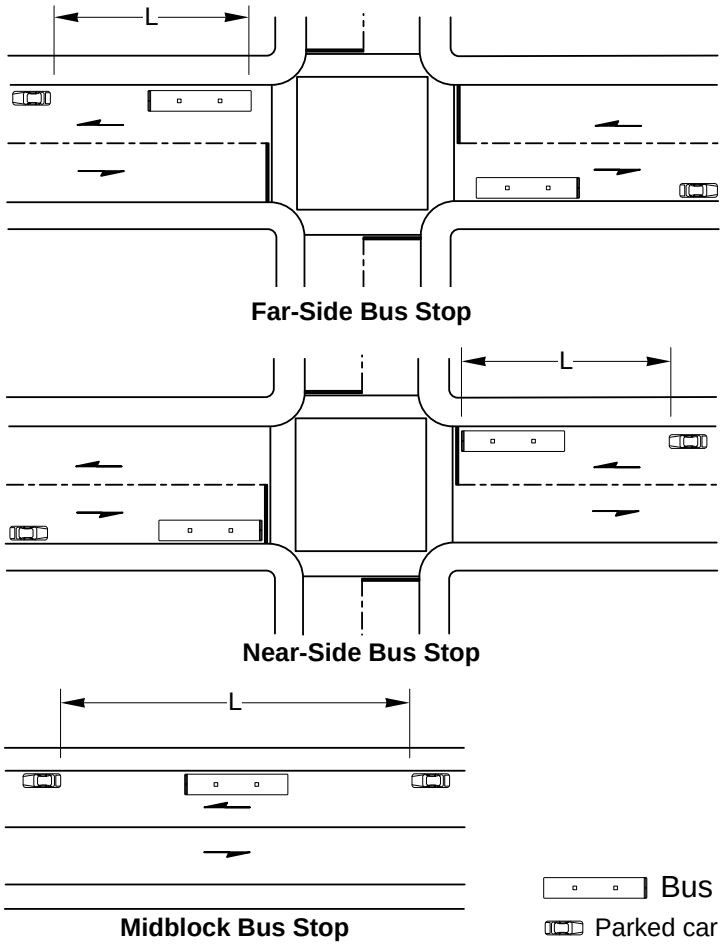
Advantages:

- Buses cause a minimum of interference with the sight distance of both vehicles and pedestrians.
- Stops can be located adjacent to major bus passenger generators and attractors.
- Allows riders to board buses closest to the crosswalk.

Disadvantages:

- Increases walking distance for passengers crossing at intersections.
- Buses may or may not have difficulty reentering the flow of traffic.
- Driveway access may or may not be negatively impacted.

Exhibit 1430-1 Bus Zone Dimensions



Minimum Lengths for Bus Curb Loading Zones (L)[1]						
Approx. Bus Length	Loading Zone Length (feet)					
	One-Bus Stop			Two-Bus Stop		
	Far-Side[2]	Near-Side[3] [4]	Midblock	Far-Side[2]	Near-Side[3][4]	Midblock
25	65	90	125	90	120	150
30	70	95	130	100	130	160
35	75	100	135	110	140	170
40	80	105	140	120	150	180
60	100	125	160	160	190	220

Notes:

[1] Based on bus 1 ft from curb on 40 ft wide streets. When bus is 0.5 ft from curb, add 20 ft near-side, 15 ft far-side, and 20 ft midblock. Add 15 ft when street is 35 ft wide, and 30 ft when street is 32 ft wide.

[2] Measured from extension of building line or established stop line. Add 15 ft where buses make a right turn.

[3] Add 30 ft where right-turn volume is high for other vehicles.

[4] Measured from head of bus zone as determined by the transit agency (may depend on ADA considerations). Add 15 ft where buses make a right turn.

1430.02(2) Bus Pullouts

When designing a pullout, incorporate a deceleration lane or taper into the pullout, a staging area for all anticipated buses, and a merging lane or taper exiting the pullout. As roadway operating speeds increase, increase the taper length accordingly.

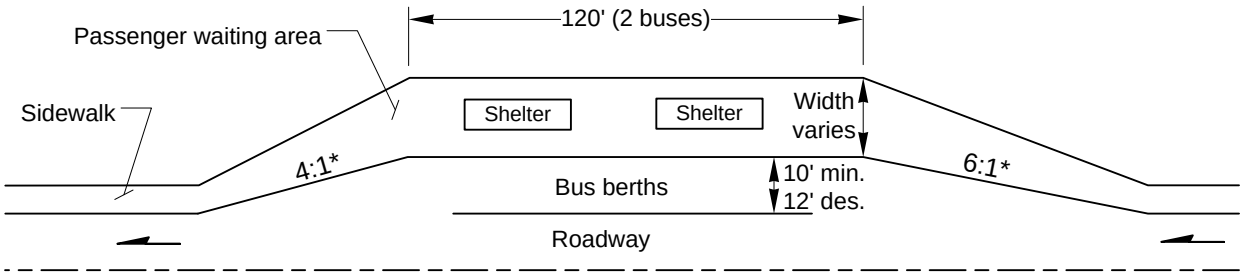
Bus Pullout with Longitudinal Island

Exhibit 1430-2 illustrates general dimensions and design features of a bus pullout located along a road. It could also apply to a pullout integrated at the edge of a park and ride lot or transit center.

Exhibit 1430-3 illustrates the dimensions and design features of bus pullouts associated with near-side, far-side, and midblock bus pullouts.

