



APT STANDARDS DEVELOPMENT PROGRAM  
**RECOMMENDED PRACTICE**

American Public Transportation Association  
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# Bus Stop Design and Placement Security Considerations

**Abstract:** This *Recommended Practice* provides guidance on the security concerns to transit agencies when considering the design and placement of bus stops.

**Keywords:** bus stop design, bus stop placement, crime prevention through environmental design (CPTED), considerations, security, threat vulnerability assessment

**Summary:** Bus stops help define boundaries, channel access and egress of passengers and provide visual barriers. Bus stops should be integrated with other security measures, including CPTED, lighting, barriers, etc., to optimize protection and complement security solutions.

**Scope and purpose:** This document establishes recommended practices for the design, installation and maintenance of bus stops. APTA recommends the use of this *Recommended Practice* by any entity, public or private, that regulates, inspects, designs, specifies, builds, maintains and/or operates public transportation facilities.

This Recommended Practice represents a common viewpoint of those parties concerned with its provisions, namely, transit operating/planning agencies, manufacturers, consultants, engineers and general interest groups. The application of any standards, practices or guidelines contained herein is voluntary. In some cases, federal and/or state regulations govern portions of a rail transit system's operations. In those cases, the government regulations take precedence over this standard. APTA recognizes that for certain applications, the standards or practices, as implemented by individual rail transit agencies, may be either more or less restrictive than those given in this document.



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## 1. Stakeholder considerations

The first point of contact between the passenger and the transit system is the bus stop/shelter. Many factors influence the design and placement of the bus stop/shelter. Transit agencies, city government, developers, employers, neighborhood groups and passenger destinations are significant influences to safe and secure bus stop/shelter placements. More so, to satisfy passenger safety and security demands, the influences of functional requirements and operational needs of the service area should be addressed. These include transit system performance, traffic flow, safety and security. At a minimum, each of these concerns should be reviewed when addressing the security concerns for the appropriate placement of a bus stop/shelter.

## 2. Risk assessment considerations

### 2.1 Systemwide risk assessment

Each transit agency should conduct and document a security risk assessment of its system and use the output as a guide to determining bus stop design considerations. The assessment should be holistic and consider the total transit environment, both static and mobile. The security risk assessment should evaluate the following:

- transit operating environment
- personnel (both managers and front-line staff)
- facilities and infrastructure
- policy and procedures
- surrounding non-transit environment

### 2.2 Specific bus stop risk assessment

Each transit agency should conduct and document a security risk assessment of bus stops in its system. The assessment should be holistic and consider the total transit environment, both static and mobile.

## 3. Crime prevention through environmental design

CPTED is a multidisciplinary approach to deterring criminal behavior. Applying CPTED principles (e.g., natural surveillance, natural access control and territorial reinforcement) to the design and placement of a bus stop/shelter location is essential to identifying space issues and concerns.

Each transit agency should complete a CPTED survey to identify and recommend the appropriate enhancements to implement crime prevention or homeland security measures. The *Recommended Practice* “Application of Crime Prevention Through Environmental Design (CPTED) for Public Transit Facilities” should be reviewed. It contains information about performing a CPTED survey.

### 3.1 Natural surveillance

Natural surveillance is the ability to observe the whole environment without taking extraordinary measures to do so. The following sections detail strategies for providing natural surveillance.

#### 3.1.1 Clear lines of sight

The optimum location and design of the amenities should permit 360-degree visibility in and around the bus stop at all times. Primary emphasis should be placed on a clear line of sight for the approach direction of buses servicing the stop.

Bus stop amenities should minimize hiding places for packages and people and encourage clear lines of sight. This includes under the seating, advertising and information display areas, and the shelter roof lines. Windbreaks and shelter glass should be designed with graffiti-resistant materials that provide sufficient

visibility. Consideration should be given to changes in grade, retaining walls or other obstructions that may create areas of concealment.

