

FY 2013 - 2014

Bus Stop Design and Safety Guideline Handbook

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Prepared for
Imperial County
Transportation Commission



Prepared by



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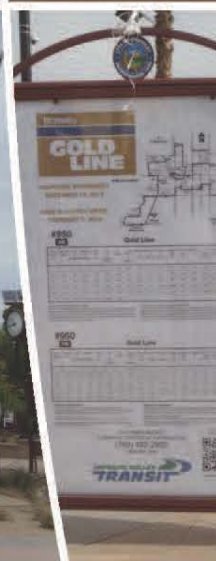
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Section 1

Introduction



Section 1: Introduction

The Imperial Valley Transportation Commission (ICTC) was created in 2009 to act as the county transportation commission, providing transportation planning and programming services within Imperial County and assuming those responsibilities from the Imperial Valley Association of Governments. ICTC manages development and administration of the Regional Transportation Plan, including the distribution of Local Transportation Allocation funds; the submittal of regional applications for transportation funds; the allocation of Transportation Development Act funds; and the planning, programming, and administration of regional transit services.

Under this last responsibility ICTC provides management and oversight of the following regional transit programs:

- IVT and its inner city circulator services (e.g., Blue, Green and Gold Lines)
- Imperial Valley Transit (IVT) ACCESS (ADA paratransit service)
- A non-emergency medical demand response service to San Diego
- Various Dial-a-Ride demand response services

As these transit services in the Valley continue to expand, it is ICTC's commitment to continually improve service, safety, quality and comfort, which is why we say:

“Come Ride with Us!”

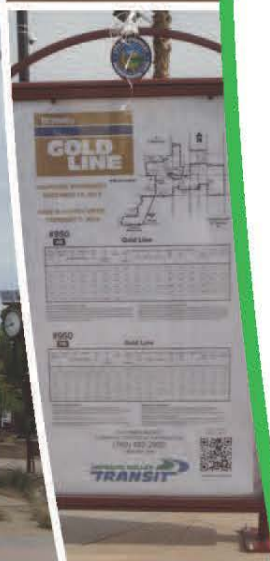
“Viaje con Nosotros!”





Section 2

Need and Purpose



Section 2: Need and Purpose

Historically, ICTC has relied on a variety of transit design guidelines developed by other transit agencies to provide developers and municipalities with design standards for on and off street bus stops. This approach has led to a wide interpretation of the standards, variable compliance with applicable regulations/safety requirements, and a lack of consistency within the service area. Combined with a general expansion of the transit system, increase in service hours, development of new off-street transfer stations, and a need for compliance with the Americans with Disability Act (ADA) and recent sustainability regulations, there is now a need to clearly establish transit design and safety guidelines that can be applied consistently throughout the IVT service area.

The development and implementation of these guidelines will accomplish a number of goals as the public transit system serving the Valley expands and evolves to meet the changing needs of its passengers. These goals include the following:

- Standardize bus stop improvements across the region in a way that meets the Valley’s needs
- Clearly identify (“brand”) the bus routes and services available
- Encourage ridership by providing a positive, safe experience for all riders
- Facilitate regular, low cost maintenance of bus stops and stations
- Facilitate compliance with applicable regulations, such as ADA, California Building Code, and Senate Bill 375
- Provide safety and security for riders to the maximum extent practicable
- Establish a foundation for expanding and improving transit service in the future
- Provide a guide for planners, engineers, and developers to integrate transit into future developments

It should be noted that developing these guidelines and meeting these goals, as they relate to agencies within the Imperial Valley, will meet two separate but distinct needs:

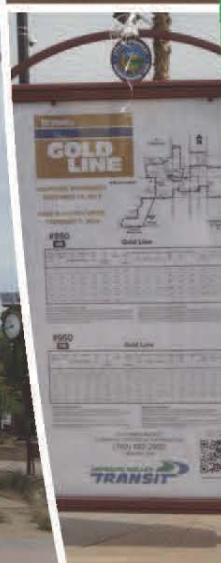
1. It will provide bus stop standards for the County and smaller cities that may have only rural or a limited number of on-street bus stops
2. It will provide standards for urban areas and larger cities that may have higher ridership and may be considering development of off-street transit/transfer stations to serve those higher volumes

Both of these types of standards are addressed in detail in the sections that follow.



Section 3

Sustainability Goals and Transit Oriented Development



Section 3: Sustainability Goals and Transit Oriented Development

The passage of Senate Bill 375 in 2008 set the framework for sustainability and long-term reduction of greenhouse gases through transportation and land use planning, and transit development is a key element in that strategy. This legislation has been further refined by the Southern California Association of Governments (SCAG), the metropolitan planning organization for the County of Imperial, through development of a Regional Transportation Plan/Sustainable Community Strategies (RTP/SCS). The transit-related strategies in SCAG's 2012-2035 RTP/SCS include:

- Concentrating growth in areas accessible to transit
- Providing more multi-family housing with jobs and housing closer to transit
- Encouraging new housing and job growth focused in High Quality Transit Areas (HQTAs)
- Expanding HQTAs through transit infrastructure and service improvements
- Expanding passenger rail network and transit investment, to represent 20 percent of total plan budget
- Investing in biking and walking infrastructure to improve active transportation options and transit access

Establishing bus stop/station guidelines and development strategies will play a key part in helping the region to meet its sustainability goals, and these strategies start with the types of transit vehicles planned to be operated within the system.





Section 4

Transit Vehicle Characteristics



Section 4: Transit Vehicle Characteristics

IVT operates both fixed route and paratransit services throughout the Imperial Valley. Services are actually provided by an operator who is under contract to ICTC. The operator, as a condition of their contract, provides all cleaning, fueling, maintenance and repairs for the vehicles at their corporate facility. For this reason, maintenance facilities are not addressed in these guidelines.

Two basic types of vehicles are currently used for fixed route services: a 40-foot low floor standard or “city” transit bus manufactured by Gillig Corporation, and a 20-foot “cutaway” bus that is a shortened bus body mounted on a commercial truck chassis provided by El Dorado National, Starcraft, and other manufacturers. Note that the dimensions of the cutaway buses vary slightly depending on the particular manufacturer. Paratransit buses are similar in design to the cutaway buses used for fixed route services; however, as paratransit services do not typically use regular bus stops they are not addressed within these guidelines.