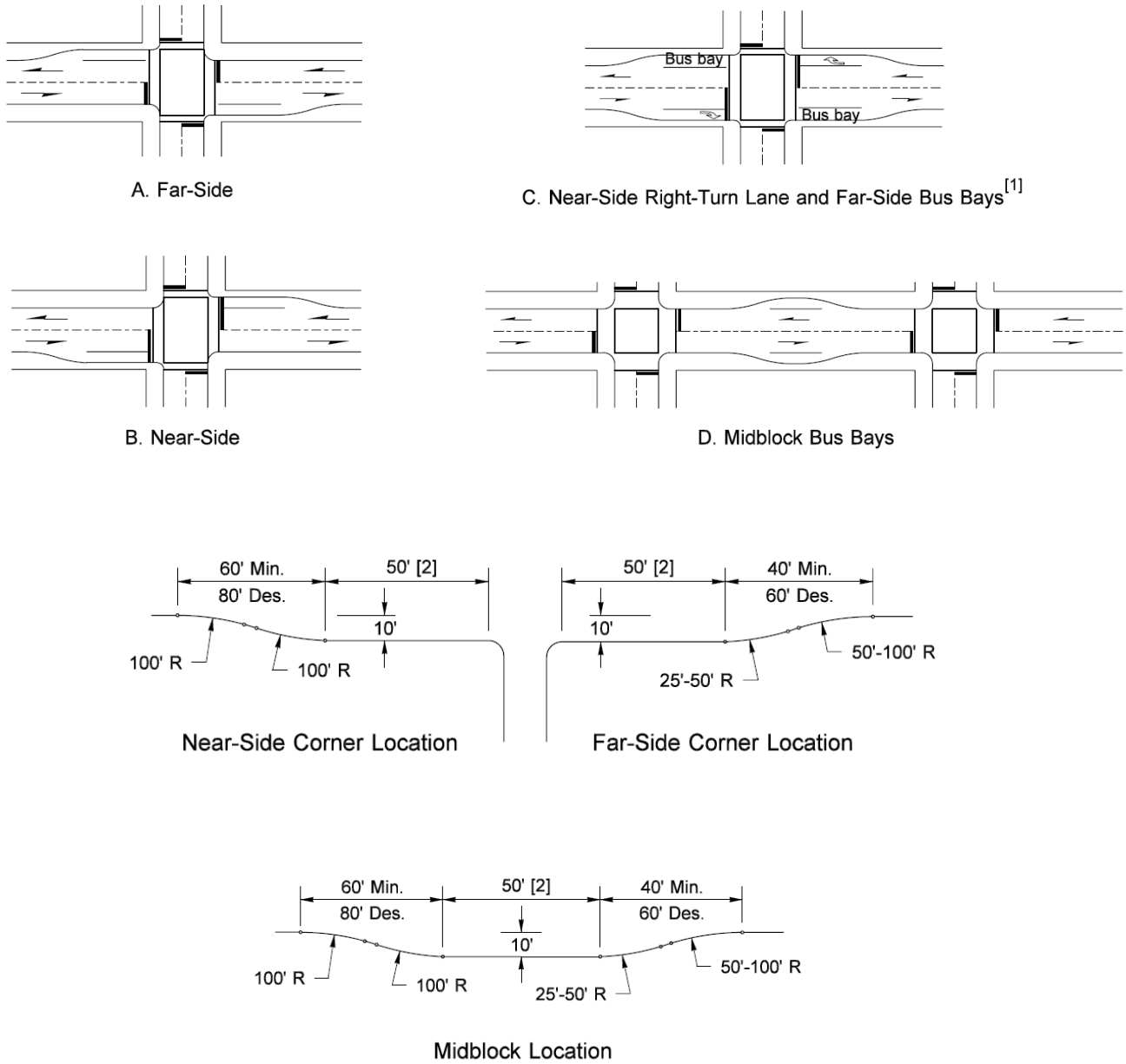
Exhibit 1430-4 illustrates the dimension and design of far-side bus zones and pullouts where buses stop after making a right turn. Adherence to these designs allows buses to stop with minimal interference to legally parked vehicles.

Exhibit 1430-2 Pullout for Bus Stop along a Road



*On higher-speed facilities, it may be necessary to provide a greater acceleration/deceleration transition. Suggested values shown; coordinate designs with the transit agency.

Exhibit 1430-3 Bus Stop Pullouts: Arterial Streets



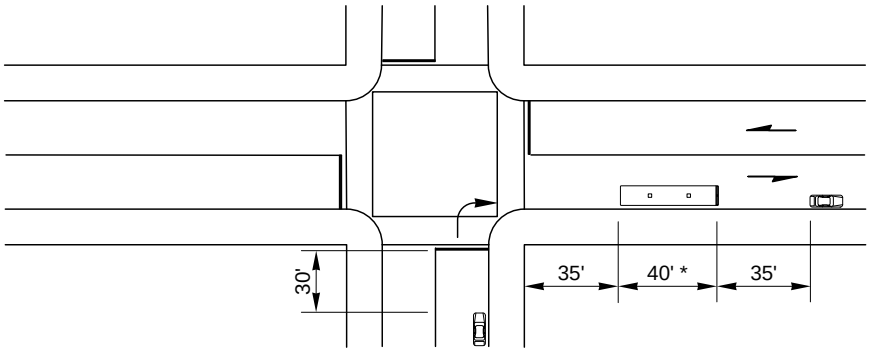
Notes:

This exhibit provides some general values; coordinate with transit provider for actual dimensions.

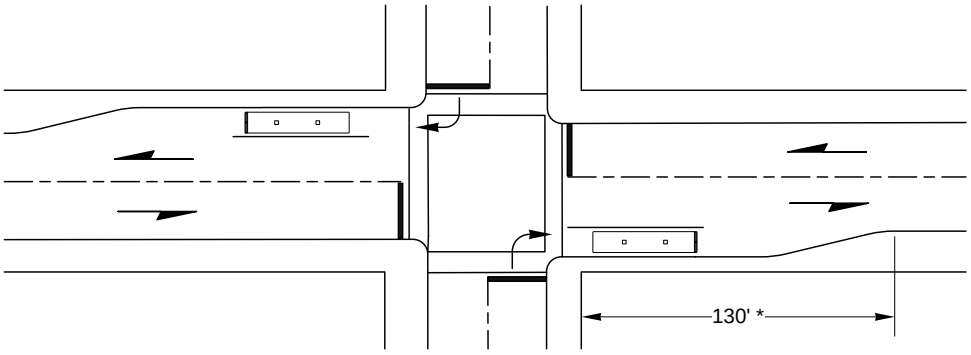
[1] For right-turn lane design, see Chapter 1310.

[2] Based on a 40 ft bus. Add 20 ft for articulated bus. Add 45 ft (65 ft articulated) for each additional bus.

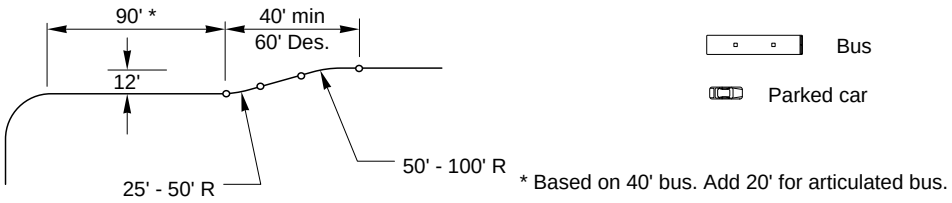
Exhibit 1430-4 Bus Zone and Pullout After Right Turn



Far-Side Bus Stop



Far-Side Bus Pullout
After Right Turn



1430.03 Passenger Amenities

1430.03(1) Bus Stop Waiting Areas

Bus passengers desire a comfortable place to wait for the bus. Providing an attractive, pleasant setting for the passenger waiting area is an important factor in attracting bus users.

Important elements of a bus stop include:

- ADA Standards
- Protection from passing traffic
- Lighting
- Security
- Paved surface
- Protection from the environment
- Seating or other street furniture (if the wait may be long)
- Information about routes serving the stop

Providing protection from passing traffic involves locating stops where there is enough space, so passengers can wait away from the edge of the traveled roadway. The buffering distance from the roadway increases with traffic speed and traffic volume. Where vehicle speeds are 30 mph or below, 5 feet is a satisfactory distance. In a heavy-volume arterial with speeds up to 45 mph, a distance of 10 feet provides passenger comfort.