### 3.1.2 Lighting

Illumination levels at night can act as a deterrent from criminal activities. A lighting level evaluation during hours of darkness should be considered. The following steps are recommended:

- Use multiple lights rather than single fittings to provide consistent lighting levels and to reduce contrast between shadow and light.
- Place lighting where it will not be blocked by mature vegetation.
- Avoid placement of unshielded lighting at eye level.
- If possible, install lighting at height levels that resist vandalism.
- Use downward lighting.
- Maximize use of existing lighting when possible.

### 3.1.3 Landscaping

Landscaping should not interfere with clear lines of sight by passing vehicles and pedestrians. A basic CPTED premise is to plant trees with foliage no lower than 6 to 7 feet and shrubs and ground vegetation that grow no higher than 2 to 3 feet. Landscaping should not create areas where items or people could be hidden.

## 3.2 Natural access control

Natural access control determines who can or cannot enter a facility. Because of its open nature, access control is very difficult in a transit environment. However, certain design strategies could be implemented to not attract unwanted activity.

## 3.3 Territoriality

Territoriality consists of establishing recognized authority and control over the environment, along with cultivating a sense of purpose, to reinforce territory boundaries. The following sections detail strategies for providing natural territoriality.

### 3.3.1 Use and ownership

Use indicators that define intended use and ownership such as signage, physical barriers and environmental cues:

- Signage can define the area of the bus stop and allowable activity such as “For Patrons Only.” (To post any enforcement actions, some jurisdictions require the posting of the actual city ordinance or state statute in addition to “No Trespassing.”)
  - Post Neighborhood Watch or Transit Watch signs and phone numbers to report any criminal activity.
  - Ensure that signage is simple, legible and bilingual if appropriate.
- Use physical barriers such as fencing or symbolic barriers (e.g., vegetation) to define pathways and access areas.
- Environmental cues such as pavement markings denoting the actual bus stop area, changes in grade or elevation or footpath material could also be beneficial.
- Use armrests designed into the bench seats and seat designs that would not be attractive for people to lie down on bus stop seating should be used. Other examples would include wave design seating, fold down and individual pillar seats at various heights.

## 4. Selection of materials

Consideration must be given to the selection of materials used in the building of bus stops and shelters. The following sections discuss factors that should be taken into account.

### 4.1 Visibility

The common use of glass shelters has been very problematic in certain locations. The goal is to comply with the previously mentioned goals of CPTED yet provide a sturdy, usable structure. Consideration must also be given to the consequences of vandalism such as graffiti and “scratchitti” (or etching). Materials easily cleaned and/or resistant to vandalism such as perforated metal sheeting or other metal semi-transparent applications are recommended.

### 4.2 Durability

Consideration should also be given to the fragmentation factor of materials used. Some pre-existing materials such as glass can be mitigated through application of certain treatments such as film and/or glazing treatments.

### 4.3 Bollards

At high-consequence locations as identified in the agency’s risk assessment, the use of bollards and other barriers such as planters to assist in buffer zone protection and stand-offs to mitigate vehicle encroachment and enhance pedestrian safety should also be considered.

### 4.4 Closed-circuit television (CCTV)

Due to advancements in technology and reductions in costs, the ability to provide CCTV coverage at high-risk bus stop locations, as identified through the agency’s security assessment, is now a possible alternative. A key consideration, however, is the supporting infrastructure, which would require at least a power source. Consideration also should be given to connectivity to monitoring systems. Alternatively, the use of CCTV by businesses proximate to bus stops or shelters should be considered.

### 4.5 Communication systems

The use of communication systems at bus stops may enhance security. If cell phones or pay phones are prevalent in a system, then a security program advising whom to call to report suspicious activity or actual criminal events should be explored. Emergency call boxes have been installed in high-traffic public areas, but their utilization and usefulness has been greatly depleted by the increased use and ownership of cell phones.