Typical 40-foot city transit bus with wheelchair ramp retracted and bike rack in folded position

City buses are typically used on urban routes with higher ridership volumes, while the cutaway buses are employed on connector, feeder, and circulator routes with lower ridership that permits use of a smaller, more economical vehicle. Other than the length and number of passengers carried, the two bus types differ principally in the way disabled passengers are boarded and disembarked. The city bus has a small ramp that deploys from the main doors at the right front corner of the vehicle, which makes it easier and quicker for a person in a wheelchair to board the bus. The cutaway bus has a wheelchair lift on the right side near the rear of the vehicle, which takes more time to deploy and retract and also requires the driver to exit the vehicle to assist the passenger and operate the lift. Wheelchair riders enter and exit the bus from the same doors, regardless of the vehicle type.



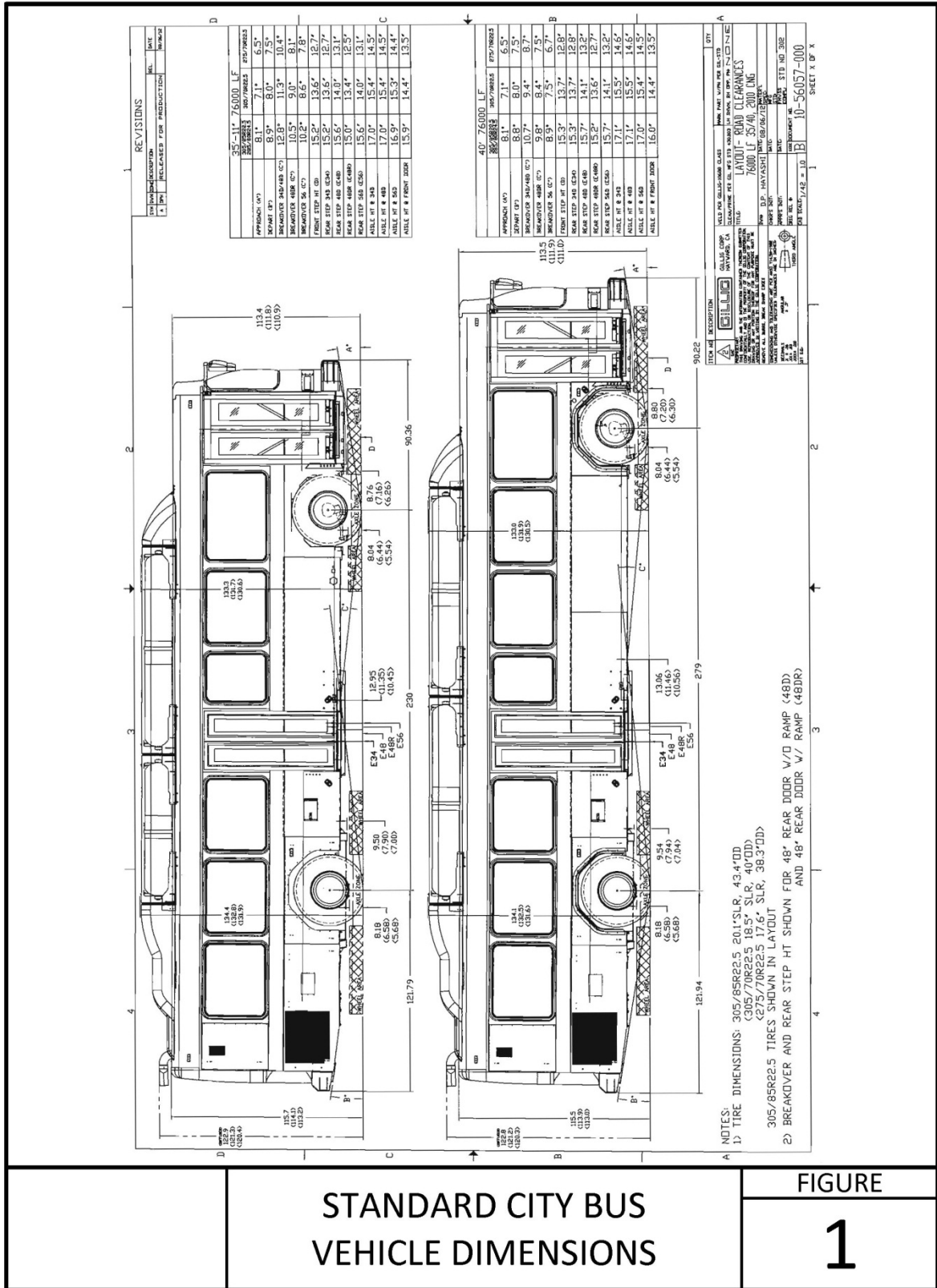
Typical 20-foot cutaway transit bus with wheelchair lift deployed

In addition to the two types of buses described above, the operator may employ 45-foot over-the-road coaches to provide express or long range service to San Diego, Coachella Valley, or Yuma. IVT has no plans at present to employ articulated buses or double decker buses in fixed-route service.

Dimensional specifications for the 40-foot city bus, 20-foot cutaway bus, and the 45-foot coach bus are presented as [Figure 1](#), [Figure 2](#), and [Figure 3](#), respectively. The turning characteristics for the 40-foot and 45-foot buses are presented in [Figure 4](#) and [Figure 5](#), respectively. The shorter cutaway buses can fit within any location in which the larger buses operate.

