APTA STANDARDS DEVELOPMENT PROGRAM
RECOMMENDED PRACTICE
American Public Transportation Association
1666 K Street, NW, Washington, DC, 20006-1215

APTA SUDS-UD-RP-005-12
Published March 2012
APTA Sustainability and Urban Design Program

Design of On-street Transit Stops and Access from Surrounding Areas

Abstract: This *Recommended Practice* discusses ways to provide or improve connections to, from and at on-street transit stops, regardless of mode.

Keywords: accessibility, land use, on-street transit stops, street connectivity, street design, transit-oriented development (TOD), urban design

Summary: This *Recommended Practice* is intended to support transit agencies to actively pursue access improvements by describing the on-street stop design features and characteristics that improve or support access to transit.

Scope and purpose: An on-street stop is a stop (for bus, streetcar, light rail, or any other mode) that is located within the right-of-way of a public street. Off-street stops, which are located on separate parcels controlled by the transit agency, introduce additional design considerations, which will be covered in an additional standard. However, the guidelines for street connectivity, street design and surrounding land uses in this standard apply to off-street stops as well. Transit agencies can use this document to assess existing or new on-street transit stops and to provide input to local jurisdictions and developers to invest in pedestrian improvements. Local jurisdictions and the general public can use this document to facilitate discussions about planning, design and investment decisions made by public agencies and elected officials. Developers, planners and architects can use this document in making design decisions regarding the interface of private development and the public realm where transit is present or planned. This *Recommended Practice* covers a broad range of subject matter for which there may be more detailed standards. Associated resources within the APTA Standards program may provide additional information about opportunities for developing partnerships, accessibility standards in relation to ADA requirements, and guidance on how to provide cues for persons with disabilities. This document is meant to compliment rather than supersede other standards and reports that cover similar subjects.

Participants

The American Public Transportation Association greatly appreciates the contributions of the APTA Sustainable Urban Design Standards Working Group, Design Subgroup provided the primary effort in the drafting of this *Recommended Practice*.

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Introduction

The ability for patrons of transit agencies to get to and from, or *access*, transit stops is critical for providing a safe, pleasant and convenient trip from beginning to end. Improvements to the ways in which patrons access stops can yield higher ridership and greater patron satisfaction.

It is important for every transit agency to realize that a transit trip is door to door, not stop to stop. The transit rider will judge his or her entire trip, not simply the portion spent in the facilities and vehicles of the transit agency. If the environment around the transit stop is unpleasant or the stop difficult to access, then some potential riders will choose not to take transit. On the other hand, if the surrounding environment is pleasant and the stop is easy to access, more people may ride and will continue to ride.

Transit providers may struggle with how to improve the way people get to and from the transit stop because the surrounding area is usually not under the direct purview of the agency or because the agency does not have sufficient staffing or financial resources to address these issues. However challenging the issues may be, transit agencies must take action to improve the access to and from the transit stop.

The purpose of this *Recommended Practice* is to present access standards appropriate for general conditions that, if achieved, will improve the ways in which people access the transit stop. As transit agencies take action to improve access, the standards can help define what to require, advocate for or fund. This document is not intended to define which agency has responsibility for funding or implementation. Where facilities are not under the control of the transit agency, agency staff should work to have transit access needs considered in projects funded and implemented by other jurisdictions. It is important to remember that transit patrons do not care about jurisdictional boundaries; their experience will be shoped by everything they encounter on their trip.

Each transit stop will have unique site conditions and will be subject to local, state or perhaps even federal regulations and guidance. The responsibilities and roles played by transit agencies and local jurisdictions will require close coordination among transit designers, planners, developers and local jurisdiction staff. Transit designers should utilize local jurisdiction staff's knowledge of existing conditions, current projects and adopted future plans for existing and prospective transit routes. Likewise, different agencies have different resources; some may have large, multimodal systems, dedicated staffs, and significant capital improvement budgets. Others may operate a single route. Transit stops will also have very different contexts, including urban, suburban, and rural areas. However, the basic principles of access remain the same.

Associated papers within the APTA Urban Design Standards program provide additional information and resources about opportunities for partnerships and ways to overcome some of the challenges associated with improving access to and from transit facilities. This document deals with specific standards and guidelines for ways to provide or improve access to and from on-street transit stops of all modes.

Design of On-street Transit Stops and Access from Surrounding Areas

1. Why access to and from transit matters to transit agencies and the community

- Increased ridership and revenue. Safe, effective and convenient access to transit stops maximizes ridership and revenue. Barriers that prevent, or conditions that discourage, a potential customer from accessing a transit stop depress transit ridership.
- Improved user safety. Safe access to the transit stop is critical to the agency and to the customer. If pedestrians do not feel safe and secure, they will not walk to the bus stop. If a person is injured or harmed walking to or from a bus stop, there may be significant costs imposed upon local governments and/or transit agencies if the conditions were unsafe. Providing designated walking paths and appropriate crossings of roadways can reduce liability for both local government and transit agencies.
- Increased opportunity for pedestrian travel for any trip. All transit customers are pedestrians for some part of the trip. This includes the walk from one’s origin to the stop, transfers between an auto and transit vehicle and transferring between two transit vehicles. Improved access to transit leads to improved conditions for other walking trips.
- Reduced costs for providing paratransit service. Some paratransit customers could use fixed-route transit if barriers like a lack of sidewalks, inadequate curb ramps or poorly timed traffic signals did not prevent access to the stop. The average cost of a paratransit trip is often 10 times that of a fixed-route trip. If barriers to fixed-route service are eliminated, some people who qualify for paratransit service will prefer the freedom of using the same fixed-route transit system as others in the community.
- More efficient fixed-route transit service. Access deficiencies may cause bus routes to deviate or to take an indirect path to serve hard-to-access destinations like office complexes surrounded by surface parking, or medical complexes with multiple entrances. The more direct a transit route is, the less running time and potentially cost is required to provide a given level of service. Also, more direct service can be more competitive with the auto and attract more customers and revenue.
- Increased value of development. The importance of transit varies based on the nature of a development. However, proximity to high quality transit service does increase the value of most development if transit is not just proximate but accessible.
- More balanced transportation modes. Application of the standards presented in this *Recommended Practice* will have benefits for pedestrian trips of all kinds, not just those to access transit. Access solutions such as off-street paths may benefit cycling trips as well as walking and access to transit. Even auto trips may benefit if increased connectivity results in more direct trips. In many communities, auto access may trump access by other modes. As communities prepare for environmental, resource and economic challenges of the future, a more balanced transportation system my help them adapt.

2. Guidelines for access to transit

A challenge for transit planners and urban designers in providing or improving access to a transit facility is in managing the approach to a transit stop or station by all the different modes of travel, which may be in conflict with one another. The fundamental goal in the design of any transit stop must be a good passenger experience. To that end, design must address several key passenger needs:

- **Connectivity.** People should be able to move directly between their origin, the transit service(s) and their destination.
- **Universal design.** All people, regardless of physical ability, should be able to easily and safely access transit services without any unavoidable impediments or barriers.
- **Safety.** People should be able to reach the transit vehicle from their origin point or reach their destination from the transit vehicle with minimal risk of being hit by a vehicle, being a victim of crime or otherwise being injured. Moreover, they should feel as if they are at minimal risk.
- **Comfort.** The experience of using transit should be pleasant. People should be protected from climatic extremes like direct sun on a hot day, heavy winds or extreme cold. Where they must wait, they should be able to do so comfortably.
- **Legibility.** People getting off the transit vehicle should be able to easily identify how to get to nearby destinations. Conversely, passengers leaving nearby origins should be able to identify the existence of transit service and how to get to it.
- **Quality.** People should perceive all public spaces as being well built and well maintained.

NOTE: For a more comprehensive list of principles, see APTA SUDS-UD-RP-003-11, Why Design Matters for Transit.

These passenger needs will invariably need to be considered in light of economy of construction and operation. However, economy is not an excuse: For the user, the ultimate measure of transit will be the personal experience.