### 4.6 Passenger amenities

The design of bus stop waiting areas and provision of amenities that enhance security and comfort plays a significant role in a person’s decision to use transit. Passenger amenities are installed at selected bus stops to improve passenger comfort and the relative attractiveness of transit as a transportation alternative. Selection of bus stops at which to install amenities takes into account a number of factors, including the following:

- average daily boardings
- proximity to major trip generators
- passenger transfer activity
- planned neighborhood improvements
- transit corridor marketing efforts
- equity among communities in the county
- proximity of other nearby sheltered areas
- customer and community requests

## 4.7 Shelters

Transit shelters are installed at selected bus stops to provide weather protection as well as seating for waiting passengers.

Some private advertisers have worked with transit organizations to develop shelter programs that provide for the installation of shelters by this private provider. The private sector partner installs and maintains the shelter without cost to the transit organization or local jurisdictions by including advertising in the shelter design (see **Figure 1**). Some cities have restrictions on outdoor advertising and thus do not participate in the program.

Shelters can also be provided by local jurisdictions, and they may be required of development in the area of the stop. Maintenance of shelters not provided by private sector entities should be performed by the jurisdiction that constructs or requires the construction of the shelter.

Design considerations include the following:

- strength and durability of structure and materials
- resistance of materials and paint treatment to weather conditions, graffiti, cutting, fire and other forms of vandalism
- potential greenhouse effect of roof design during hot weather
- existence or provision of external lighting in the area, and provision of internal lighting for the shelter
- appropriateness of the design to the neighborhood
- required dimensions of the concrete pad to ensure wheelchair accessibility
- accommodation of trash can and newspaper boxes within the location design
- easy maintenance of the shelter and other amenities
- communications conduits for future use
- semi-transparent enclosure that allows a coach operator to see inside the shelter
- wheelchair marking/placard that indicates the space underneath the shelter dedicated for wheelchairs

## 4.8 Bus benches

Benches are installed inside all standard shelters. Benches may also be installed independently at bus stops that do not have shelters. Local communities may also install benches as one element of an improved streetscape; in this case, efforts should be made to locate benches near bus stops where they do not create barriers to accessible bus boarding or sidewalk usage.

The design factors for benches should include the following:

- Benches should be placed facing the street.
- The structure and materials should be chosen for strength and durability.
- Materials and paint treatments should be resistant to weather conditions, graffiti, cutting, fire and other forms of vandalism.
- The design should be appropriate to the neighborhood.

**FIGURE 1**  
Ad-supported transit shelter



- Benches should be placed on the back side of the sidewalk, a minimum of 6 to 9 feet from the bus sign post, to allow pedestrians to move past people sitting on the bench.
- Ensure that there are no conflicts with wheelchair accessibility and loading at the bus stop.
- Benches should be anchored to prevent unauthorized movement.
- Construct furniture for easy relocation to allow for bus route changes, street improvement projects, etc.

## 4.9 Newspaper and vendor boxes

Newspaper and vendor boxes can provide waiting transit customers with convenient access to reading material. However, newspaper boxes that obstruct access to the landing area, sidewalk, shelter or posted transit information must be removed or relocated. Newspaper boxes should not be chained or otherwise affixed to the bus stop sign pole, shelter or bench. Currently, laws or ordinance restricting placement of vendor boxes are instituted by the cities where they are located. Vendor boxes for free publications should be discouraged, as they contribute to trash problems at bus stops.

## 4.10 Trash containers

Refer to the APTA *Recommended Practice* “Trash Container Placement to Mitigate the Effect of an Explosive Event” for guidance as it applies to the deployment of trash containers.

## 4.11 Additional considerations

There are additional amenities that are frequently found at or near bus stops and shelters, such as landscaping, bicycle racks and lockers. These can also create security vulnerabilities, and consideration should be made to their elimination or mitigation.

# 5. Customer information systems

Customer information systems assist customers with knowledge of the transit system’s routes, schedules, bus stop locations, safety and security information, just to name a few. They also inform customers of any changes to or provide updates on the transit system. Examples are given in the sections that follow.