Passengers arriving at bus stops, especially infrequent riders, want information and reassurance. Provide information that includes the numbers or names of routes serving the stop. Other important information may include a system route map, the hours and days of service, schedules, and a phone number for information. Information technology systems are evolving and some transit agencies now provide information about wait time until the next bus and kiosks to purchase the fare before boarding.

Where shelters are not provided, a bus stop sign and passenger bench are desirable, depending on weather conditions. The sign indicates to passengers where to wait and can provide some basic route information. The information provided and format used is typically the responsibility of the local transit agency.

1430.03(2) Passenger Shelters

Passenger shelters provide protection for waiting transit users and create driver awareness of intermodal connections involving vulnerable users. Locate the shelter conveniently for users, without blocking the sidewalk or the drivers' line of sight.

Providing shelters (and footing for shelters) is normally the responsibility of the local transit agency; it provides for shelter design and footing needs. State motor vehicle funds cannot be used for design or construction of shelters, except for the concrete pad.

Lighting can enhance passenger safety and security. Lighting makes the shelter visible to passing traffic and allows waiting passengers to read the information provided. General street lighting is usually sufficient. Where streetlights are not in place, consider streetlights or transit shelter lights. For information on illumination, see Chapter 1040.

A properly drained paved surface is needed so passengers do not traverse puddles and mud in wet weather. Protection from the environment is typically provided by a shelter, which offers shade from the sun, protection from rain and snow, and a wind break.

Shelters can range from simple to elaborate. The latter type may serve as an entrance landmark for a residential development or business complex and be designed to carry through the architectural theme of the complex. If a non-public transportation entity shelter is provided, its design and siting must be approved by the local transit agency. The reasons for this approval include safety, barrier-free design, intermodal connections, and long-term maintenance concerns.

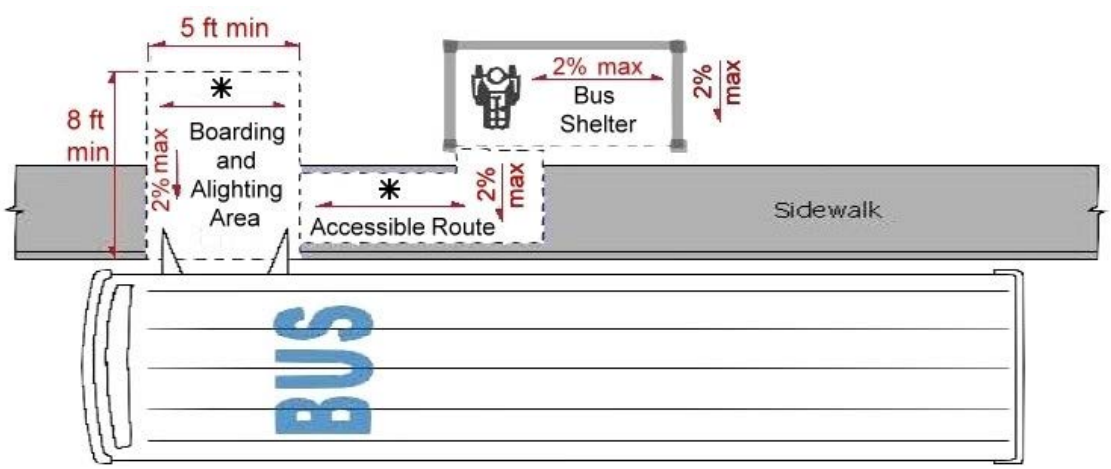
Consider shelters at bus stops in new commercial and office developments and in places where large numbers of elderly and disabled persons wait, such as at hospitals and senior centers. In residential areas, shelters are placed at the highest-volume stops.

In order to use buses that are accessible, bus stops must also be accessible. The nature and condition of streets, sidewalks, passenger loading pads, curb ramps, and other bus stop facilities can constitute major obstacles to mobility and accessibility. State, local, public, and private agencies need to work closely with public transportation officials to provide universal access.

Involve the local transit agency in the bus stop pad design and location so that lifts can actually be deployed at the site.

In order to access a bus stop, it is important that the path to the stop also be accessible. This can be accomplished by the use of sidewalks with curb ramps. For sidewalk design and curb ramp information, see Chapter 1510 and the *Standard Plans*. Exhibit 1430-5 depicts ADA standards for bus stop locations.

Exhibit 1430-5 Bus Stop Accessibility Features



✱ Slope may be the same as the roadway

Design bus shelter clear space to meet the requirements found in *ADA Standards for Transportation Facilities*.

Passenger shelter showing clear space

For more details, see:

Chapter 3, *ADA Standards for Transportation Facilities*, United States Access Board
www.access-board.gov/guidelines-and-standards/transportation/facilities/ada-standards-for-transportation-facilities/chapter-3-building-blocks

Chapter 8, *ADA Standards for Transportation Facilities*, United States Access Board
www.access-board.gov/guidelines-and-standards/transportation/facilities/ada-standards-for-transportation-facilities/chapter-8-special-rooms,-spaces,-and-elements

1430.04 Park and Ride Lots

Park and ride lots provide parking for people who wish to transfer from private vehicles, bicycles, and other modes to public transit or carpools/vanpools. Most park and ride lots located within urban areas are served by transit agencies. Leased lots, such as at churches or shopping centers, or park and rides in rural locations, may have no bus service and only serve carpools and vanpools.

HOV facilities are often considered and included in larger park and ride lots, to improve access for transit and carpools (see Chapter 1410).

Park and ride needs and locations are determined through planning processes typically conducted by transit agencies, WSDOT, and/or RTPOs/MPOs. Once the need is identified, then the project lead should be identified. Early and continual coordination between the project lead and other stakeholders, authorities, and agencies is critical.

Park and ride lot

A **Cooperative Agreement** is written by Headquarters (HQ) Real Estate Services for the purpose of assigning maintenance and/or operational responsibilities for a WSDOT park and ride lot to a transit agency or local governmental agency. (See the *Agreements Manual* and the HQ Real Estate Services Cooperative Agreement form.)

When a memorandum of understanding (MOU) or other formal agreement exists that outlines the design, funding, maintenance, and operation of park and ride lots, it must be reviewed for requirements pertaining to new lots. If the requirements in the MOU or other formal agreement cannot be met, the MOU must be renegotiated.

1430.04(1) Site Selection

In determining the location of a park and ride lot, public input is a valuable tool. Estimated parking demand and other factors determine the size of the lot. Traveler convenience is an important siting factor. Locations that minimize overall trip travel time are most attractive to commuters. Park and rides near freeway access tend to be heavily used because they minimize overall trip travel time for the most people. Freeway proximity makes it easier for transit authorities to provide frequent route service. Other factors that may affect the initial size of the park and ride lot may include available land, the state of the economy, energy availability and cost, perceived congestion, transit service frequency, and environmental controls.