The standards and recommendations that make up this document all follow from these six performance goals and should be considered in that light. The designer should always ask one basic question: “Is this connected, accessible, safe, comfortable, legible and of high quality?” If the answer is no, then the design will not create a good transit stop, even if it follows every standard.

The standards presented in this *Recommended Practice* are organized by the area they address, starting with the surrounding neighborhood as a whole and then moving inward to the stop itself:

- street connectivity;
- street design;
- surrounding land uses;
- transit stop location; and
- transit stop design.

The guidelines that follow are the result of observed and researched best practices in urban design as it relates to transit. They should be applied within walking distance of a transit stop. These standards are also relevent to transfers at on-street stops; a patron changing from one bus to another may use two stops, several sections of sidewalk and multiple crosswalks.

2.1 Street connectivity

Street networks define the form and structure of cities and towns. The density and pattern of streets can encourage or discourage different modes of travel. Communities where many people get around on foot will tend to have a dense street network that facilitates putting origins and destinations in closer proximity and avoiding out-of-direction travel. Communities where most trips are by car are likely to have fewer, larger streets, and a lot of land will be dedicated to auto circulation and parking. Transit needs a balanced street network to succeed: People need to be able to directly access streets with transit within a reasonable walk, while transit vehicles need enough room to operate. Transit agencies need to take responsibility for advocating that the pathways to transit stops from points within the catchment area of a transit stop will provide a direct, safe and pleasant experience for the transit customer.

Street connectivity is a term for how densely streets are spaced and connect with one another. In a uniform street grid, street connectivity is measured by block length. Shorter blocks facilitate more direct travel, placing more area within walking distance of a stop. Shorter blocks can also simplify transfers between transit routes operating on different streets. In a less regular street pattern, intersections per square mile can be a useful measure. More intersections represent more connections and thus more direct travel.

FIGURE 1
Street Maps at the Same Scale

New York City, NY	Los Angeles, CA	Portland, OR
264 × 900 ft blocks	420 × 630 ft blocks (with some alleys)	260 × 260 ft blocks
180 Intersections per square mile	150 intersections per square mile	400 intersections per square mile

Diagram: Christof Spieler

The level of street connectivity in existing and new development varies greatly. Historic patterns, topography and natural features often impact achievable street connectivity. Trips may be lengthened by having to avoid lakes or by limited crossings of rivers, or they may be made more difficult by hills. However, many of the limits on connectivity are human-made. Post-World War II development often has very large blocks and cul-de-sacs, which greatly reduce connectivity.

Pedestrian connectivity can be provided by off-street paths as well as by streets. However, off-street paths are generally less desirable because they are less connected to land uses such as stores and offices, which usually front streets, and because they can feel isolated and dangerous.

Connectivity guidelines are probably most useful when evaluating the provision of streets to serve new development, subdivisions and redevelopment of large parcels. Transit agencies should seek opportunities to participate in land use reviews and other permitting activities where street requirements are imposed. It is also useful to advocate that zoning and subdivision codes require connectivity consistent with this *Recommended Practice* and to help local governments understand the relationship of connectivity to transportation choices. In developed areas, transit agencies may have an opportunity to advocate for improved connectivity when capital improvement plans for transportation are considered.

2.1.1 Street connectivity guidelines

Guidelines	Examples
Provide full street connections with spacing between of 200 to 600 ft. Reference: *LEED for Neighborhood Development (LEED ND)* requires 140 intersections per square mile.	 *Photo: Christof Spieler* Good: Short blocks. (Houston, TX)
Provide streets with adequate right-of-way to support transit approximately every quarter to half mile.	 *Photo: Christof Spieler* Good: Arterial with bus service. (Houston, TX)
Limit cul-de-sacs or other closed-end street designs to circumstances in which barriers prevent full street extensions, and limit the length of such streets to approximately 200 ft. If full street connection is prevented, then provide bicycle and pedestrian access ways on public easements or rights-of-way to achieve connectivity approximately every 300 to 500 ft. Create direct connections between off-street systems and the street where transit service is provided.	 *Photo: Christof Spieler* Good: A pedestrian and bicycle path connects a dead-end street to nearby transit service. (Houston, TX)

Guidelines	Examples
Private streets or off-street pedestrian networks can provide additional pedestrian connectivity but should not be a substitute for public street network connectivity. Sidewalks feel safer than off-street paths because they are observable by motorists. Where off-street paths or trail systems exist, create direct connections between those systems and the street where transit service is provided.	 *Photo: Christof Spieler* **Good:** Off-street path in area with no street connectivity. (Houston, TX)
Ensure connectivity between bike lanes and transit facilities, especially in low-density suburban areas. Local bike networks should be connected with transit facilities and be free of all barriers, such as curbs and fences. On-street bike lanes should connect to a transit stop or station (facility). Bike access can be enhanced with multi-use paths leading to transit facilities, when on-street bike lanes are not available. While the proximity of bike facilities and transit vehicles can create conflict, the solution to these conflicts is not to eliminate bike facilities but rather to design to minimize conflict. Reference: *The NACTO Urban Bikeway Design Guideline* says that “the configuration of a bike lane requires a thorough consideration of existing traffic levels and behaviors, adequate safety buffers to protect bicyclists from parked and moving vehicles, and enforcement to prohibit motorized vehicle encroachment and double parking.”	NACTO  *Photo: Christof Spieler* **Good:** A bike lane alongside light rail (Portland, OR)

2.2 Street design

Streets need to be appropriately designed for the convenient, efficient mobility of all users: pedestrians, bicyclists, motorists and transit riders. A hierarchy of street and intersection types should allow for suitable travel speeds and minimize conflicts between travel modes. This hierarchy will be reflected in the size of the street and the allocation of space to different uses. Jurisdictions use a variety of names to describe different types of streets. A typical street hierarchy, from large to small, might be:

- limited access highways;
- regional collectors;
- arterials;
- main streets;
- collectors;
- local collectors; and
- local streets.

Each functional classification in the hierarchy has a different cross-section or allocation of space. A freeway has six or more travel lanes for high-speed vehicles and no pedestrian access, while a local street may have two lanes, on-street parking and slow traffic mixing with pedestrians. It is important to realize that a street classification alone does not fully describe the functional needs of a street. The surrounding context greatly affects the use of a street. In a commercial area, an arterial may have one or two travel lanes in each direction, parking to support adjacent shops and wide sidewalks to provide for large numbers of people strolling, outdoor cafes and amenities like trees and benches. The same street in an industrial area may have more lanes, no parking and basic sidewalks.

This *Recommended Practice* focuses on guidelines for the design of streets where people access transit. Transit agencies have often focused on streets from the standpoint of transit vehicles, which are some of the larger vehicles on the road, need space to maneuver and may be delayed if roads are congested. However, as previously noted, transit works best in a balanced transportation system, so if transit is to be effective, the same streets that carry transit vehicles also have to be designed to accommodate pedestrians and bicycles. These considerations can be at odds; the wide lanes and generous intersections that make it easy to run buses make it harder for pedestrians to cross the street. Moreover, transit agencies also to have to consider streets that are not used by transit vehicles but are used by transit passengers on their way to a stop.

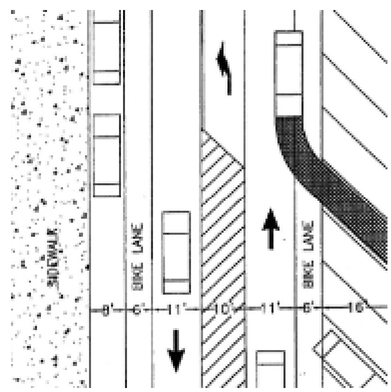
Street design guidelines may be most useful when new streets are planned, but many communities also redesign and rebuild streets to meet evolving functions. Congestion may prompt consideration of adding travel lanes, while increased retail activity might prompt consideration of allocating a travel lane for parking. These changes can often be made at minimal cost, but major investments in street construction are also an opportunity to rethink the cross-section of a street. Transit agencies can participate in these planning and investment decisions to ensure that the needs of transit and transit patrons are met.