## 5.1 Signage

Each bus stop can be marked with a header sign indicating the transit operators that serve the stop. Bus stop signs indicate to passengers and drivers where buses stop, as well as publicize the availability of the service. (see **Figure 2**).

The sign must be securely mounted on its own post or a light standard, at an angle perpendicular to the street. The sign must be easily visible to the approaching bus driver, ideally within 4 feet of the edge of the street. The bus stop sign should neither block nor be blocked by other jurisdictional signs. To prevent the sign from being struck by the bus mirrors signs should be placed at a sufficient distance from the curb for clearance and yet not impede pedestrian travel. The header sign is the point at which the front of the bus should be aligned when the bus is servicing passengers and thus should be placed approximately 1 foot beyond the far side of the landing area for stops served by front-lift buses. The bottom edge of the sign should be positioned at a height of at least 80 inches from the ground. Each header sign should contain the names of routes that service the stop, as well as the telephone number to call for more information. ADA minimum specification standards make signage accessible to

**FIGURE 2**  
Bus stop signage



people with low vision. These requirements do not apply to route and schedule information posted at bus stops.

## 5.2 Route and schedule information

At bus stops that are near major trip generators, or where attracting additional ridership is desirable, an up-to-date route and schedule should be posted, as well as information about fares and holiday schedules. Space must be provided on all four sides for passengers to inspect posted information. The schedules should be mounted on the side away from the street.

## 5.3 Electronic message boards

Electronic message boards at key bus stops that provide real-time schedule and route information have been implemented by some transit systems. Actual arrival information provides customers with an increased sense of security. They can also be utilized to enhance security by displaying real time messages for emergencies, detours or missing-person alerts. Consideration should also be given to mitigate vandalism and theft of the boards. Collocation with CCTV systems is highly desirable.

## 5.4 Usage and location analysis

The placement of stops and/or shelters must be determined by criteria that are consistently applied and documented. Criteria should include the following:

- pedestrian traffic and demographic information
- passenger volume
- traffic volume and circulation
- crime rate in area of the bus stop

## 5.5 Bus access to the stop

### 5.5.1 Limited visibility over hills and around curves

Bus stops should not be located over the crest of a hill, immediately after a curve to the right, or at other locations that limit the visibility of the stopped bus to oncoming traffic. If the bus stops in the travel lane at such locations, it is in danger of being struck from the rear. Even if the bus pulls off the road at such stops, pulling back into the travel lane presents accident potential. If a bus stop must be located in such a location, approaching cars should be warned of the need to be prepared to stop.

### 5.5.2 On-street parking

Locating a bus stop in an area with existing curbside parking requires either removal of enough parking to permit the bus to pull off, service the stop and re-enter the travel lane, or installation of a sidewalk extension or curb bulb to provide passenger access to the bus.

## 5.6 Adjacency

Before a bus stop is placed, it is important to consider the area around it. The following sections address concerns related to adjacency.

### 5.6.1 Abutting property owners/tenants

To promote good public relations, it is desirable that bus stops be placed at locations where they will minimize the annoyance to the adjacent residents or business owners. Some commercial establishments are interested in having a bus stop in front, while residents may object to the presence of a bus stop in front of their homes, especially if the stop is used for layovers. All efforts should be taken to minimize the impact to



each property owner, but vehicle and pedestrian safety should be the overriding factor in determining the final bus stop location.

### 5.6.2 Transfer locations

Stops should be located to minimize street crossings of passengers transferring to other routes where transfer activity between routes is heavy.

### 5.6.3 Compatibility with adjacent properties

Care should be taken to avoid locating a bus stop immediately adjacent to land uses that are highly sensitive to the effects of bus fumes and noise.

### 5.6.4 Proximity to major trip generators

When feasible, a bus stop should be located to minimize walking distances to the activity center that is expected to generate the most ridership.