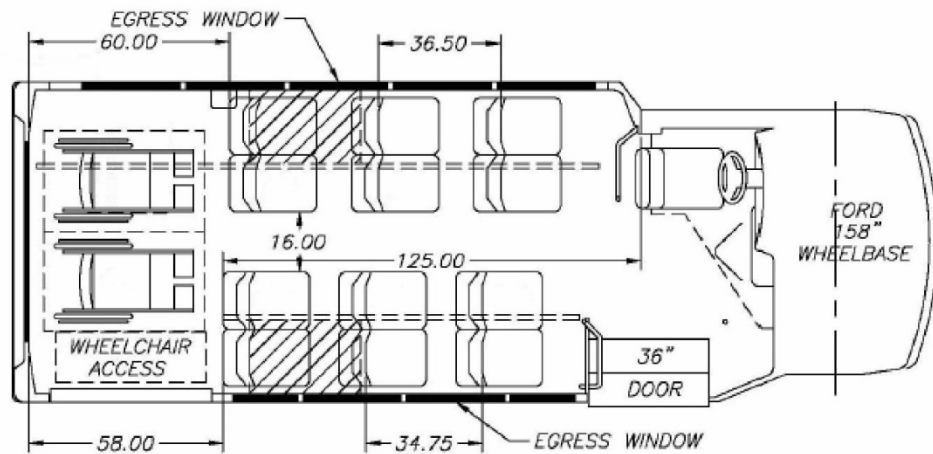


Typical 45-foot coach bus used in transit service



Vehicle Feature "Paratransit" Maximum Dimensions

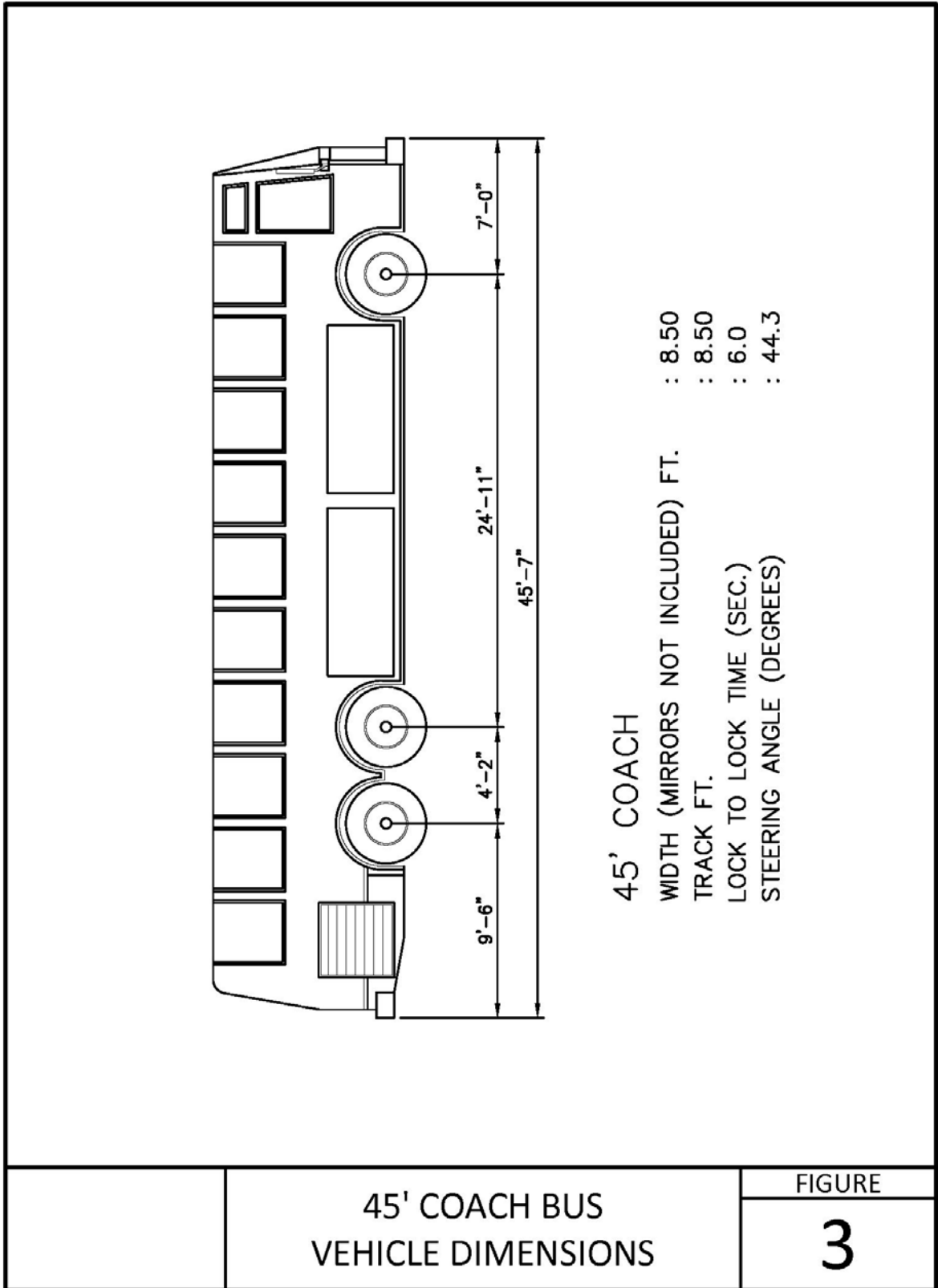
Overall Height,	9 Feet, 0 Inches
Overall Length, w/bumpers	23 Ft, 0 In
Overall Vehicle Width	8 Ft, 0 In
Front Axle to Front Bumper	7 Ft, 5 In
Rear Axle to Rear Bumper	10 Ft, 0 In
Edge of Outside Mirror-to-Mirror	10 Ft, 0 In
Step to Ground, Front Entrance	0 Ft, 10 In
Step to Ground, Rear Entrance	Not applicable