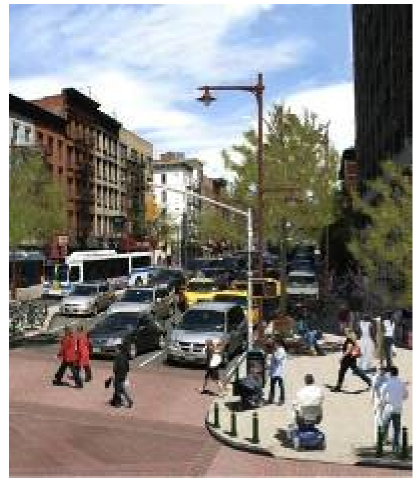
Many local jurisdictions have street design guidelines that were written primarily with the needs of automobiles in mind and were intended for new greenfield streets. Applied indiscriminately, especially in an existing context with limited right-of-way, these standards can result in very pedestrian-unfriendly streets. However, national practice has evolved to take multiple modes and context into account and to allow more flexibility.

This guidance first addresses the travelway realm of the street, where automobiles and transit vehicles move, and then the very important pedestrian realm. It then addresses crossings, where pedestrians must use the travelway. Finally, it provides guidance for streetscape.

2.2.1 Travelway guidelines

Guidelines	Examples
Provide lanes that are as narrow as is reasonable. Wide travel lanes promote higher speeds (which dramatically increase fatality rates in auto-pedestrian accidents) and increase pedestrian crossing distance. Where right-of-way is limited, wider lanes also mean less space for the pedestrian realm. To promote walkability, lanes should be as narrow as the design vehicle and design speed permits. 10 to 12 ft lanes are adequate; where buses use a street, the curb lane should be 11 ft. References: AASHTO's *A Policy on Geometric Design of Highways and Streets (AASHTO)* says that lane widths of 10 ft may be used in highly restricted areas having little or no truck traffic, that 11 ft lanes are used quite extensively for urban arterial street designs, and that 12 ft lanes should be used where practical on higher-speed, free-flowing principal arterials. *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach (An ITE Recommended Practice)* (*CSS Guidebook)* says that 10 ft lanes may be used where design speeds are 30 mph or less. 11 or 12 ft lanes should be used for speeds of 35 mph or above or if frequency of buses or tractor-trailers is high. The *Smart Transportation Guide* recommends 10 to 12 ft lanes, with 12 ft lanes for speeds over 35 mph and heavy vehicles exceeding 5 percent of traffic.	 *Photo: Christof Spieler* Bad: Wide lanes on a low-traffic street encourage speeding and lengthen crosswalks. (San Marcos, TX)
Provide as few lanes as is reasonable. Every added lane increases pedestrian crossing distance, pedestrian travel time and the risk of auto-pedestrian accidents. Five or fewer lanes are preferred. A five-lane cross-section typically provides two travel lanes and turn lane. A five-lane crossing represents 55 ft for the pedestrian to walk. If bike lanes are added, the distance increases to 65 ft. If on-street parking is added to both sides of the street, the distance becomes 79 ft. It can take nearly a minute to cross this distance; the elderly or disabled may take much longer. References: *AASHTO* notes that "because of the demands of vehicular traffic in congested areas, it is often difficult to make adequate provision for pedestrians. Yet provisions should be made, because pedestrians are the lifeblood of our urban areas." The *CSS Guidebook* says that in urban areas, thoroughfare capacity is often a lower priority than others factors such as economic development and, "higher levels of congestion are considered acceptable." The *Smart Transportation Guide* says that if a state roadway is not critical to regional movement, then levels of service of E or F should be considered.	 *Photo/rendering: Project for Public Spaces* Good: Traffic lanes are reduced to create wider sidewalks. (New York City)

Guidelines	Examples
Design right turn lanes to accommodate buses. Where lanes are dedicated for right turns, provide for through movement for buses only, and avoid double right turn lanes. Buses typically need to travel in the lane next to the sidewalk to access bus stops. Right-turn-only lanes may require a difficult lane change. However, a right-turn-only lane with a queue-jumper signal for buses is very desirable. Double right-turn lanes may create unsafe conditions for a bus, as cars may turn right in front of it, or will require locating bus stops away from the intersection so that the lane change can be made. Neither condition is recommended.	 *Photo: Christof Spieler* **Good:** Through lane for buses shared with right turns. (Houston, TX)
Provide on-street parking whenever possible. On-street parking provides a buffer between pedestrian and other motorized or nonmotorized traffic. On-street parking lanes should be 7 to 8 ft or diagonal spots with a depth of 16 ft. In transit corridors where diagonal parking is provided, reverse-angle parking is preferred. Reverse-angle parking is designed such that vehicles back in to park, then drive forward to leave. This will reduce the chances of collision with buses and other vehicles, since drivers pulling out of parking spots will see buses, automobiles and bicyclists much better than they would if they were backing out. Whenever on-street parking is provided, it is important to ensure that a bus is still able to stop by the curb so that passengers have a clear path to the vehicle. This can be done in two ways: by extending the curb outwards at the transit stop (a bulbout) or by prohibiting parking at the stop. The area where parking is prohibited needs to be clearly designated to avoid any confusion as to where parking is legal or not. "No Parking" zones must also be large enough such that buses are not attempting to board passengers around and through parked cars. Where bulbouts are not provided, Restrict any curbside parking within the bus stop zone considering the length of the bus with factor of three (3). Thus, if the bus length is 60' the restricted zone will be 180'. References: *AASHTO* notes that in urban areas, "the designer should consider on street parking so that the proposed street or highway improvement is compatible with land use." The *CSS Guidebook* endorses on-street parking: "The presence and availability of on-street parking serves several critical needs on urban thoroughfares: to meet parking needs of adjacent uses, protect pedestrians from moving traffic and increase activity on the street…" The *Smart Transportation Guide* states: "On street parking is an important part of the urban fabric. Parking lanes benefit pedestrians, since they serve as a buffer from traffic, and can reduce the speed of passing vehicles by creating side friction. Further, on street parking acts as a visual cue that tells motorists they are in a more urbanized, lower speed area. On street parking should be considered in all contexts except the rural and suburban corridor (as opposed to suburban neighborhood or center) context areas."	 *Photo: Christof Spieler* **Good:** Cars and trees together make the sidewalk feel sheltered. (Toronto)  *Diagram: Tom Hylton, Proposed High Street Traffic Calming Plan, City of Pottstown* **Good:** Reverse-angle parking  *Photo: Christof Spieler* **Good:** Bulbout allows curbside boarding with onstreet parking. (Seattle)

Guidelines	Examples
Design intersections with corners as tight as possible. This makes intersections safer for pedestrians in two ways: It reduces the length of crosswalks, and it forces cars making right turns to slow down. It increases pedestrian space at intersections, where pedestrians bunch up as they wait to cross. Curb return radii for typical urban intersections should be 10 to 25 ft radius maximum. Avoid channelized right-turn "pork chop" islands. References: *AASHTO* notes that "curb radii of only 10 to 15 feet have been used in most cities." The *CSS Guidebook* says, "A typical minimum curb return radius of 10 to 15 ft should be used where high pedestrian volumes are present or anticipated; 15 ft should be used where: volumes of turning vehicles are low; the width of the receiving intersection approach can accommodate a turning passenger vehicle without encroachment into the opposing lane; passenger vehicles constitute the majority of turning vehicles." The *Smart Transportation Guide* recommends that, "In the urban core and town center contexts, where pedestrian activity is often intense, the smallest possible curb radii should be used," noting that 10 to 15 ft is used at most urban intersections (provided that the corner building should have more setbacks not to obstruct driver's safe sight).	 *Rendering: Project for Public Spaces* Good: Tight corner at intersection. (New York City)
Design streets to accommodate bicycles. Bicycles can be accommodated with shared lanes, with striped bike lanes, or with separate bike lanes. Careful street design and signage can minimize the risk of accidents. Shared travel lanes should be included on smaller streets with marked, separate paths for bicycles on primary routes. Streets with speeds exceeding 25 mph should include a separate, striped bike lane. Bike lanes must have smooth pavement. Grates can be a hazard to bicyclists and should be designed and located carefully. Minimize conflict with other mode travel lanes. When conflict is inevitable, ensure proper marking for visual attraction, using dashed lines markings to indicate spots of potential conflict. Bicycles should not be on the sidewalk, and crossings of bike lanes and pedestrian paths should also be designed carefully. Where a street has a bike lane, bicyclists can come into conflict with transit riders getting on or off a bus. This may not be a major issue where bicycle and/or transit passenger volumes are low. Where a busy bike lane meets a busy bus stop, though, it is best to route the lane away from conflict with boarding passengers, either by providing space for bikes to pass the bus on the left or by placing the stop on a boarding island between the bike lane and the traffic lanes. References: *AASHTO* states that "The bicycle has become an important element for consideration in the highway design process." The *CSS Guidebook* says that bicycles are to be considered on all classes of routes, adding, "As the operating speeds get higher, the need for physical separation grows from shared use, to striped lanes to physically separated facilities."	 *Photo: Christof Spieler* Good: Bike lane separated from traffic. (New York City)  *Photo: Dave Feucht* Good: Streetcar stop on boarding island between bike lane and traffic lanes. (Portland)