## 5.7 Pedestrian access to the stop

### 5.7.1 Crosswalks

Bus stops should ideally be located close to existing crosswalks to encourage safe pedestrian crossings, but they also should be located so that a stopped bus will neither block a crosswalk nor obstruct pedestrian visibility of oncoming traffic and vice versa. In general, it is safer to locate the bus stop on the far side of a crosswalk so that passengers will cross behind, rather than in front of, the bus.

### 5.7.2 Universal access

Pedestrian routes to bus stops should be designed to meet the need of all users (including people with disabilities, the elderly and children). Paved pedestrian pathways can help ensure that they are accessible to everyone. Provide accessible circulation routes that included curb cuts, ramps, visual guides, signage (visual and Braille) and railing where needed. Place ADA-compliant curb ramps at each corner of an intersection.

### 5.7.3 Sidewalk conditions

Stops should be located and constructed to make use of existing sidewalk facilities, or new sidewalk facilities should be constructed to provide pedestrian access to the bus stop. At stops with heavy ridership, additional passenger waiting/standing areas should be constructed off of the main sidewalk so waiting passengers do not block passage of other pedestrians. Where a bus stop serves as a transfer point, there should be a paved connection to the connecting route stops.

Guidelines for sidewalk construction include the following:

- Pathway slope should not exceed 1 foot vertical over 20 feet horizontal (5 percent). Pathway cross slope should not exceed 1 foot vertical over 50 feet horizontal (2 percent).
- A minimum horizontal clearance of 48 inches (60 inches is preferred) should be maintained along the entire pathway.
- A vertical clearance of 84 inches should be maintained along the entire pathway.
- Minimize the use of elements that restrict pedestrian movement, such as meandering sidewalks, walled communities, and expansive parking lots. Pathways should be designed so that pedestrians traverse as straight a path as possible.

#### 5.7.4 Special pedestrian access considerations for rural stops

- In rural areas without sidewalks, a minimum 4-foot-wide paved shoulder of decomposed granite, compacted and stabilized, should be provided if possible.
- At rural bus stops, a concrete waiting area should be provided if possible. A paved area 35 feet long and 8 feet wide is desirable, with a minimum of 5 feet by 8 feet reserved for lift operation. A tactile warning device should be placed between the roadway and the bus waiting area to allow visually impaired pedestrians to identify the bus stop position.

### 5.8 Physical site characteristics

#### 5.8.1 Landscaping issues

The presence of trees and bushes at a bus stop may necessitate periodic trimming at the stop to prevent buses from hitting tree branches and bushes from encroaching on sidewalks. Tall bushes are also a potential security problem, and additional lighting should be considered at stops with this issue.

#### 5.8.2 Drainage

Areas that tend to accumulate standing water should be avoided or improved. However, bus stops should not be located so that passengers are required to step over catch basins when alighting the bus, as this creates a potential tripping hazard.

#### 5.8.3 Lighting

Adequate lighting is important for passenger comfort and security as well as for visibility of waiting passengers to the bus and other oncoming traffic. Bus stops that are served after dark should be located where they will be illuminated at night, preferably from an overhead streetlight. If this is not possible, then lighting should be installed at the stop.

#### 5.8.4 Construction issues

Power source and placement of conduits for cables and power lines are important to remember. Security placement should override the convenience of placement for supporting infrastructure.

#### 5.8.5 Right-of-way considerations

If a bus stop may be a future candidate for transit shelter or bench installation, then a site should be selected that includes adequate right-of-way for constructing improvements.

#### 5.8.6 Bicycle facilities

To the extent feasible, bus stops should be located so they do not block bicycle travel lanes. Bus stops should also be located so that bicycle racks do not block pedestrians' access to the bus boarding and alighting area.