Consider sizing the facility to allow for a conservative first-stage construction with expansion possibilities. As a rule of thumb, 1 acre can accommodate approximately 90 vehicles in a park and ride lot. This allows approximately 40% of the area for borders, landscaping, passenger amenities, bus facilities for larger lots, and future expansion. (See the AASHTO *Guide for Geometric Design of Transit Facilities on Highways and Streets*, Appendix E, for complementary information.)

The local transit authority can give critical input on the need for and design of the park and ride lot. The comprehensive transit plan may already specify a location, and coordination with the transit agency will ensure the site works well for transit vehicle access. Good coordination with the transit agencies through the entire design process is necessary to ensure a well-planned facility that meets the needs of all modal users.

Develop a list of potential sites to identify properties that can be most readily developed for parking and that have suitable access. Sources for selecting sites can include State Route Corridor Sketches and useful tools such as GIS or existing aerial photos, detailed land use maps, or property maps.

Factors influencing site selection and design of a park and ride facility include:

- Local transit authority master plan
- Regional transportation plan
- Local agency codes
- Ability to use existing underutilized paved parking areas within proximity of the desired location
- Local public input
- Proximity to demand
- Local traffic operations, characteristics, parking availability, and roadway geometry
- Local government zoning

- Social and environmental impacts
- Local land use compatibility with current or future development patterns
- Cost and benefit/cost
- Access by all modes of travel
- Security and lighting impacts
- Maintenance
- Stormwater treatment and outfall
- Available utilities
- Existing right of way or sundry site
- Potential for future expansion

Purchasing or leasing property increases costs. Therefore, the first choice is state- or transit-owned right of way, assuming the other selection criteria are favorable. Also, give prime consideration to the use of city- or county-owned right of way. Select a site that complements the current and future land use and highway needs.

Investigate each potential site in the field. The field survey serves to confirm or revise impressions gained from the office review. When conducting the investigation, consider the following:

- Physical characteristics of the site
- Current use and zoning of the area
- Land use surrounding the property (such as residential or commercial use)
- Street network and condition of the roadways
- Visibility from adjacent streets to enhance security
- Potential for additional expansion
- Ability to meet ADA requirements and accessibility for motorists and other modes of travel, including transit
- Proximity of any existing parking facilities (such as church or shopping center parking lots) that are underutilized during the day
- Potential for joint use of facilities with businesses (such as day care centers or dry cleaners) or land uses compatible with park and ride patrons
- Congestion and other design considerations
- Avoiding locations that encourage noncommuter use (such as proximity to a high school)

The desirable location for park and ride lot along one-way couplets is between the two one-way streets, with access from both streets. When this is not achievable, provide additional signing to guide users to and from the facility.

Establish potential sites, with transit agency input, and complete public meetings and environmental procedures prior to finalizing the design. Follow the procedures outlined in Chapter 210.

1430.04(2) Design Guidance

The remainder of this section covers basic design principles and guidance for park and ride lots. Design features are to be in compliance with local requirements. In some cases, variances to local design requirements may be needed to provide for the safety and security of facility users.

Common design components with park and ride lots include:

- Geometric design of access points
- Selection of a design bus type
- Efficient traffic flows, both internal and external circulation, for transit, carpools, vanpools, pedestrians, and bicycles
- ADA-compliant features
- Parking space layout (including accessible stalls)
- Pavements
- Shelters
- Seating or other street furniture
- Exclusive HOV facilities
- Bicycle facilities
- Motorcycle facilities
- Traffic control devices (including signs, signals, and permanent markings)
- Illumination (within the lot and along the streets)
- Stormwater treatment, drainage, and erosion control
- Security for facility users and vehicles (emergency call boxes or telephones)
- Landscape preservation and development
- Environmental mitigation
- Restroom facilities (for transit drivers only or open to the public)
- Trash receptacles
- Artwork (where required by other agencies)

The degree to which the desirable attributes of any component are sacrificed to obtain the benefits of another component can only be determined on a site-specific basis. However, these guidelines present the optimum design elements of each factor.

Large park and ride lots are intended to be transfer points from private automobiles and other modes to transit buses. The same basic principles are used in designing all park and ride lots.

Park and Ride lots that serve a large number of buses and/or routes may also serve as Transfer/Transit Centers; in these cases section 1430.05 would also apply.

1430.04(2)(a) Access

Provide for all modes of transport used to arrive at and depart from transit facilities. The six basic modes are pedestrian, bicycle, motorcycle, automobile, vanpool, and bus.

Coordinate with the local jurisdiction and transit authorities to develop the park and ride lot's ingress and egress locations for transit and for other vehicles. Design the access route, circulation patterns, and return routes to minimize travel time. Exclusive direct connections for buses, vanpools, and carpools may reduce transit costs and save time for riders.

Design transit facility access points on intersecting collector or local streets where possible. Locate the access to avoid the queues from nearby intersections. Provide vehicle storage lanes for entering and exiting vehicles to ensure ease of access and encourage use of the facility. To avoid increasing congestion on the highway or the community that the facility serves, locate entrances and exits where a traffic signal, or other intersection control type (see Chapter 1300), can be reasonably installed at a later time, if needed.

Entrances and exits to park and rides range in scale from full public intersections to driveways, depending on contextual factors such as traffic volumes and remoteness. Design access points using criteria in the 1300 chapter series (Division 13) or other published design guidelines used by the local agency.

When locating access points on a state highway, see chapters in the 500 series (Division 5) for information about access control types (managed or limited access) and standard access spacing and other requirements.

When designing the entrance/exit locations used by buses, start the design using a 15-foot lane width, and then adjust as needed using the bus design vehicle and turn simulation software (such as AutoTURN®) to verify the design.

1430.04(2)(b) Internal Circulation

Provide walkways to minimize pedestrian use of a circulation road or an aisle to minimize pedestrian conflict points with other modes.

Make the pedestrian circulation path from any parking stall to the loading zone as direct as possible. Where pedestrian movement originates from an outlying part of a large parking lot, consider a walkway that extends toward the loading zone in a straight line.

For additional criteria for pedestrian movement, see *Design Manual* Chapter 1510 and Chapter 630 of the *Roadside Manual*.

Pedestrian Access Route

Locate major vehicular circulation routes within a park and ride lot at the periphery of the parking area to minimize vehicle-pedestrian conflicts. Take care that an internal intersection is not placed too close to a street intersection. Consider a separate loading area with priority parking for vanpools. Wherever possible, do not mix buses and auto circulation.

Close coordination with the local transit authority is critical in the design of internal circulation for buses and vanpools. Design bus circulation routes to provide for easy movement, with efficient terminal operations and convenient passenger transfers. Design bus routes within the internal layout, including entrance and exit driveways, to the turning radius of the design bus vehicle.