2.2.2 Pedestrian realm guidelines

Guidelines	Examples
The key measure of a sidewalk or pedestrian path is pedestrian clear zone: a continuous paved zone with at least 7 ft of vertical clearance and no surface obstructions of any sort.	 *Photo: Christof Spieler* **Bad:** Example of inadequate pedestrian realm. (Houston)
The minimum width of the clear zone should be 5 ft. This will allow two people to pass comfortably, or two people to walk comfortably alongside each other. It is also the minimum width in which two wheelchairs can pass. While 5 ft is a minimum, a wider clear zone is better. A 6 ft clear zone will be more enjoyable for two people to walk on than a 5 ft clear zone. Clear zone width should respond to the expected or desired pedestrian activity levels or the immediate context. Paths that will carry high volumes of pedestrian need to be designed for that volume and may need to be wider than minimum standards indicate. 10 or 15 ft wide clear zones are common in high-pedestrian-activity areas like CBDs, dense mixed-use areas or university campuses. Off-street multi-use paths where bicyclists and pedestrians both use the facility should have a minimum 12 ft clear zone. **References:** *AASHTO* recommends 4 to 8 ft sidewalks. The *CSS Guidebook* recommends a minimum clear pedestrian zone in constrained areas of 5 ft in residential areas and 6 ft in commercial areas, with a preferred dimension of 6 to 10 ft, with wider zones in very high-volume areas. The *Smart Transportation Guide* recommends 8 to 10 ft clear zones for major roadways in town center and urban core contexts and 5 to 8 ft in most context types.	 *Photo: Christof Spieler* **Good:** Wide clear zone. (Tempe, AZ)  *Photo: Christof Spieler* **Bad:** Narrow sidewalk with even narrower clear zone. (Houston, TX)

Guidelines	Examples
Between the clear zone and the street there should be a buffer zone, which consists of an edge zone and a street furnishings zone. The edge zone allows for overhangs of parked cars, car doors, and mirrors. The furnishings zone is the location for any poles, light poles, boxes, street furniture or trash receptacles, none of which can be in the clear zone. The combined buffer zone also buffers pedestrians from traffic. The buffer zone can also be used for landscaping including street trees. However, the buffer zone should always be paved at transit stops and at onstreet parking. In most urban conditions, a paved buffer zone with street trees in tree wells, rather than a continuous green strip, is most appropriate. References: *AASHTO* recommends a minimum 2 ft buffer. The *CSS Guidebook* recommends a 1.5 ft edge zone for parallel parking and an edge zone of up to 2.5 ft for angled parking, in addition to a street furnishings zone, for a minimum edge and furnishing zone of 3 feet in residential areas and 4 feet in commercial areas.	 *Photo: Christof Spieler* Good: Obstacles clustered at curb. (Seattle, WA)
Minimize driveways or curb cuts that impede pedestrian movements.	 *Photo: Christof Spieler* Bad: Numerous driveways interrupt sidewalk. (Houston, TX)
The 2 ft immediately in front of a building or tall landscaping will not be used by pedestrians and will tend to attract minor urban clutter. This "frontage zone" should not be considered part of the clear zone even if it is paved. Low obstacles are acceptable in this zone. References: The *CSS Guidebook* specifies a minimum1 ft frontage zone with residential uses and a 2 foot frontage zone with commercial uses.	 *Photo: Christof Spieler* Good: Clutter at buildings does not block sidewalk. (Portland, OR)

Guidelines	Examples
Adequate space should be provided where activities such as sidewalk cafes, street vendors and performances take place so that they do not impinge on the clear zone. An additional 8 to 15 ft alongside the clear zone should be added to accommodate such activities.	 *Photo: Christof Spieler* Good: Wide sidewalk leaves room for diners and pedestrians. (Austin, TX)
Site constraints or local regulations may dictate smaller or wider sidewalks. However, sidewalks should not be narrowed unless other street elements (i.e., traffic lanes) have been minimized. ADA will permit a 3 ft wide path if passing areas of 5 ft by 5 ft are provided at reasonable intervals, not to exceed 200 ft. However, this represents an inconvenience to wheelchair users and should be avoided.	 *Photo: Christof Spieler* Bad: Narrow, congested sidewalk alongside wide traffic lane. (Los Angeles)
Provide a maximum slope of 5 percent. On sloping paths, provide level areas every 400 ft, preferably with benches for resting.	 *Photo: Christof Spieler* Good: Ramps integrated into plaza with level areas. (San Francisco, CA)
Eliminate hidden or recessed areas above or below grade, in alleys, walls, dense planting, and storage and service areas.	 *Photo: Christof Spieler* Good: Simple canopy maintains visibility. (San Francisco, CA)

Guidelines	Examples
Provide illumination at night. Lighting no greater than 12 ft in height should be provided to distinguish the pedestrian network. Street lighting is not necessarily adequate for sidewalks, and off-street paths need their own lighting fixtures.	 *Photo: Christof Spieler* **Good:** Path lit with pedestrian-scale lights. (Phoenix, AZ)

2.2.3 Crossing guidelines

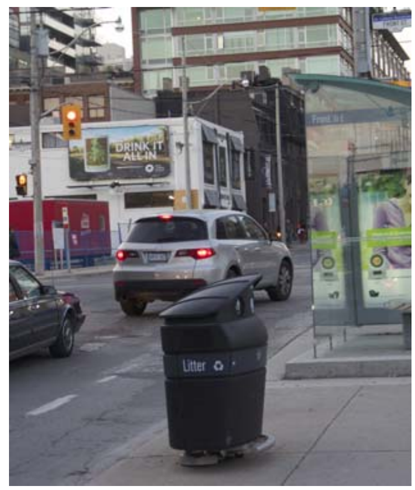
Guidelines	Examples
Avoid elimination of any travel mode in intersection design. Every intersection should accommodate pedestrians and bicyclists as well as motorists. Provide complete pedestrians crossings at every intersection. Forcing pedestrians to detour to a major intersection to cross a street can greatly increase trip time and thus discourage pedestrian activity. Provide safe and protected pedestrian crossings at each corner of the intersection. Eliminating a crossing on one side of an intersection can triple the distance and time it takes for a pedestrian to cross a street. This inconveniences pedestrians and encourages jaywalking. The preferred location for pedestrian crossings is at intersections. However, where blocks are long or where there is a high concentration of pedestrian activity, mid-block crossings can be useful.	 *Photo: Project for Public Spaces* **Good:** Intersection serves cars, pedestrians, bicyclists and transit. (Toronto, CA)