### 5.9 Planning guidelines

Land uses should be designed to facilitate the movement, and minimize the distances, between housing developments and transit services. For long-term compatibility with bus transit systems, new construction should consider the following:

- Minimize the distance between buildings and the bus stop through proximity and orientation. This can be encouraged by including transit accessibility concerns in zoning policies, setback guidelines, building orientation guidelines, and parking requirements to encourage transit-oriented development.
- Eliminate barriers to pedestrian activity. This includes sound walls, landscaping, berms, or fences that impede pedestrian access or visibility. If access is restricted, gates should be installed at access points.

- New residential development should provide breaks in walls between properties to allow pedestrian access to bus stops.
- Provide a dedicated sidewalk and/or bike path through new development that is safe and direct to the nearest bus stop or transit center.

## References

- American Public Transportation Association, *Recommended Practices*, “Application of Crime Prevention Through Environmental Design (CPTED) for Public Transit Facilities” and “Trash Container Placement to Mitigate the Effect of an Explosive Event.”
- American Public Transportation Association, *Recommend Practices, APTA Technical Standards document Technical Recommended Practice for The Selection of Cameras, Digital Recording Systems, Digital High-Speed Networks and Train-lines for Use in New Transit-Related CCTV Systems*. APTA IT-RP-001-08.
- Arlington County, Virginia, *Bus Stop Design Standards*.
- BC Transit, *Transit Stop Installation Checklist*. <http://www.bctransit.com/corporate/resources/pdf/res-urban-22.pdf>
- Easter Seals Project ACTION, *Toolkit for the Assessment of Bus Stop Accessibility and Safety*. [http://projectaction.easterseals.com/site/DocServer/06BSTK\\_Complete\\_Toolkit.pdf?docID=21443](http://projectaction.easterseals.com/site/DocServer/06BSTK_Complete_Toolkit.pdf?docID=21443)
- Federal Transit Administration, *System Security Program Planning Guide*, FTA-MA-90-7001-94-1, January 1994. <http://www3.cutr.usf.edu/security/documents/FTA/Transit%20System%20%20Security%20%20Program%20Planning%20Guide.pdf>
- Federal Transit Administration, *Transit Security Design Considerations*, FTA-TRI-MA-26 7085-05, November 2004. <http://transit-safety.fta.dot.gov/security/SecurityInitiatives/DesignConsiderations/CD/front.htm>
- Lusk, Anne, Federal Transit Administration, *Bus and Bus Stop Designs Related to Perceptions of Crime*, MI-26-7004-2001.8, 2001. <http://tris.trb.org/view.aspx?id=772955>
- Transit Cooperative Research Program, *Location and Design of Bus Stops on Major Streets and Highways*, TCRP Report 19, TCRP A-10, 1996, Chapter 4, “Curb-Side Factors,” Chapter 5, Glossary, Appendix A: Literature Search, Appendix B: Review of Transit Agency’s Manuals, and Appendix C: Survey Findings. [http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp\\_rpt\\_19-c.pdf](http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_19-c.pdf)

## Definitions

**Americans With Disabilities Act (1990):** The act provides reasonable access to and use of building, facilities, and transportation by people with disabilities.

**bus bay type stop:** A specially constructed area off the normal roadway section for bus loading and unloading.

**bus stop/shelter:** A place on a bus route where buses stop to embark or alight passengers.

**crime prevention through environmental design:** The application of designing safety and security into the natural environment of a specific area. Specifically, CPTED concepts and strategy use the three interrelated principles of natural surveillance, natural access and territoriality, plus activity support and maintenance. By using the behavior of people, identifying crime generators, the physical environment and the space of an area, CPTED can provide benefits of safety and security if applied in the conceptual, design and planning stages of a project.

**crime analysis:** The study of information about criminal incidents to detect patterns or trends of criminal activity that may be used to predict the need for specific police techniques, such as aggressive patrol of a given geographic area or analysis that seeks to determine what crimes are likely to impact particular targets, the criminals likely to commit the crimes, how the crimes are likely to occur, and when they are likely to occur.