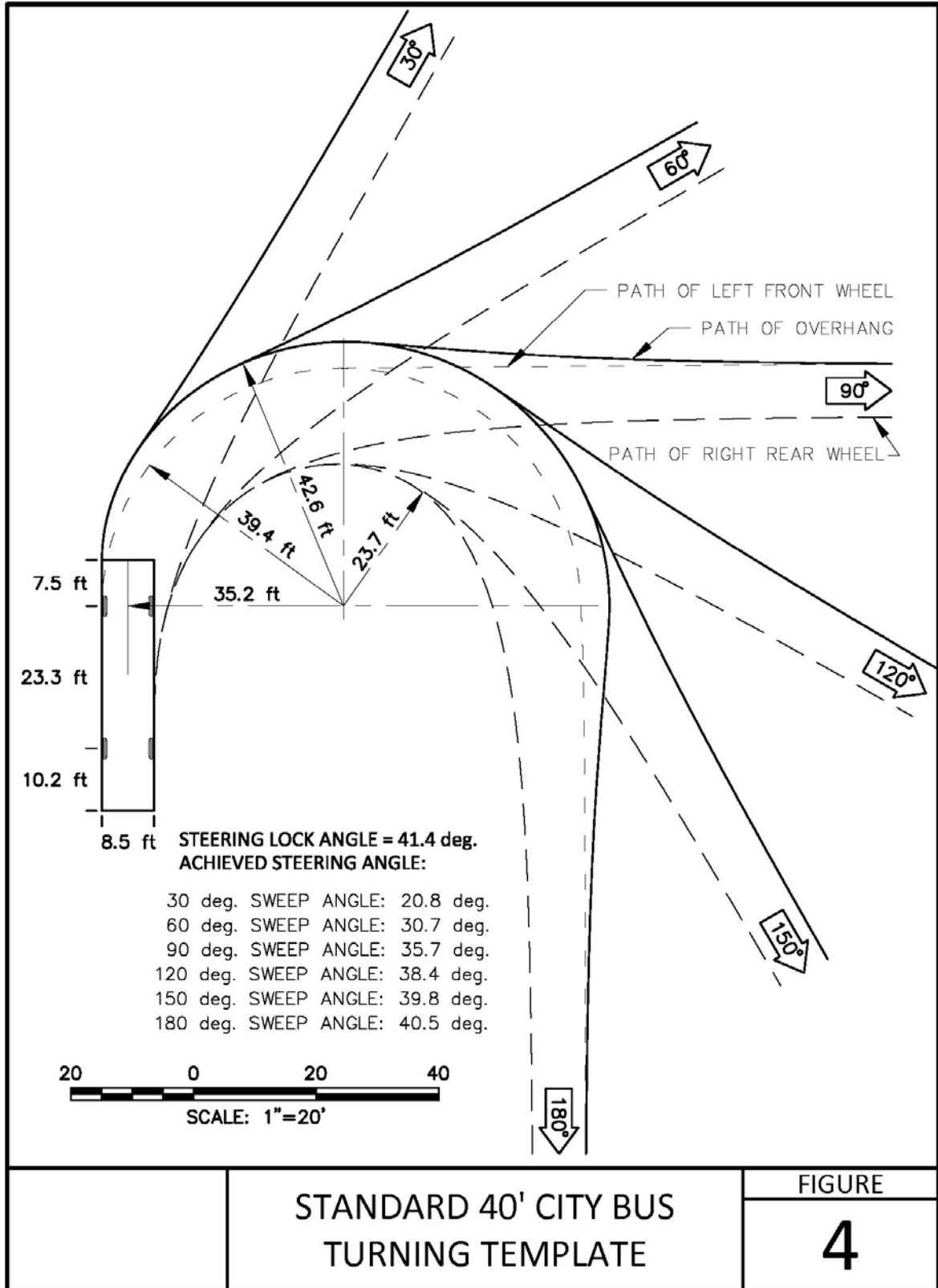


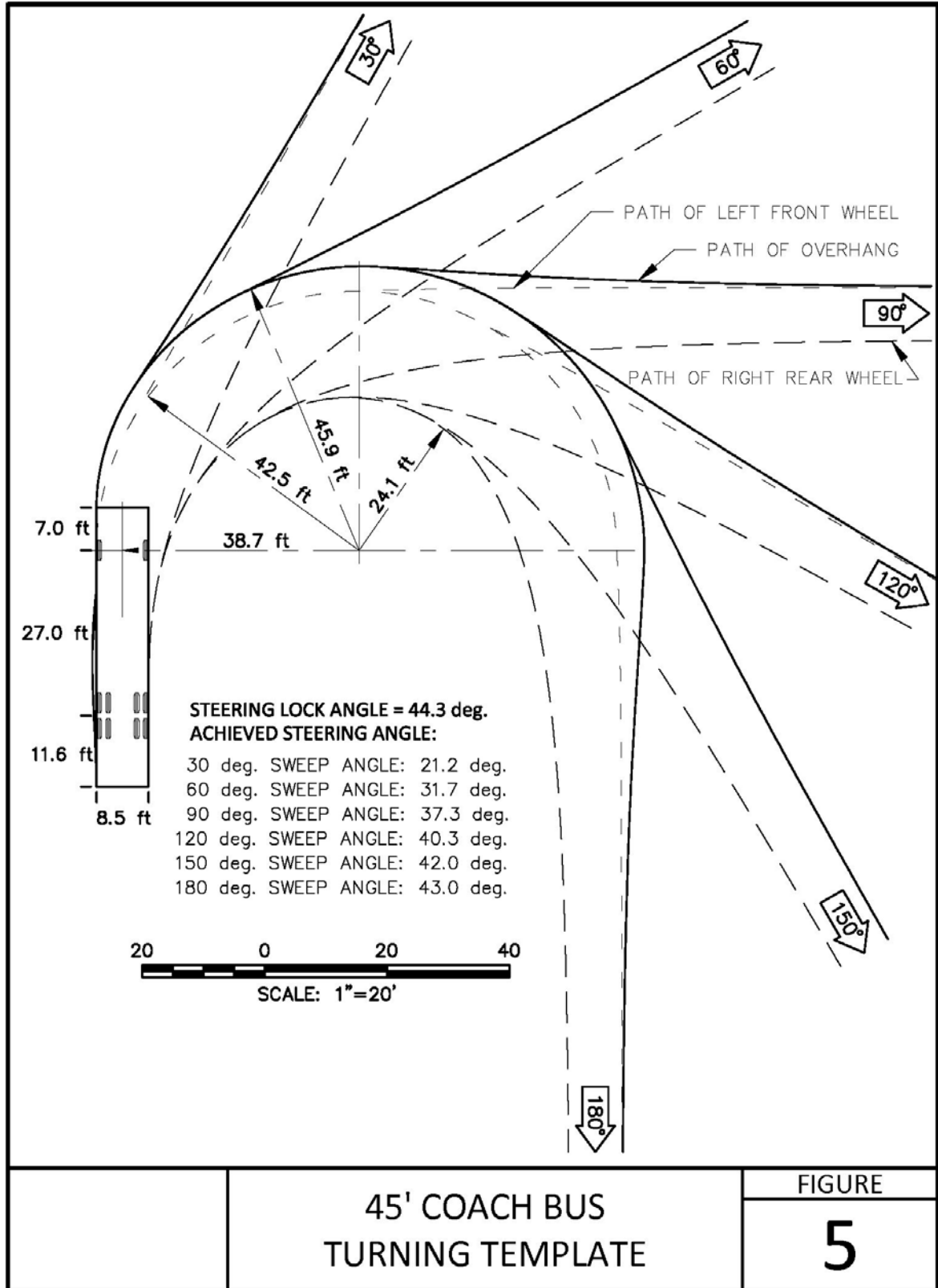
CUTAWAY BUS
VEHICLE DIMENSIONS

FIGURE

2









Section 5

On Street Bus Stops

Bus Stop Location and Placement

Bus Turnouts

Bus Layover Stops

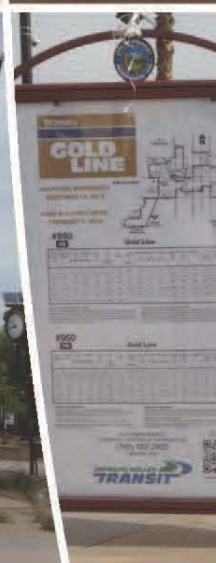
Sidewalks, Ramps, and Accessibility Requirements

Bus Route Signs

On Street Bus Stop Amenities

Maintenance Considerations

Permit Considerations



Section 5: On Street Bus Stops

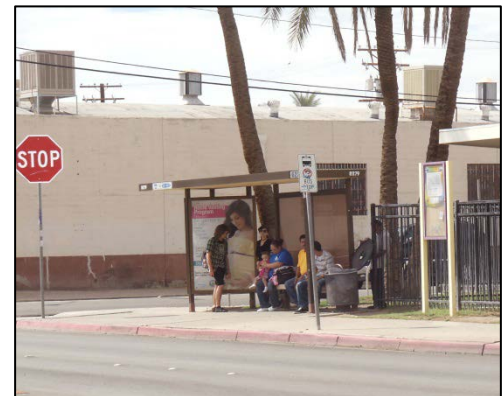
5.1. Bus Stop Location and Placement

There are three categories of bus stops: Category I (sign only); Category II (sign and bench); and Category III (sign, bench, and shelter). For each of these bus stop categories, there are three basic locations: far-side stops, near-side stops, and mid-block stops. Each location has its benefits and may either be a curbside stop or have a bus turnout, although turnouts are most commonly used at mid-block stops. A typical bus stop is shown in [Figure 6](#).

Far-side stops are located downstream of signalized or unsignalized intersections and are generally preferred unless there is a compelling reason to use one of the other types of stop. Far-side stops typically provide a gap in traffic, so the bus has a higher level of visibility and may pull out into traffic more safely. Further, far-side stops have better operational characteristics and less impact to traffic on the public street.

Near-side stops are located upstream of an intersection and may be used where the route changes direction at an intersection. Issues associated with using near-side stops include buses or passenger shelters that block sight lines near intersections; buses that block right turn lanes; and pedestrians/passengers that walk in front of the bus.

Mid-block stops are located between intersections and typically serve a major destination such as a hospital or shopping center. Mid-block stops typically result in a loss of on-street parking, encourage jay-walking, require transitions so the bus may pull in and out of the stop, and can interfere with driveways and utilities.