Additional considerations for internal circulation are:

- Base the general design for the individual user modes on the priority sequence of: pedestrians, bicycles, feeder buses, and park and ride area.
- Design the different traffic flows (auto, pedestrian, bicycle, and bus) circulating within the lot to be understandable to all users, and to minimize conflicting movements between modes.
- Disperse vehicular movements within the parking area by the strategic location of entrances, exits, and aisles.
- Do not confront drivers with more than one decision at a time.
- Provide clear signing for all modes.
- Make the pedestrian circulation routes ADA-compliant (see Chapter 1510).
- Parking stall and access aisle surfaces shall be even and smooth, with surface slopes not exceeding 2%.
- Consider future expansion.
- Align parking aisles to facilitate convenient pedestrian movement toward the bus loading zone.
- Locate the passenger loading zone either in a central location, to minimize the pedestrian walking distance from the parking area to the loading zone, or near the end of the facility, to minimize the transit travel time.
- In large lots, you may need to provide more than one waiting area for multiple buses.

1430.04(2)(c) Parking Area Design

Refer to the *Roadside Manual* for detailed guidance on parking area design. Some general guidelines follow.

Normally, internal circulation is two way with 90° parking. However, one-way aisles with angled parking may be advantageous in a smaller lot due to the limited available space or to promote a specific circulation pattern.

Provide parking for bicycles, motorcycles, and private automobiles, as well as carpools, vanpools, and buses. Locate accessible parking stalls close to the transit loading and unloading area. Two accessible parking stalls may share a common access aisle. For information on the number and design of accessible stalls, see the *Roadside Manual* and the parking space layouts in the *Standard Plans*. Sign accessible parking stalls in accordance with the requirements of RCW 46.61.581. Parking stalls and access aisle surfaces shall be even and smooth, with surface slopes not exceeding 2%.

Locate the bicycle-parking area relatively close to the transit passenger loading area, separated from motor vehicles by curbing or other physical barriers, without landscaping that hides the bike area from view, and with a direct route from the street.

- Design the bike-parking area to discourage pedestrians from inadvertently walking into the area and tripping. Provide lots that are served by public transit, with lockers or with a rack that will support the bicycle frame and allow at least one wheel to be locked.
- Consider providing shelters for bicycle racks. For bicycles, the layout normally consists of stalls 2.5 feet x 6 feet, at 90° to aisles, with a minimum aisle width of 4 feet. Coordinate decisions to provide bicycle lockers, racks, and shelters with the local transit authority and the region subject matter experts.

For more information, see *Understanding Flexibility in Transportation Design – Washington*. It is complementary to the content in this chapter, and provides more insights to modal designs, environment and aesthetics, community engagement, jurisdictional coordination.

1430.04(2)(d) Drainage

Provide sufficient slope for surface drainage, as ponding of water in a lot is undesirable for both vehicles and pedestrians. This is particularly true in cold climates where freezing may create icy spots. The maximum grade is 2%. Install curb, gutter, and surface drains and grates where needed. Coordinate designs for drainage and pedestrian access routes to avoid conflicts. Coordinate drainage design with the local agency to make sure appropriate codes are followed. For additional drainage information, see *Design Manual* Chapter 800 and the *Roadside Manual*.

1430.04(2)(e) Pavement Design

Design pavement to conform to design specifications for each of the different uses and loadings that a particular portion of a lot or roadway is expected to handle. Bus lanes are typically Portland cement concrete pavement. Within the parking area, HMA-type pavements are typically used. Coordinate the pavement designs with the local transit agency and local jurisdiction. Consult with the Region Materials Engineer on pavement section requirements. There may be benefits to permeable pavement if space for stormwater facilities is limited.

1430.04(2)(f) Driver Guidance

Provide a well thought out design for traffic movements within the lot using the proper pavement markings and signage for safe and efficient use by all users of the lot. Typically, reflectorized markings for centerlines, lane lines, channelizing lines, and lane arrows are needed to guide or separate patron and transit traffic. Install park and ride identification signs. For signing and pavement markings, see Chapters 1020 and 1030 and the MUTCD.

1430.04(2)(g) Shelters

Coordinate with the transit agency on the need, location, design, and installation of pedestrian shelters. To satisfy local needs, shelters may be individually designed, provided by the transit agency, or selected from a variety of commercially available designs. These designs must meet ADA accessibility requirements. Consider the following features in shelter design:

- Select open locations with good visibility for user safety.
- Situate enclosed shelters away from edges of driveways and roadways to keep users dry.
- Select materials and locations where the bus driver can see waiting passengers.
- Avoid using doors, for ease of maintenance and to limit vandalism opportunities.
- Allow for a small air space along the bottom of the enclosure panels, to permit air circulation and reduce debris collection.
- Optional features you may provide are: lighting; heat; telephone; static or electronic travel information (schedules); electronic fare collection equipment; commercial advertisements for revenue generation; and trash receptacles.

For additional information on passenger amenities, see 1430.03.

1430.04(2)(h) Illumination, Safety, and Security

Lighting is important from a safety standpoint and as a deterrent to criminal activity in both the parking area and the shelters. For guidance, see *Design Manual* Chapter 1040, Chapter 630 of the *Roadside Manual*, local agency criteria, and AASHTO.

The *Guide for Geometric Design of Transit Facilities on Highways and Streets*, AASHTO, 2014, states: "Security at stations and major stops—both manned and unmanned—should be achieved by closed circuit television monitoring, provision of call boxes, good visibility and lighting, police surveillance, and effective designs. Both the actual security and the passengers' perceptions of security are important for a viable service or operation." (See the Guide for more information.)

1430.04(2)(i) Planting Areas

Selectively preserve existing vegetation and provide new plantings to afford a balanced environment for the park and ride lot user. For guidance and policy, see the *Roadside Manual* and the *Roadside Policy Manual*, respectively.

1430.04(2)(j) Fencing

For fencing guidelines, see Chapter 560 and discuss with the partnering transit agency.

1430.04(2)(k) Maintenance

Maintenance of park and ride lots outside state right of way is the responsibility of the local transit authority. Negotiate maintenance agreements with local transit authorities or other appropriate parties during the design phase, to identify the requirements and responsibilities for the maintenance. A Cooperative Agreement is written by HQ Real Estate Services for the purpose of assigning maintenance and/or operational responsibilities for a WSDOT park and ride lot to a transit agency or local governmental agency. (See the *Agreements Manual* and the HQ Real Estate Services Cooperative Agreement form.)

Consider the following in the maintenance plan:

- Cost estimate
- Periodic inspection
- Pavement repair
- Traffic control devices (signs and pavement markings)
- Lighting
- Mowing
- Cleaning of drainage structures
- Sweeping/trash pickup
- Landscaping
- Shelters
- Snow and ice control

Understanding Flexibility in Transportation Design – Washington, 2005 provides more information on many of the above topics.

For more information, see *Understanding Flexibility in Transportation Design – Washington*. It is complementary to the content in this chapter, and provides more insights to modal designs, environment and aesthetics, community engagement, jurisdictional coordination.

1430.04(2)(d) Drainage

Provide sufficient slope for surface drainage, as ponding of water in a lot is undesirable for both vehicles and pedestrians. This is particularly true in cold climates where freezing may create icy spots. The maximum grade is 2%. Install curb, gutter, and surface drains and grates where needed. Coordinate designs for drainage and pedestrian access routes to avoid conflicts. Coordinate drainage design with the local agency to make sure appropriate codes are followed. For additional drainage information, see *Design Manual* Chapter 800 and the *Roadside Manual*.