Guidelines	Examples
Time traffic signals to allow pedestrians ample time to cross a street. Children and the elderly require one second for every 3.5 ft. Traffic signals must be designed to function for all modes, including bicycles and the visually impaired. References: *Highway Capacity Manual 2010* says that changes in signal timing are sometimes used to improve safety at intersections. Conversely, changes to improve traffic flow may have adverse effects on the safety of pedestrians and cyclists. The *CSS Guidebook* says that traffic engineering strategies can be highly effective in improving intersection safety. Effective measures include increasing the size of signal lenses from 8 to 12 in. to increase their visibility; providing separate signal faces over each lane; installing high-intensity signal indications; and changing signal timing, including the length of yellow-change and red-clearance intervals. Consider protected left-turn phasing as a strategy to reduce vehicle pedestrian conflicts. *Green Lights for Bikes* suggests using inductive loops at intersections that will detect when metal passes over them (i.e. a bicycle), placing a request for a green signal. This is beneficial in that it does not require the bike rider to stop to push a button for a signal. An inductive loop in a bicycle lane is unlikely to detect vehicles in the adjacent traffic lane, provided the edge of the loop is at least 700mm from the general traffic lane.	 *Photo: Christof Spieler* Good: Children safely using a crosswalk. (Portland, OR)
Where streets have on-street parking, crossing widths can be reduced by curb extensions (bulbouts) into the intersection. The same bulbouts can be extended and used as transit stops.	 *Photo: Christof Spieler* Good: Curb bulbouts define parking and narrow crosswalks. (Mercer Island, WA)

Guidelines	Examples
Provide ADA-compliant wheelchair ramps (two per corner) at all intersections. A single ramp directs the disabled diagonally into the center of the intersection and into the path of traffic; it also encourage cars to cut the corner. Reference: The *FHWA Best Practices Guide* says, "In many situations, diagonal curb ramps are not recommended. Diagonal curb ramps force pedestrians descending the ramp to proceed into the intersection before turning to the left or right to cross the street. This problem is worse at intersections with a tight turning radius and without on-street parking because wheelchair users are exposed to moving traffic at the bottom of the curb ramp. Furthermore, diagonal curb ramps can make it more difficult for individuals with vision impairments to determine the correct crossing location and direction."	 *Photo: Christof Spieler* Bad: Single ramp directs pedestrians into traffic. (Houston, TX)  *Photo: Christof Spieler* Good: Double ramps align with crosswalks. (Kirkland, WA)
If a raised median nose extends into the crosswalk, provide an ADA-compliant channel through the median. This protects pedestrians from turning cars.	 *Photo: Christof Spieler* Good: Break in median accommodates wheelchairs and provides pedestrian refuge. (Kirkland, WA)
Use different paving surfaces at crossings to provide visual identification of pedestrian routes for cars, auditory identification of pedestrian routes for cars, tactile identification of driving routes for pedestrians, and traction to reduce the risk of slipping and falling. However, keep in mind that surfaces with large gaps such as cobblestone or brick can be difficult for individuals with wheelchairs or walkers to navigate.	 *Photo: Christof Spieler* Good: Paving marks crosswalk. (Houston, TX)

Guidelines	Examples
Provide enough illumination to light all four corners of urban intersections with striped crosswalks.	 *Photo: Christof Spieler* **Good:** Well-lit intersection. (San Francisco, CA)

2.2.4 Streetscape features guidelines

Guidelines	Examples
Provide regularly spaced garbage receptacles, particularly in areas where people may pause or linger.	 *Photo: Christof Spieler* **Good:** Trash receptacle (with recycling) provided at bus stop. (Toronto, Ontario)
Provide quality benches, tree guards, street lighting, bicycle racks and garbage receptacles. Consistent, repeated use of a design or material helps tie together the streetscape environment.	 *Photo: Capital Metro* **Good:** Well-designed, matching street furniture. (Austin, TX)

Guidelines	Examples
Street trees, landscaping, shrubs or other streetscape design features should be used to provide a separation between the vehicular traffic and the pedestrian traffic. The width of this edge treatment (trees, shrubs, etc.) will be dependent on and proportional to the overall right-of-way. Tree wells or grates should be used instead of continuous planting strips where there is on-street parking or where pedestrian activity is heavy. Street trees increase the desirability of pedestrian activity by providing shade. Trees in center medians reduce the perceived width of the street.	 *Photo: Christof Spieler* **Good:** Large trees provide generous shade. (Tempe, AZ)
Select tree species whose canopy does not encroach into pedestrian headroom or tall curbside vehicles such as buses. A minimum spacing as low as 12 ft is possible, depending on the species.	 *Photo: Christof Spieler* **Good:** Trees do not limit clearance for buses. (Houston, TX)

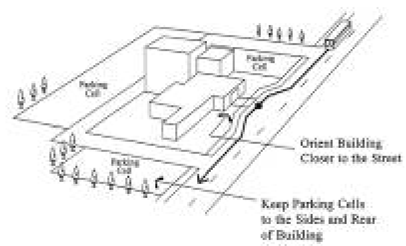
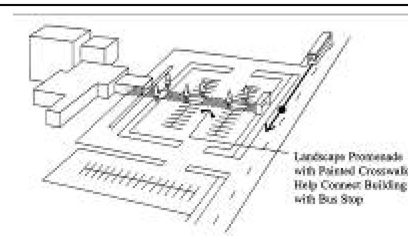
2.3 Surrounding land uses

Buildings, both public and private, significantly impact the quality of the pedestrian environment. Buildings can offer pedestrians safety, security, wayfinding, protection from the elements and amenities. Buildings can also contain uses, such as retail, which increase pedestrian activity.

Land use guidelines may be most useful to transit agencies when there is an opportunity to participate in a local jurisdiction's review of new development, for example through a design review process. They may also help advise developers and others who wish to design buildings in a way that promotes walking, transit and biking. Transit agencies may have more direct responsibility when engaged in joint development projects.

Guidelines	Examples
Development and redevelopment projects of all sizes could provide opportunities to improve the pedestrian experience or remove barriers to pedestrian access to transit stops. All projects, including projects that on the surface do not appear to have an impact on transit access (e.g., a service station or a fast food restaurant), and projects not adjacent to the transit route but within the walkshed of a transit stop should be reviewed for opportunities to construct sidewalks, provide a new direct pedestrian link or improve the safety and environment of the pedestrian experience.	 *Photo: Christof Spieler* **Good:** Passageway to light rail station integrated into building. (Jersey City, NJ)

Guidelines	Examples
Provide retail, personal service, restaurants, cafes and residences on the ground floor to provide services that may be helpful to transit riders, and make adjacent sidewalks more appealing to pedestrians.	 *Photo: Christof Spieler* **Good:** Coffee shop at bus/subway transfer node. (Los Angeles)
Locate buildings next to sidewalks. Parking lots should never be constructed between buildings and streets. Locating buildings next to sidewalks minimizes walking distance for pedestrians and transit customers needing to access those buildings. Buildings adjacent to sidewalks also provide shade and shelter from wind. Add architectural elements such as canopies that provide additional shade and shelter from rain. Avoid architectural elements that increase the effect of the elements, such as buildings that channel wind, downspouts that channel water onto sidewalks, and reflective facades that direct summer heat onto pedestrians.	 *Photo: Christof Spieler* **Good:** Canopy protects from rain. (Portland, OR)
Maintain large windows facing the transit facilities, providing eyes on the street. Avoid the use of burglar bars, barbed wire and other security features that indicate the presence of crime.	 *Photo: Project for Public Spaces* **Good:** Windows make the sidewalk feel inviting. (South Orange, NJ)

Guidelines	Examples
Locate building front doors to open directly onto sidewalks. Transit patrons should not be forced to walk across parking lots to access jobs, residences or services.	 *Photo: Christof Spieler* **Good:** Front door to grocery store welcomes pedestrians. (Portland, OR)  *Diagram: TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996*
Where existing buildings are set back from sidewalks, provide pathways to building front doors. Where existing berms or verges block paths, create breaks for access to transit facilities.	 *Diagram: TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996*
Design plazas or open spaces that visually connect important components of the transit facility around its perimeter at a pedestrian scale and encourage pedestrians to linger. However, underused plazas can be a deterrent to pedestrian activity because they make pedestrians feel isolated and vulnerable. Locate plazas where pedestrian activity is high, where building land uses face the plaza, and where there are uses for the plaza.	 *Photo: Christof Spieler* **Good:** Plaza connects transit station with retail. (Portland, OR)

2.4 Location of stops

Locating transit stops so that they are accessible to people is considerably easier when there is high street connectivity and when streets and adjacent land uses are designed with the comfort and convenience of pedestrians and transit users as an objective. Transit planners know too well that these ideal conditions are often not present. While there may be situations where it is simply too dangerous or ineffective to provide a transit stop, it is more likely that stops need to be placed to be as accessible as possible given the circumstances.