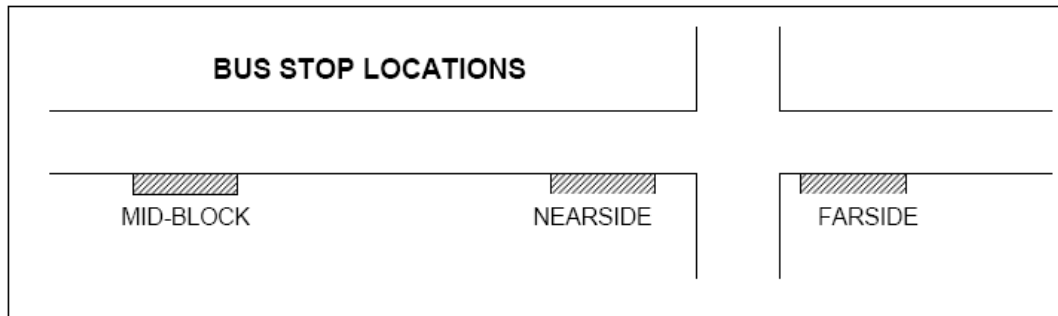
**curbside type stop:** A bus stop in the travel lane immediately adjacent to the curb.

**discontinuous sidewalk:** A sidewalk that is constructed to connect the bus stop with the nearest intersection; the sidewalk does not extend beyond the bus stop.

**far-side bus stop:** A bus stop located immediately after an intersection (see Figure 3).

**midblock bus stop:** A bus stop located within the middle of the block (see Figure 3).

**FIGURE 3**  
Bus stop locations relative to an intersection



**natural access control:** The physical guidance of people coming and going from a space by the judicious placement of entrances, exits, fencing systems, landscaping and lighting. See also *natural surveillance* and *territorial reinforcement*.

**natural surveillance:** The placement of physical features, activities and people in a way that maximizes visibility.

**near-side bus stop:** A bus stop located immediately before an intersection (see Figure 3).

**nub type stop:** A stop where the sidewalk is extended into the parking lane, which allows the bus to pick up passengers without leaving the travel lane; also known as bus bulb or curb extensions.

**open bay type stop:** A bus bay designed with the bay “open” to the upstream intersection.

**queue jumper type stop:** A bus bay designed to provide priority treatment for buses, allowing them to use right turn lanes to bypass queued traffic at congested intersections and access a far-side open bay type stop.

**risk assessment:** A formal methodical process used to evaluate risks to a transit system. The security portion of the risk assessment identifies security threats (both terrorism and crime) to the transit system; evaluates system vulnerabilities to those threats; and determines the consequences to people, equipment and property.

**shelter:** A curbside amenity designed to provide protection and relief from the elements and a place to sit while patrons wait for the bus.

**territorial reinforcement (territoriality):** The use of physical attributes that express ownership, such as fences, signage, landscaping, lighting, pavement designs, etc. See also *natural access control* and *natural surveillance*.

**waiting pad (accessory pad):** A paved area provided for bus patrons, which may contain a bench or shelter.

## Abbreviations and acronyms

<b>ADA</b>	Americans with Disabilities Act
<b>APTA</b>	American Public Transportation Association
<b>CATS</b>	Charlotte Area Transit Systems
<b>CCTV</b>	closed-circuit television
<b>CPTED</b>	crime prevention through environmental design
<b>CPUC</b>	California Public Utilities Commission
<b>CTA</b>	Chicago Transit Authority
<b>FTA</b>	Federal Transit Administration
<b>MBTA</b>	Massachusetts Bay Transportation Authority
<b>MNR</b>	Metro-North Railroad (New York City)
<b>RPTA</b>	Regional Public Transportation Authority
<b>TCRP</b>	Transit Cooperative Research Program
<b>TSA</b>	Transportation Security Administration
<b>VTA</b>	Valley Transportation Authority (Santa Clara Valley)