1430.04(2)(e) Pavement Design

Design pavement to conform to design specifications for each of the different uses and loadings that a particular portion of a lot or roadway is expected to handle. Bus lanes are typically Portland cement concrete pavement. Within the parking area, HMA-type pavements are typically used. Coordinate the pavement designs with the local transit agency and local jurisdiction. Consult with the Region Materials Engineer on pavement section requirements. There may be benefits to permeable pavement if space for stormwater facilities is limited.

1430.04(2)(f) Driver Guidance

Provide a well thought out design for traffic movements within the lot using the proper pavement markings and signage for safe and efficient use by all users of the lot. Typically, reflectorized markings for centerlines, lane lines, channelizing lines, and lane arrows are needed to guide or separate patron and transit traffic. Install park and ride identification signs. For signing and pavement markings, see Chapters 1020 and 1030 and the MUTCD.

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Coordinate with the transit agency on the need, location, design, and installation of pedestrian shelters. To satisfy local needs, shelters may be individually designed, provided by the transit agency, or selected from a variety of commercially available designs. These designs must meet ADA accessibility requirements. Consider the following features in shelter design:

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- Select materials and locations where the bus driver can see waiting passengers.
- Avoid using doors, for ease of maintenance and to limit vandalism opportunities.
- Allow for a small air space along the bottom of the enclosure panels, to permit air circulation and reduce debris collection.
- Optional features you may provide are: lighting; heat; telephone; static or electronic travel information (schedules); electronic fare collection equipment; commercial advertisements for revenue generation; and trash receptacles.

For additional information on passenger amenities, see 1430.03.

1430.04(2)(h) Illumination, Safety, and Security

Lighting is important from a safety standpoint and as a deterrent to criminal activity in both the parking area and the shelters. For guidance, see *Design Manual* Chapter 1040, Chapter 630 of the *Roadside Manual*, local agency criteria, and AASHTO.

The *Guide for Geometric Design of Transit Facilities on Highways and Streets*, AASHTO, 2014, states: "Security at stations and major stops—both manned and unmanned—should be achieved by closed circuit television monitoring, provision of call boxes, good visibility and lighting, police surveillance, and effective designs. Both the actual security and the passengers' perceptions of security are important for a viable service or operation." (See the Guide for more information.)

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Selectively preserve existing vegetation and provide new plantings to afford a balanced environment for the park and ride lot user. For guidance and policy, see the *Roadside Manual* and the *Roadside Policy Manual*, respectively.

1430.04(2)(j) Fencing

For fencing guidelines, see Chapter 560 and discuss with the partnering transit agency.

1430.04(2)(k) Maintenance

Maintenance of park and ride lots outside state right of way is the responsibility of the local transit authority. Negotiate maintenance agreements with local transit authorities or other appropriate parties during the design phase, to identify the requirements and responsibilities for the maintenance. A Cooperative Agreement is written by HQ Real Estate Services for the purpose of assigning maintenance and/or operational responsibilities for a WSDOT park and ride lot to a transit agency or local governmental agency. (See the *Agreements Manual* and the HQ Real Estate Services Cooperative Agreement form.)

Document the agreements in the Design Documentation Package (see Chapter 300).

Consider the following in the maintenance plan:

- Cost estimate
- Periodic inspection
- Pavement repair
- Traffic control devices (signs and pavement markings)
- Lighting
- Mowing
- Cleaning of drainage structures
- Sweeping/trash pickup
- Landscaping
- Shelters
- Snow and ice control

Understanding Flexibility in Transportation Design – Washington, 2005 provides more information on many of the above topics.

1430.05 Transfer/Transit Centers

Transfer/transit centers are large multimodal bus stops where buses on a number of routes converge to allow riders the opportunity to change buses or transfer to other modes.

Transit centers are frequently major activity centers and serve as destination points.

Many factors dictate the particular needs of each transit center. Design of a transit center considers such features as passenger volume; number of buses on the site at one time; local auto and pedestrian traffic levels; and universal access.

Transit agencies generally lead in the development of transfer/transit centers, and their standards apply. Consult the AASHTO *Guide for Geometric Design of Transit Facilities on Highways and Streets* for more comprehensive overviews and design guidelines for these facilities.

1430.05(1) Bus Platforms

At a transit center where several transit routes converge and where buses congregate (lay over), multiple bus berths or spaces are typically needed, along with areas where passengers boarding or alighting the bus can take refuge. Typically, there are several design styles for multi-berth bus platforms (see AASHTO). Parallel and sawtooth types are described below.

An important aspect in multiple bus berthing is proper signing and marking for the bus bays for both operators and passengers. Clearly delineate the route served by each bay. Consider pavement marking to indicate stopping positions. Separate layover bays may be needed for terminating bus routes, or the layover function can be provided at the passenger platform if the platform only serves a single route. Consider future service plans and maximize flexibility in the design of transit center bays and circulation.

Portland cement concrete pavement is desirable for pedestrian walkways on the platform, for ease of cleaning.

Where buses are equipped with a bicycle rack, provide for the loading and unloading of bicycles.

Exhibit 1430-6 shows typical parallel and sawtooth designs for parking 40-foot buses for passengers boarding and alighting at a platform. The sawtooth design does not require buses to arrive or depart in any order.

Exhibit 1430-7 is an example of a platform design that has a combination of parallel and sawtooth bus berths at a platform. The sawtooth design provides more space-efficient berthing, as the parallel design shown may require that buses arrive and/or depart in order. Coordinate the bus berth style and platform design with the local transit authority throughout the design process, and obtain its concurrence for the final design.

In the design of parallel bus berths, additional roadway width is needed for swing-out maneuvers if shorter bus loading platforms are utilized. The roadway width and the amount of lineal space required at the bus platform are directly related where designs allow departing buses to pull out from the platform around a standing bus. The shorter the berth length allowed, the wider the roadway. Use turn simulation software (such as AutoTURN®) to verify the design.