The following guidance is intended to inform transit stop location decisions, stop design and provision of amenities at stops. These decisions and investments may be under the direct control of the transit agency. The guidance may also help communicate to the public or other agencies the rationale for stop locations, design and other provisions.

2.4.1 Stop spacing guidelines

Guidelines	Examples
Stop spacing requires the need to balance the operating needs of the transit system (fewer stops reduce in-vehicle travel time for customers and can reduce operating costs) with considerations of the distance customers must walk to access the stop (fewer stops can increase walk distance and out-of-vehicle travel time for customers). When determining the location of transit stops, whether as part of a transit stop evaluation/rationalization program on existing routes, locating stops on new route segments, or responding to requests to relocate a transit stop, the paths transit customers will use to access the stop from the catchment area of the stop need to be taken into consideration. When designing for pedestrian access, the majority of activity will be generated within ⅛ to ¼ mile of the stop. See APTA-SUDS-UD-RP-001-09 for more information on determining areas of influence around transit stops. The size of this catchment area will be influence by topography, street connectivity and the presence of barriers like freeways. Locate and space stops so that as many destinations as possible fall within this zone.	 *Photo: Christof Spieler* **Good:** Bus stops in center of high-activity area. (New York City)
When reviewing projects located at intersections, careful consideration needs to be given to the location of driveways so that transit stops will not be located further from the intersection than necessary. Locating a stop too far from the intersection may encourage unsafe jaywalking and increase the distance the customer must walk to transfer if the intersection is a transfer point.	 *Photo: Christof Spieler* **Good:** Bus stop directly at intersection with crosswalk. (Houston, TX)

2.4.2 Stop location guidelines

The location of a bus stop relative to an intersection is driven by traffic conditions and the transit route. Every site will present a unique set of issues, and locating a bus stop presents a context-sensitive design issue. This document cannot exhaustively address all of the issues that may arise in the process of stop location and there is no substitute for careful local analysis when determining stop locations. See TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996 for more information.

FIGURE 2

Bus Stop Locations

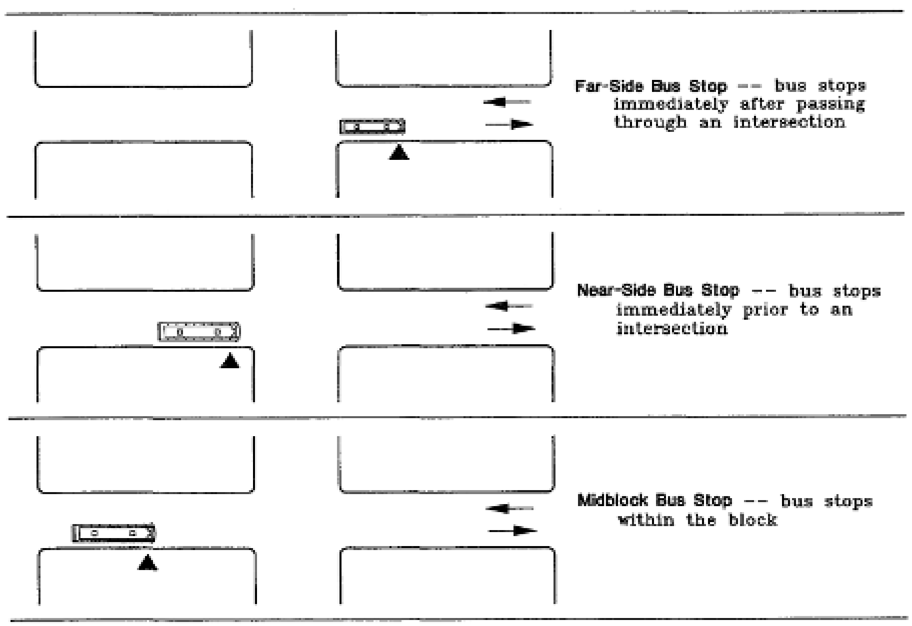


Diagram: TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996

The following is a checklist of the most important considerations from TriMet's recently updated version of *Bus Stops Guidelines*:

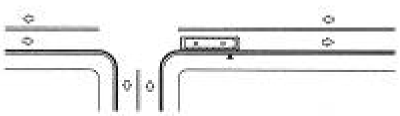
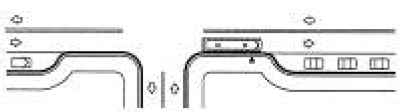
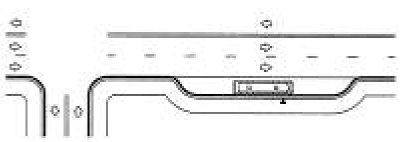
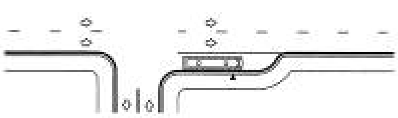
- Safety
  - Waiting, boarding and alighting must be safe
  - Steer riders toward safe street crossings
  - Watch for other pedestrians
  - Consider impacts on other traffic
  - Provide adequate sight distance, i.e., provide visibility for bus driver and waiting riders
- Travel time delays
  - Farside allows signal treatments to work most effectively
  - Alternate placement nearside-farside if signals occur at every stop
- Service quality tradeoffs – fewer stops mean:
  - Faster and more efficient service
  - More potential for amenities at each stop
  - Longer walk distance to stops for some
- Stops must be suitable for bus operations
- Impacts on traffic
- Accessible for all
  - Slope – no more than 2% for level surfaces, 8% for ramps
  - If necessary, construct 5" x 8" concrete pad at stop
  - Check for curb ramps at intersection and on surrounding streets
  - Direct routes and comfortable, safe walking environment to stop
- Ensure compatibility with adjacent properties

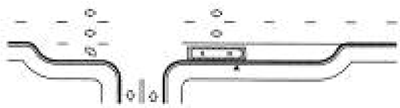
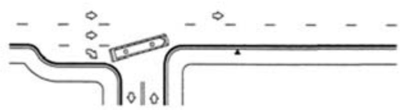
2.4.3 Stop geometry

The geometry of the stop is driven by the size of the stop (which depends on the type of vehicle used), the requirements for general traffic lanes, and the availability of right-of-way.

Side of street

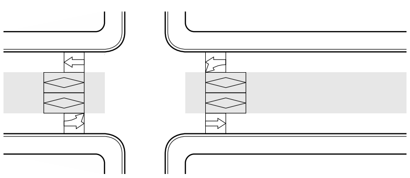
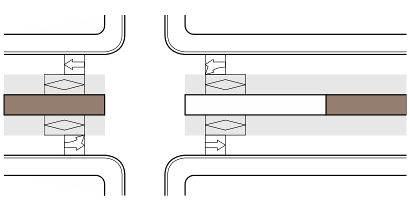
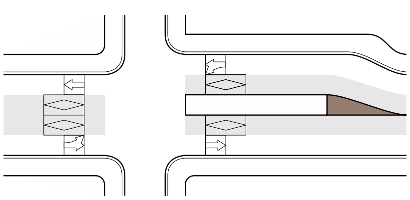
The most common location for transit service is on the side of the street, usually in mixed traffic lanes but sometimes in exclusive lanes. Side-of-street alignments permit the use of simple stops on the sidewalk and are generally less expensive to construct than center-of-street alignments. On one-way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