Typical near-side bus stop

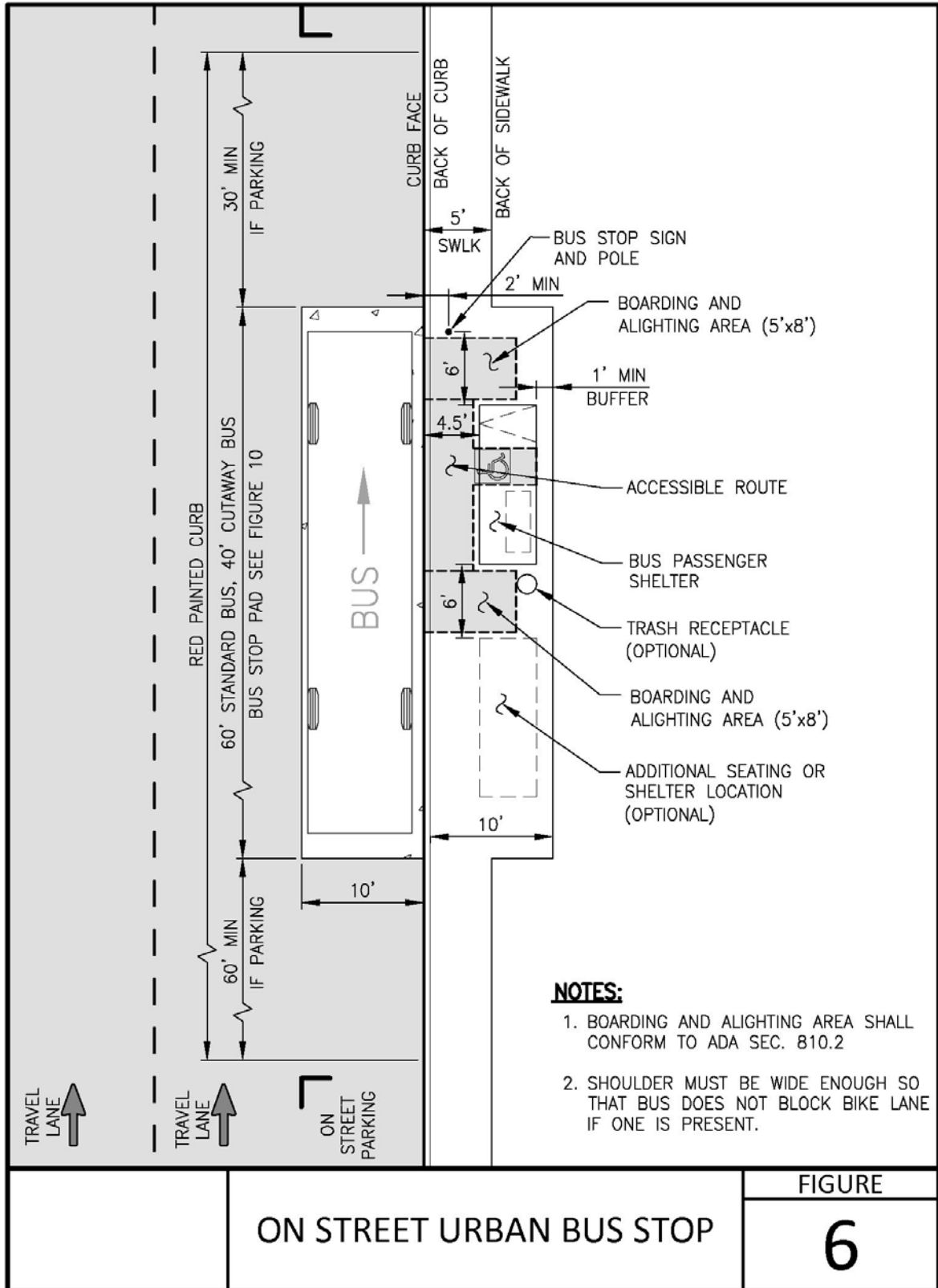


Typical mid-block bus stop

5.2 Bus Turnouts

Bus turnouts should be used instead of curbside stops when any of the following conditions exist:

- Roadway average daily traffic exceeds 5,000 vehicles per day
- Roadway has a bike lane or is designated as a bike route
- Roadway either has inadequate width or bus would be blocking traffic with a curbside stop



ON STREET URBAN BUS STOP

FIGURE

6

These criteria also apply to layover stops, particularly extended or frequent layovers. Turnouts are typically used with mid-block stops at destination locations such as hospitals or shopping centers, and carry with them the drawbacks of mid-block stops in addition to other concerns, including the need for additional right-of-way width. Bus turnouts near intersections present additional issues and need to be reviewed on a case-by-case basis when no other alternatives exist. A typical mid-block bus stop with a turnout is shown in [Figure 7](#).



Typical mid-block bus stop with turnout

5.3 Bus Layover Stops

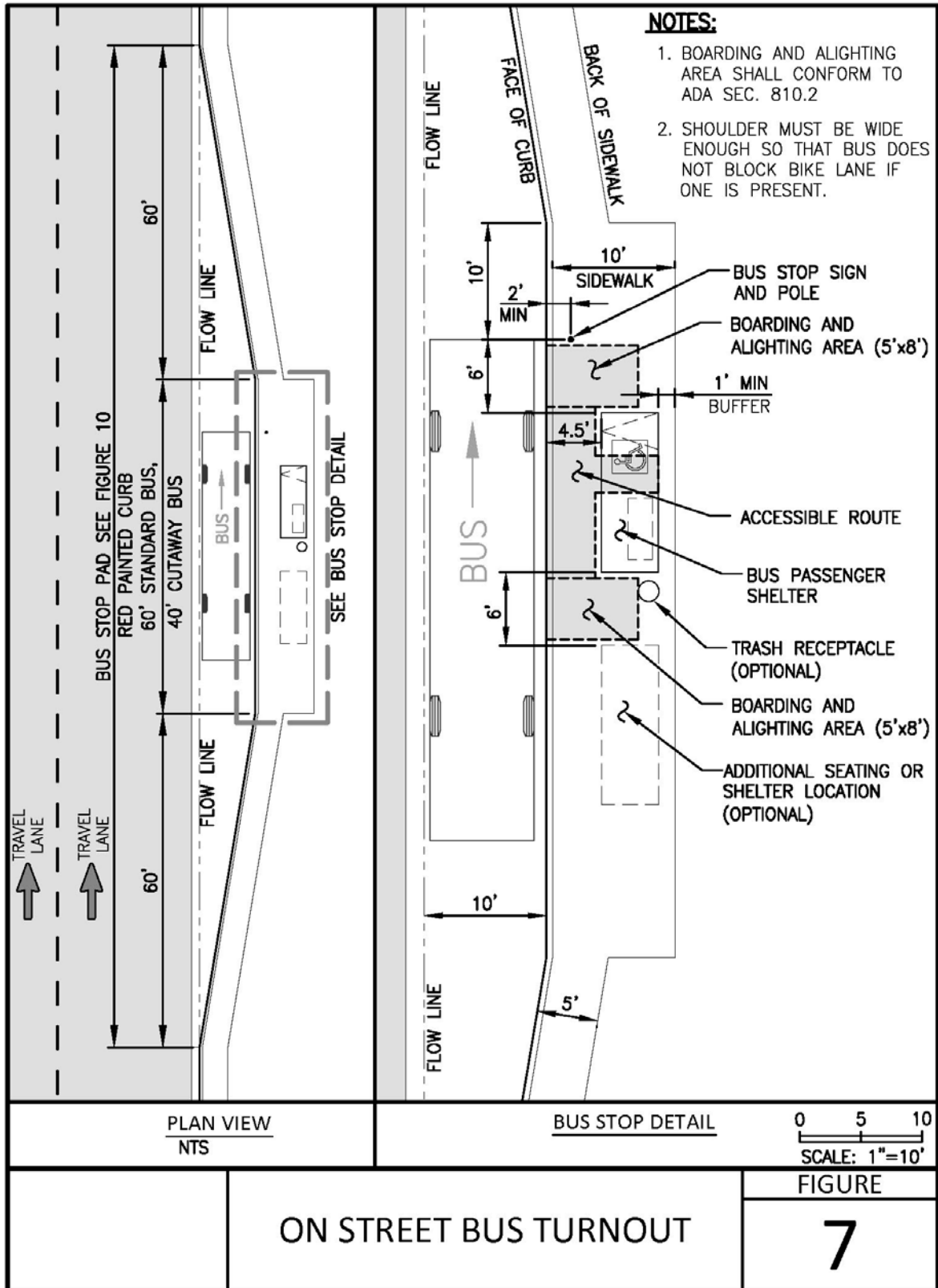
Layover or “float” time is built into transit schedules to accommodate delays, driver rest periods, and other fluctuations in the schedule. This float time may be used up during brief layovers at “time stops.” A bus may disembark passengers and remain idle (known as “dwell time”) at a regular stop during this period. Alternatively, the bus may stop and disembark at a layover stop just upstream from the regular stop before boarding passengers there and proceeding to the next stop on the established schedule. Bus stops used only as layover stops will have a red curb and will need to meet accessibility requirements for disembarking passengers. However, layover stops do not require passenger shelters, benches, or other amenities as no passenger waiting or boarding typically occurs at these stops.