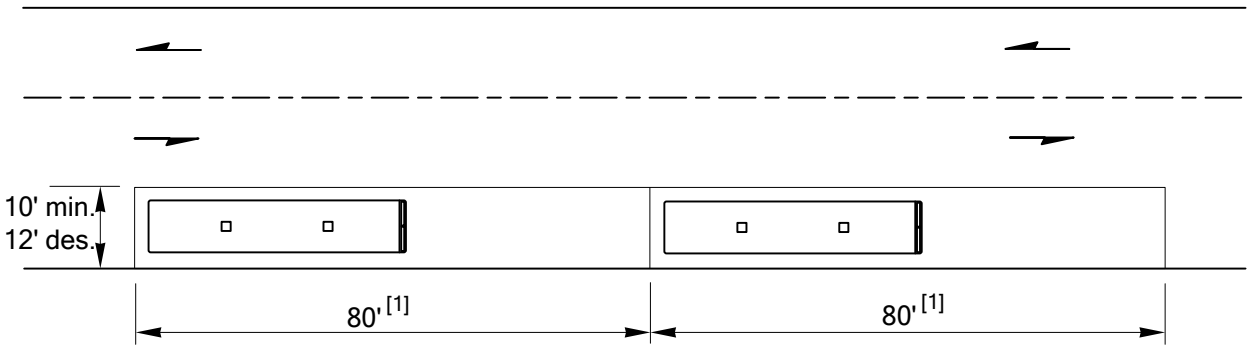
Considerable length is needed in a parallel design to permit a bus to pass and pull into a platform in front of a parked bus. Design the bus aisle so that a bus can by-pass another bus stopped at the platform. The decision to provide a parallel design to accommodate a by-pass maneuver may depend on how many routes service the location, and the frequency of service.

1430.05(2) Flow/Movement Alternatives

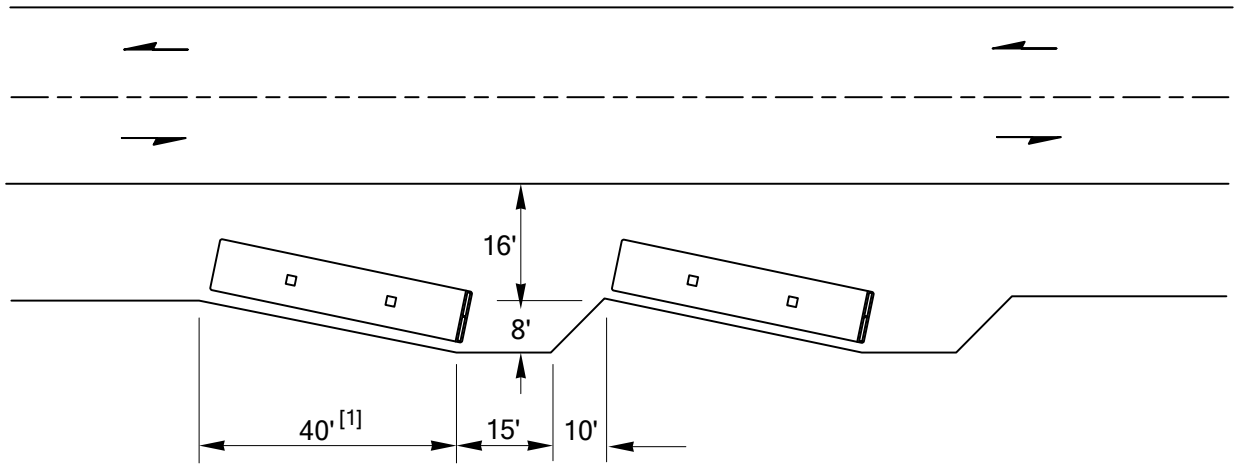
Two primary alternatives for vehicle and passenger movement are possible for transfer centers, regardless of the type of bus berths used, as shown in Exhibit 1430-6. Buses may line up along one side of the transfer center. This type of arrangement is generally suitable for a limited number of buses due to the walking distances for transferring passengers. For a larger number of buses, an arrangement similar to Exhibit 1430-7 can minimize transfer time by consolidating the buses in a smaller area.

Consult the AASHTO *Guide for Geometric Design of Transit Facilities on Highways and Streets* for more comprehensive overviews and design guidelines.

Exhibit 1430-6 Bus Berth Design



Parallel Design



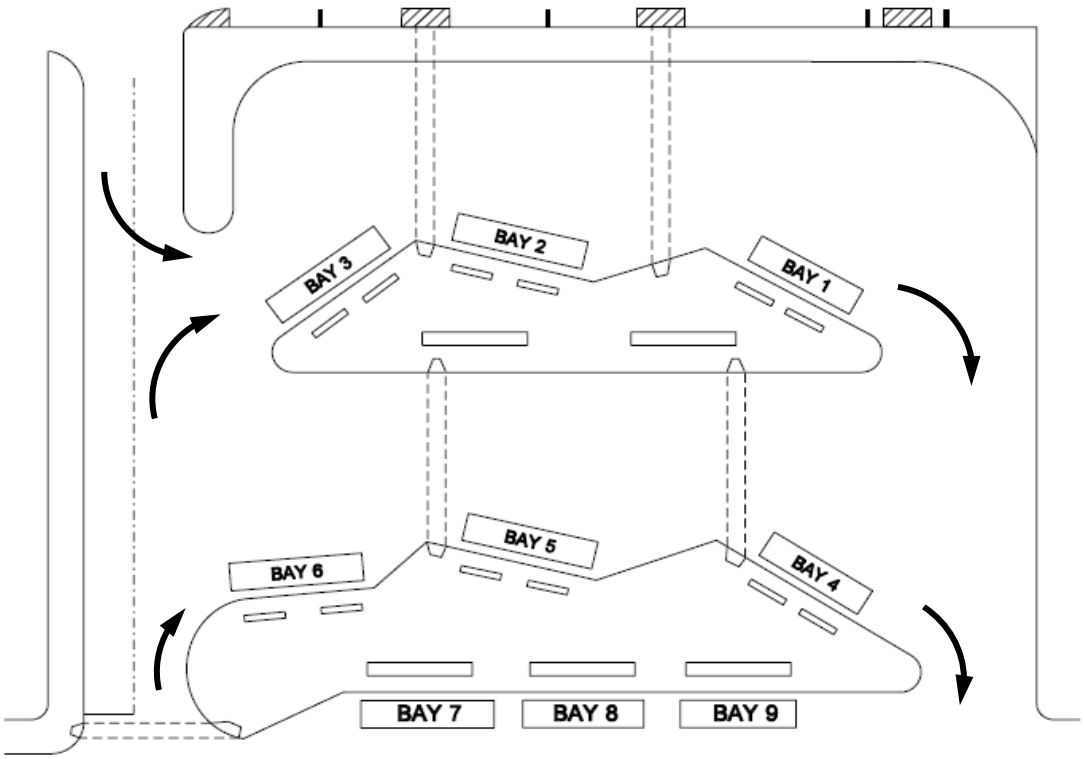
Sawtooth Design[2]

Notes:

[1] Dimensions shown are for a 40-ft bus; adjust the length when designing for a longer bus.

[2] Design shown is an example; contact the local transit agency for additional information.

Exhibit 1430-7 Design Alternative for a Combination of Bus Berths at a Platform



Not to Scale

1430.06 Roadway and Intersection Design

Refer to chapters in the 1100, 1200, and 1300 series (Divisions 11, 12, and 13) for guidance on roadway and intersection design controls and design elements. Some brief discussions are provided below.

1430.06(1) Pavement

Coordinate the pavement design (type and thickness) of a transit project, whether initiated by a public transportation agency or a private entity, with WSDOT or the local agency public works department, depending on highway, street, or road jurisdiction. These agencies play a major role in determining the paving section for the particular project.