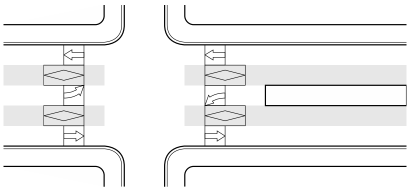
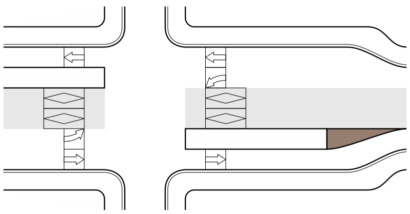
Type	Advantages	Disadvantages	Suitability
Side of street: Curbside stop  *Diagram: TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996*	Provides easy access for bus drivers and minimal delay for bus; simple in design, easy to install and relocate.	Traffic can back up behind the bus; auto drivers may make unsafe movements to avoid being caught behind the bus; no parking zone will require loss of on-street parking.	Most common type of stop.
Side of street: Nub  *Diagram: TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996*	Removes fewer parking spaces; improves pedestrian movements at the intersections; provides additional sidewalk area for pedestrians; results in minimal delay for the bus.	For existing development, there would be some construction cost; traffic can back up behind the bus; auto drivers may make unsafe movements to avoid being caught behind the bus.	Use when there is adequate space in the right-of-way and sidewalk can be altered; nub design also works well for pedestrian crossings at the corner.
Side of street: Bus bay with acceleration and deceleration lane  *Diagram: TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996*	Passengers get on and off the bus away from the travel lane; minimizes delay to through traffic,	Bus drivers may have problems merging back into traffic, causing delay to bus and potential for accidents; for existing development, there would be some construction cost; alters the street and sidewalk.	Use when there is no on-street parking; there is a high volume of traffic; street traffic speeds are 40 mph; traffic exceeds 250 vehicles during the peak hour; bus needs layover time at end of route.
Side of street: Open bus bay  *Diagram: TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996*	Has same advantages as bus bay, plus allows bus to decelerate as it moves through the intersection.	Bus drivers may have problems merging back into traffic, causing delay to bus and potential for accidents; for existing development, there would be some construction cost; alters the street and sidewalk.	Use when there is no on-street parking; there is a high volume of traffic; street traffic speeds are 40 mph; traffic exceeds 250 vehicles during the peak hour; bus needs layover time at end of route.

Type	Advantages	Disadvantages	Suitability
Side of street: Queue jumper bus bay  *Diagram: TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996*	Has same advantages of bus bay and open bus bay, plus allows bus to bypass traffic queues at a signal, improving bus speed and reliability.	May cause delays to right-turning vehicles; for existing development, there would be some construction cost; alters the street and sidewalk.	Use when right-turn-only lane provides best alternative for bus stop at intersection; there is no on-street parking; there is a high volume of traffic; traffic exceeds 250 vehicles during the peak hour.
Side of street: Bus stop in right-turn-only lane with queue jumper (no bay)  *Diagram: Modified from TCRP Report 19, Guidelines for the Location and Design of Bus Stops, 1996*	Provides easy access for bus drivers and minimal delay for bus; allows bus to stop close to intersection to minimize walk to connecting bus stops; can give priority to buses in congested areas; does not block through travel lanes.	May cause delays to right-turning vehicles; for existing development, there would be some construction cost; alters the street and sidewalk.	Use when right-turn-only lane provides best alternative for bus stop at intersection; there is no on-street parking; there is a high volume of traffic; traffic exceeds 250 vehicles during the peak hour.

Center of street

Center-of-street alignments work well for exclusive guideways in two-way streets.

Type	Advantages	Disadvantages	Suitability
Center of street: No platform  *Diagram: Christof Spieler*	Inexpensive; requires minimum space.	Unsafe for passengers; no level boarding possible; difficult to provide accessibility.	Use only in low-traffic situations with vehicles that have onboard lifts. Generally obsolete, but common in some legacy systems.
Center of street: Center platform with continuous median  *Diagram: Christof Spieler*	No curves in guideway; room for landscaping between platforms.	Increases right-of-way requirements between stations; requires left-side boarding doors in vehicle; dedicated left-turn lanes require additional right-of-way.	Use when right-of-way permits and when landscaped medians will enhance the street. Well suited to close stop spacing.
Center of street: Center platform with discontinuous median  *Diagram: Christof Spieler*	Reduces right-of-way requirements.	Requires left-side boarding doors in vehicle; dedicated left turn lanes require additional right-of-way.	Use when right-of-way is limited.

Center of street: Center platform with center turn lanes  *Diagram: Christof Spieler*	Reduces right-of-way requirements.	Left-turning vehicles have to merge across transit guideway, increasing accident risk; stations cannot be located at intersections with left-turn lanes, making pedestrian access to platforms more difficult or restricting vehicle movements.	Use when turn lanes are important and there is not sufficient right-of-way to provide them to the right of the guideway.
Center of street: Side platforms  *Diagram: Christof Spieler*	Efficiently provides dedicated left-turn lanes to the right of the guideway.	Increases right-of-way width.	Use when right-of-way permits.

2.5 Design of stop

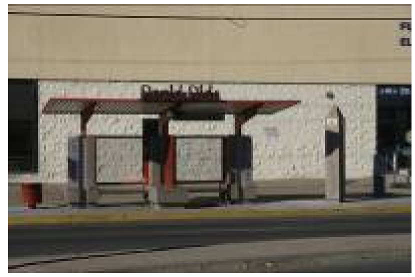
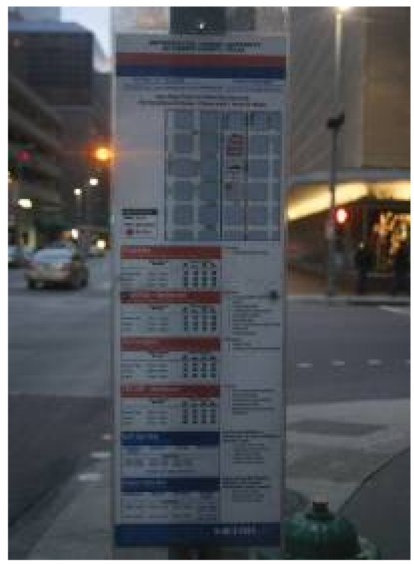
The stop itself serves several purposes:

- It signals the presence of transit service.
- It provides information about the transit service that is provided.
- It provides information about the surrounding destinations.
- It provides a place for passengers to wait comfortably and securely.
- It may provide a place to park a bicycle.
- It provides a place for the transit vehicle to pause.
- It provides a surface for passengers to board the vehicle.

The following guidance is designed to help transit agencies design stops that meet these needs well. It is not intended to address the technical details of how to make a stop compatible with different transit vehicles.

The first item to consider is how passengers on their way to transit will locate the stop and identify the service provided and how passengers arriving by transit will locate surrounding destinations.

2.5.1 Stop wayfinding guidelines

Guidelines	Examples
Provide signage that clearly indicates the presence of transit service. Transit stop signs should be distinctive. From a distance of 300 to 500 ft in both directions, the shape, color and reflectiveness of the sign should identify the area as a transit stop to anyone on foot or driving, even if the person can't read the wording on the sign. Transit stop signs can serve as a marketing tool for the transit agency as well as provide critical information for the transit customer.	 *Photo: Christof Spieler* **Good:** Distinctive stop with signage visible from a distance. (Albuquerque, NM)
Provide information on the transit service provided. At a minimum, this should include: • phone number and website of transit agency; • name or identification of stop; • routes that serve the stop; and • destinations of routes that serve the stop. To encourage casual and first-time riders, additional information is needed: • fare information; • schedule or frequency of service (including time of first and last service of the day); • real-time arrival information (provided through a display at the stop or via a patron's mobile phone); and • route map and/or system map. • contact information for the transit police Refer to ADA access guidelines for specifics on letter and number size and color.	 *Photo: Christof Spieler* **Good:** Information panel at stop. (Houston, TX)