5.4 Sidewalks, Ramps, and Accessibility Requirements

There are many specific requirements within the ADA regulations that apply to transit stops, as well as a number of advisory standards. A few of the most relevant standards that apply to bus stops and the areas immediately adjacent include:

- Section 206.3, “Location”
- Section 403, “Walking Surfaces”
- Section 406, “Curb Ramps”
- Section 810.2, “Bus Boarding and Alighting Areas”
- Section 810.3, “Bus Shelters”

There are many other mandatory and advisory standards that may apply to transit facilities. Excerpts of the relevant ADA regulations may be found in [Appendix D](#). Additional details regarding these standards are available at www.ada.gov.



5.5 Bus Route Signs

Bus stop locations are marked by standard bus route signs, known as “blade signs,” due to their shape. In addition to marking the location, blade signs provide an indication to the bus driver where to stop the bus to board passengers; provide a mounting point for a small bus schedule case (also known as a “cassette”); provide a mounting point for tactile devices for the visually impaired; and identify transit routes and services through “branding,” or graphics on the signs. Bus route signs should be mounted using the following design standards:

- The sign should be placed on a two-inch diameter aluminum or two-inch square galvanized steel pole at the right front of the bus stop or bus bay, a minimum of one foot behind the face of the curb
- The pole should be located a minimum of eight feet above the sidewalk, with the bottom of the sign mounted a minimum of 84 inches above the ground
- A tactile Braille route indication device should be mounted between 48 and 60 inches above ground level
- Cassettes containing route schedule information, if provided, should be mounted between the sign and the Braille route indication device, with all devices secured to the pole with tamperproof hardware and no exposed sharp edges
- The pole should be embedded in concrete a minimum of 12 inches below grade and should be located so as not to obstruct accessible paths of travel