Consult with the Region Materials Engineer on pavement section requirements.

1430.06(2) Grades

Roadway grades refer to the maximum desirable slope or grade, or the maximum slope based on the minimum design speed that a 40-foot bus can negotiate efficiently. For roadway grade guidance, see Chapter 1220 or the *Local Agency Guidelines*.

Bus speed on grades is directly related to the weight/horsepower ratio. Select grades that permit uniform operation at an affordable cost. In cases where the roadway is steep, a climbing lane for buses and trucks may be needed. For climbing lane guidance, see Chapter 1270. Avoid abrupt changes in grade due to bus overhangs and ground clearance.

1430.06(3) Lane Widths

Guidance on roadway and lane widths is given in Chapter 1230 or the *Local Agency Guidelines*, based on the context, modal users, needs of the highway or road, and jurisdiction.

1430.06(4) Design Vehicle Characteristics

Most transit agencies operate several types of buses within their systems. Vehicle sizes range from articulated buses to passenger vans operated for specialized transportation purposes and vanpooling. Several bus types are listed below. (See Chapter 1103, Design Controls, and Chapter 1300 for design vehicle guidance.)

1430.06(4)(a) City Buses (CITY-BUS)

These traditional urban transit vehicles are typically 40 feet long and have a wheelbase of approximately 25 feet. Many of these vehicles are equipped with either front or rear door wheelchair lifts or a front “kneeling” feature that reduces the step height for mobility-impaired patrons. Installing higher curb can reduce the time it takes to kneel a bus and thus increase reliability.

1430.06(4)(b) Articulated Buses (A-BUS)

Because articulated buses are hinged between two sections, these vehicles can turn within a relatively short radius. Articulated buses are typically 60 feet in length, with a wheelbase of 22 feet from the front axle to the mid axle and 19 feet from the mid axle to the rear axle. If articulated buses are the common bus using a stop, adjust the length of the pullout accordingly to avoid conflicts.

1430.06(4)(c) Small Buses

Some transit agencies operate small buses, which are designed for use in low-volume situations or for driving on lower-class roads. Small buses are also used for transportation of elderly and disabled persons and for shuttle services. Passenger vans are a type of small bus used for specialized transportation and vanpooling. Since the vehicle specifications vary so widely within this category, consult the local transit authority for the specifications of the particular vehicle in question.

1430.06(5) Intersection Radii

A fundamental characteristic of transit-accessible development is convenient access and circulation for transit vehicles. It is important that radii at intersections be designed to accommodate turning buses. Radii that accommodate turning buses reduce conflicts between automobiles and buses, reduce bus travel time, and provide maximum comfort for the passengers.

Refer to Chapters 1300 and 1310 for intersection design guidance, and take the following factors into consideration in designing intersection radii:

- Right of way availability
- Angle of intersection
- Width and number of lanes on the intersecting streets
- Feasibility of channelization adjustments such as set-back stop bar or adjusted center line
- Design vehicle turning radius
- On-street parking and/or curb extensions (see Chapter 1510)
- Allowable bus encroachment
- Operating speed and speed reductions
- Adequate intersection sight distance
- Needs of pedestrians, bicyclists, and other design users (see chapters in the 1100 series (Division 11) for contextual discussions and Chapter 1230 for roadway types.)

Because of space limitations and generally lower operating speeds in urban areas, curve radii for turning movements are typically smaller than those used in rural areas.

1430.07 Documentation

Refer to Chapter 300 for design documentation requirements.

1430.08 References

1430.08(1) Federal/State Laws and Codes

Americans with Disabilities Act of 1990 (ADA) (28 Code of Federal Regulations [CFR] Part 36, Appendix A, as revised July 1, 1994)

Revised Code of Washington (RCW) 46.61.581, Parking spaces for persons with disabilities – Indication, access – Failure, penalty

RCW 70.92.120, Handicap symbol – Display – Signs showing location of entrance for handicapped

Washington Administrative Code (WAC) Chapter 468-46, Transit vehicle stop zones

WAC 468-510-010, High occupancy vehicles (HOVs)

1430.08(2) Design Guidance

ADA Field Guide for Accessible Public Rights of Way, WSDOT
www.wsdot.wa.gov/publications/manuals/fulltext/m0000/ada_field_guide.pdf

ADA Standards for Accessible Design, U.S. Department of Justice (USDOJ), 2010; consists of 28 CFR parts 35 & 36 and the *ADA and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities* (ADA-ABAAG; also referred to as the 2004 ADAAG), July 23, 2004, U.S.

Access Board. (For buildings and on-site facilities; applies to new construction or alterations as of March 15, 2012.)
www.access-board.gov/guidelines-and-standards

ADA Standards for Transportation Facilities, USDOT, 2006; consists of 49 CFR Parts 37 & 38 and the *ADA and ABA Accessibility Guidelines for Buildings and Facilities* (ADA-ABAAG; also referred to as the 2004 ADAAG), July 23, 2004, U.S. Access Board as modified by USDOT. (For transit, light rail, and similar public transportation facilities.)
www.access-board.gov/guidelines-and-standards

Manual on Uniform Traffic Control Devices for Streets and Highways, USDOT, FHWA; as adopted and modified by Chapter 468-95 WAC "Manual on uniform traffic control devices for streets and highways" (MUTCD)

Plans Preparation Manual, M 22-31, WSDOT

Roadside Manual, M 25-30, WSDOT

Standard Plans for Road, Bridge, and Municipal Construction (Standard Plans), M 21-01, WSDOT

Traffic Manual, M 51-02, WSDOT

Revised Draft Guidelines for Accessible Public Rights-of-Way (PROWAG), November 23, 2005, U.S. Access Board. The current best practices for evaluation and design of pedestrian facilities in the public right of way per the following FHWA memoranda:
http://www.fhwa.dot.gov/environment/bikeped/prwaa.htm
http://www.fhwa.dot.gov/civilrights/memos/ada_memo_clarificationa.htm
www.access-board.gov/guidelines-and-standards

Transit Capacity and Quality of Service Manual, Third Edition (TCRP Report 165), Transportation Research Board.
http://www.trb.org/Main/Blurbs/169437.aspx

1430.08(3) Supporting Information

A Policy on Geometric Design of Highways and Streets (Green Book), AASHTO, current edition

ADA Standards for Accessible Design, U.S. Department of Justice
www.ada.gov/stdspdf.htm

Bus Use of Highways: Planning and Design Guidelines, National Cooperative Highway Research Program Report 155, Transportation Research Board, 1975

Guide for Geometric Design of Transit Facilities on Highways and Streets, AASHTO, 2014
The AASHTO Guide provides a comprehensive reference of current practice in the geometric design of transit facilities on streets and highways.

Guidelines for the Location and Design of Bus Stops, Transit Cooperative Research Program (TCRP) Report 19, Transportation Research Board, 1996

Understanding Flexibility in Transportation Design – Washington, WSDOT, 2005
www.wsdot.wa.gov/research/reports/600/638.1.htm