Guidelines	Examples
Use signage and shelter design to signal the presence high-quality service. This may include rail service, BRT, express routes or high-frequency routes.	 *Photo: Aspet Davidian* **Good:** “Rapid” stop looks different from typical local bus stop. (Los Angeles, CA)
When possible, design the stop and the surroundings such that a person’s final destination is visible from the stop. Line-of-sight connections are preferable to signage.	 *Photo: Christof Spieler* **Good:** Basketball arena is visible from light rail stop. (Los Angeles, CA)
Provide indoor and outdoor signage and wayfinding elements to help direct transit users to and from the station and transfer points, and to other neighborhood destinations.	 *Photo: Christof Spieler* **Good:** Signage designed for pedestrians. (Seattle, WA)

Guidelines	Examples
Provide signage that designates bicycle routes and shows distances to intersecting transit facilities or nearby destinations. Use standard (local) transit agency symbols and lettering for identification on signs directing riders to/from bikeways to/from transit stops.	 *Photo: Christof Spieler* **Good:** Bicycle route signage adjacent to bus stop. (Portland, OR)
Design all signage to respect building scale, architectural features and the established design objectives of the streetscape.	 *Photo: Christof Spieler* **Good:** Pedestrian signage integrated into streetscape. (Houston, TX)

2.5.2 Stop amenities guidelines

Incorporate, concentrate and coordinate amenities for pedestrians that improve the overall experience of using transit. Levels of passenger activity or the types of passengers (e.g., schoolchildren, people with disabilities or elderly people), may warrant the placement of seating or covered seating areas.

Guidelines	Examples
Prohibit parking along any curb or platform where the transit vehicle will stop so that passengers have a clear path to the vehicle. The area where parking needs to be prohibited needs to be clearly designated to avoid any confusion as to where parking is legal or not. Never assume that a driver knows where not to park. Designating the no-parking zone should be by a means separate from the transit stop sign. The preferred method is painting the curb in the appropriate no-parking color. An alternate is separate no parking signs clearly delineating the length of the zone.	 *Photo: Christof Spieler* Good: Parking clearly prohibited at bus stop. (Las Vegas, NV)
Construct a landing pad for passengers to board or alight the vehicle, based on the vehicle design and location of doors. A typical bus stop pad to allow the operation of a wheelchair lift or ramp requires: • a firm, stable surface (concrete, asphalt or pavers, depending on surrounding materials); • a minimum clear length of 96 in. (measured from the curb or vehicle roadway edge); • a minimum clear width of 60 in. (measured parallel to the vehicle roadway) to the maximum extent allowed by legal or site constraints; and • a cross slope not to exceed 2 percent. These guidelines should be verified with local and national accessibility requirements and with vehicle specifications.	 *Photo: DART* Good: Wheelchair user being let off on landing pad. (Dallas, TX)
Connect pad to streets, sidewalks or pedestrian paths by an accessible route. The slope of the pad must meet accessibility requirements but should be the same as the parallel roadway to the extent practicable. For water drainage, a maximum slope of 1:50 (2 percent) perpendicular to the roadway is allowed.	 *Photo: Christof Spieler* Bad: No landing pad, no ramp, no connecting sidewalk. (Houston, TX)
Provide benches for passenger to wait. Locate the benches so that passengers seated on them can see approaching vehicles. Ensure that benches do not intrude into the landing pad or the pedestrian clear zone.	 *Photo: Christof Spieler* Good: Passenger using bench. (Houston, TX)

<table>
<tr><th>Guidelines</th><th>Examples</th></tr>
<tr><td>
Provide shelters to protect waiting passengers from the elements.
Do not place shelters in the pedestrian clear zone. Locate shelters so that they do not impair operation of wheelchair lifts.
A minimum distance of 2 ft should be maintained between the back-face of the curb and the roof or panels of the shelter. Greater distances are preferred to separate waiting passengers from nearby vehicular traffic.
Shelters should be located at the end of the transit stop zone so they are highly visible to approaching buses and passing traffic and to reduce walking distance from the shelter to the bus. Locate shelters so that passengers in the shelter can see approaching vehicles.
Shelters should not be located directly in front of store windows. When shelters are directly adjacent to a building, a 12 in. clear space should be preserved to permit trash removal or cleaning of the shelter.
A minimum clear entrance (doorway) of 32 in. is recommended. The entrance may be constructed as part of the “path of travel,” but then it must be 36 in. wide minimum
A minimum clear floor area measuring 30 in. wide by 48 in. long, completely within the perimeter of the shelter, must be provided. A rider using a wheelchair or other mobility aid must be able to enter the shelter from the public way and reach the 30 in. by 48 in. clear floor area.
A minimum 7.5 ft clearance between underside of roof and sidewalk surface is desired.
Light shelters when existing streetlights do not provide adequate lighting. Proper lighting is important for the safety and security of transit patrons.
Shelters should be designed to protect from wind, rain, wind-driven rain and harsh sun. Local climactic conditions will influence shelter design. Most shelters require both a roof and side panels to be effective. A good shelter is both practical and attractive.
Bus stops and their surroundings should be designed according to the principles of Crime Prevention Through Environmental Design, paying particular attention to sight lines and visibility. For example, the materials used to construct shelters should be as transparent as possible so that a rider waiting at the stop can see his/her surroundings.
Reference:
Crime Prevention Through Environmental Design says that bus shelters should be well lit with vandal resistant lighting and located with unobstructed sightlines to the footpath, street and any nearby buildings. Bus shelters should be designed to permit people to observe inside the shelter as they approach e.g. by constructing shelters with one or 2 transparent or semi-transparent walls.
</td><td>

Photo: Christof Spieler
Good: Shelter protects passengers from rain. (Portland, OR)
</td></tr>
</table>

Guidelines	Examples
Use pedestrian-scale landscaping, pavement color and texture, street furniture components, plazas and kiosks to increase the visual variety and attractiveness of the station facilities.	 *Photo: Christof Spieler* Good: Light fixtures, banners, shelter, paving, and plantings establish pedestrian scale at transit center waiting areas. (Tempe, AZ)
Provide trash receptacles at boarding areas. These may be required even when boardings are low because of surrounding uses (e.g., a transit stop near a fast food restaurant). Guidelines for placement of a trash receptacle are as follows: • Anchor the receptacle securely to the ground to reduce unauthorized movement. • Locate the receptacle away from wheelchair landing pad areas, and allow for at least a 3 ft separation from other street furniture. • Locate the receptacle at least 2 ft from the back of the curb. • Ensure that the receptacle, when adjacent to the roadway, does not visually obstruct nearby driveways or land uses. • Avoid installing receptacles that have ledges or other design features that permit liquids to pool or remain near the receptacle (this may attract insects). • If possible, attempt to locate the receptacle away from direct sunlight; heat may cause foul odors to develop).	 *Photo: Capital Metro* Good: Trash can at stop. (Austin, TX)
At stops with high bicycle use, such as stops near universities or adjacent to bike paths, provide bicycle storage. Bicycle storage is useful even where bikes are permitted on transit vehicles, since the number of bikes than can fit on one vehicle is generally limited. Locate bicycle storage outside of the landing pad and pedestrian clear zone and such that it does not intrude on waiting passengers. Use defensible spaces that are physically and visually accessible, while avoiding areas with low visibility. All bike racks must be positioned to provide 2 ft by 6 ft of space per bicycle. Racks should provide 48 in. aisles measured from tip to tip of bike tires across the space between racks to accommodate one person being able to walk one bike through the aisle. 72 in. of depth should be allowed for each row of parked bikes. The rack should be located no less than 24 in. from walls. Inverted U racks should be at a minimum of 36 in. apart. Rental lockers for regular users may be provided in addition to racks where the demand exists and space permits.	 *Photo: Christof Spieler* Good: Local bus stop adjacent to off-street bike path with bike racks. (Seattle, WA)

Guidelines	Examples
At sites where high levels of cyclists are currently using, or will use, the station, provide or support other entities to provide amenities such as changing rooms, lockers and shower facilities in office buildings for employees to encourage cycling and transit use.	 *Photo: Christof Spieler* Good: Bike lockers for regular bike commuters. (Seattle, WA)

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Abbreviations and acronyms

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
CBD	central business district
CSS	Context Sensitive Solutions
FHWA	Federal Highway Administration
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
TOD	transit-oriented development