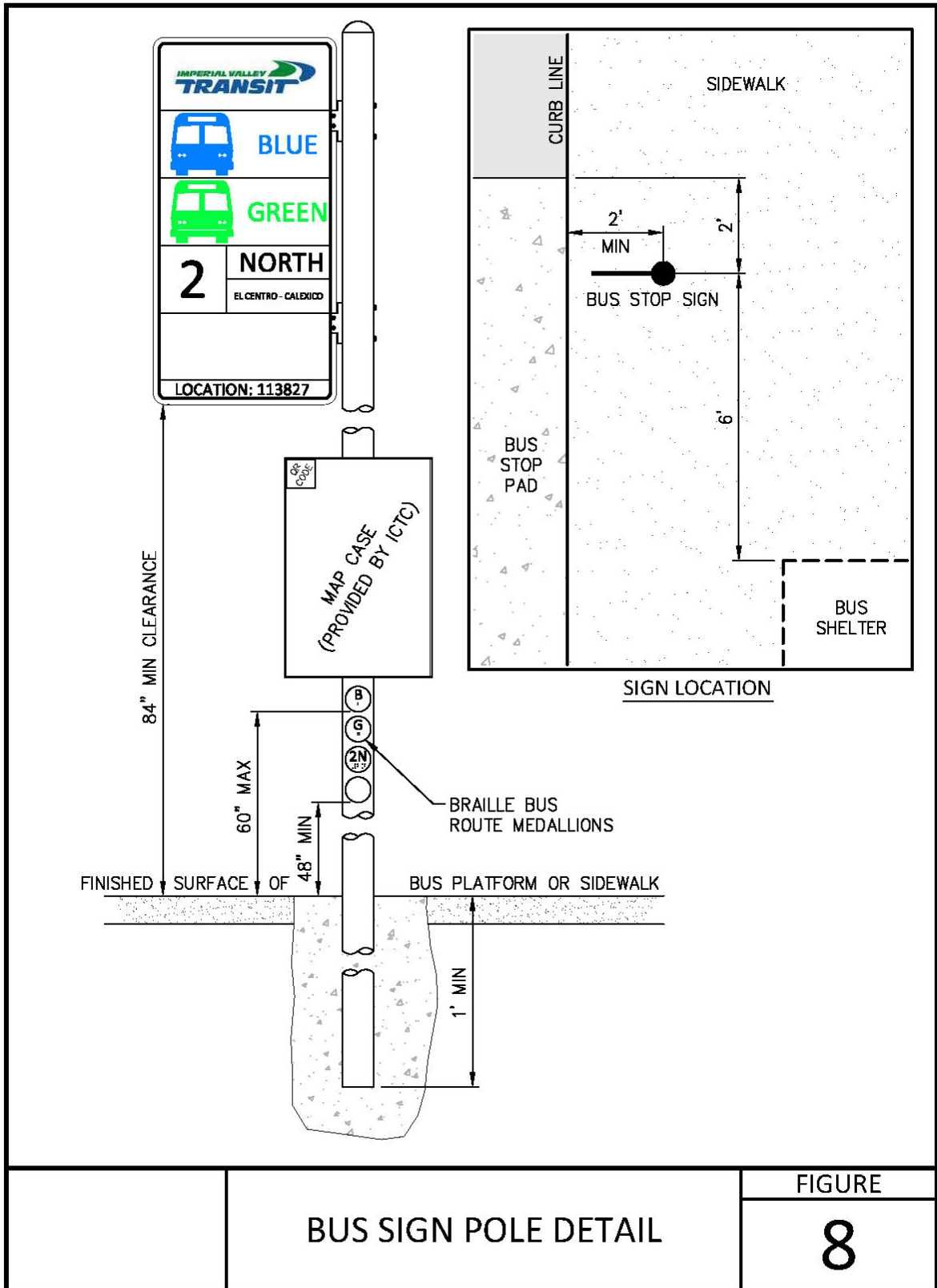


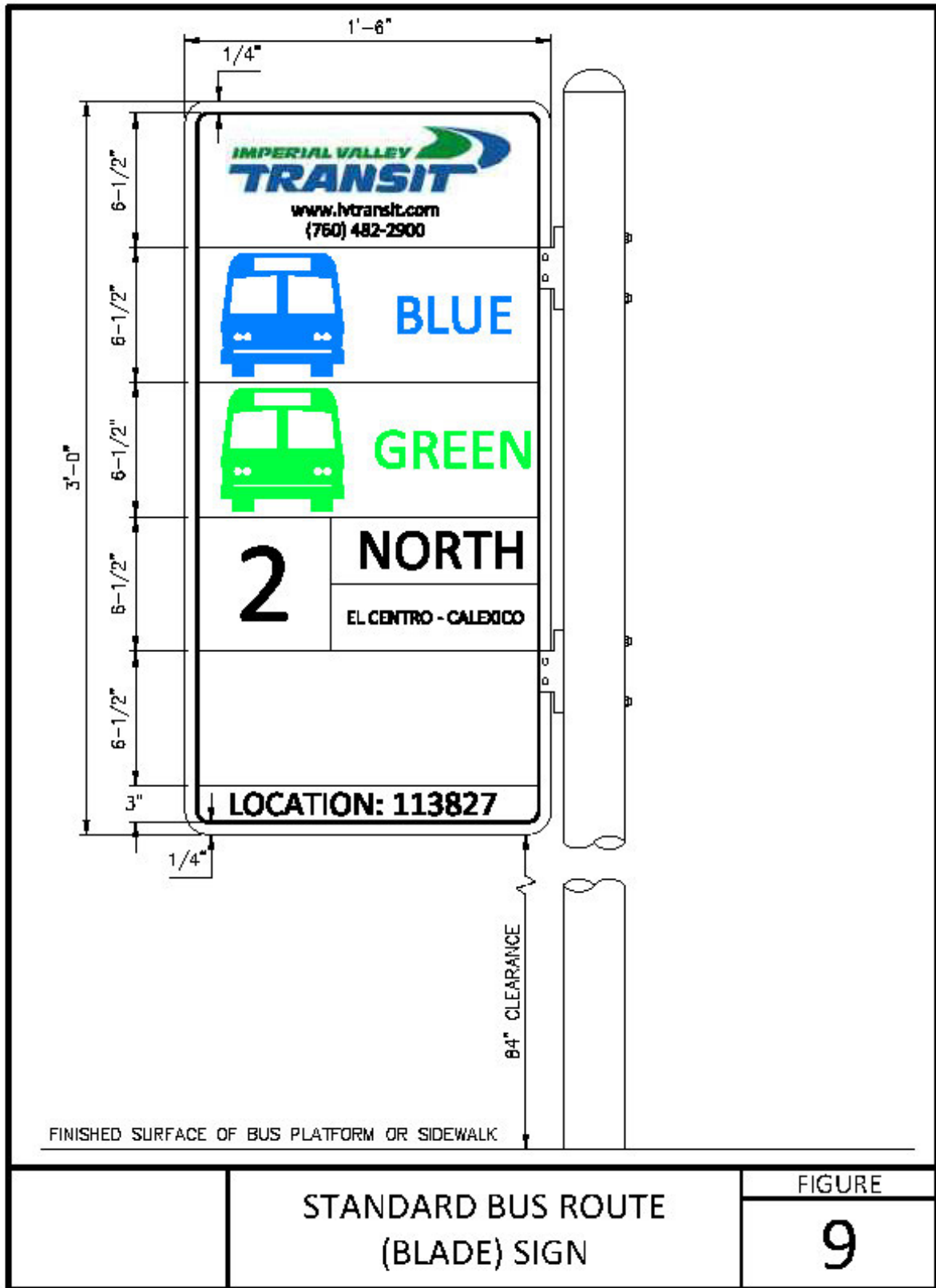
Tactile Braille route indication devices

Typical bus route sign installation is shown in [Figure 8](#) and [Figure 9](#).

5.6 On Street Bus Stop Amenities

In addition to a bus route sign, on street or curbside bus stops should have, at a minimum, the following amenities: bus pad, passenger shelter, bench, trash receptacle, and a map/schedule cassette. Optional amenities typically located at high volume, urban stops may include bike racks, map/schedule cases, additional shelters or benches, news racks, or additional lighting. Each of these amenities is described in detail below.





5.6.1 Bus Pad

A concrete pad should be provided at each stop to prevent damage and furrowing of asphalt pavement due to loads and turning movements imposed by bus tires. The pad should be 10 to 12 feet in width, 40 to 60 feet long, and 8 to 9 inches thick. Stops where multiple buses may be simultaneously present should be extended accordingly. Aggregate base may be required under the concrete pad, depending on drainage and soils conditions, and expansion or control joints should be constructed in the concrete pad at 15-foot maximum intervals. Grades and drainage patterns for the pad should follow the existing street, and streets with poor drainage characteristics or frequently standing water should be avoided as locations for bus stops. A typical concrete bus pad installation is shown in [Figure 10](#).

5.6.2 Passenger Shelters

All curbside stops should have a standard passenger shelter that will accommodate at least four passengers, including three bench seats and one wheelchair space ([Figure 11](#)). In this application, “catalog” shelters offer many benefits. Specifically, they are relatively inexpensive, offer a variety of options, are easy to repair, and are easy to relocate as transit needs change. The standard shelter within the system is a lighted, “Euro” style dome roof shelter with perforated metal panels that come in either “advertising” (17 feet long) or “non-advertising” (13 feet long) options. The shelter with advertising panels features a triangular portion with two internally-lighted “billboard” panels, which generates an advertising revenue stream that can be directed towards bus stop maintenance activities.

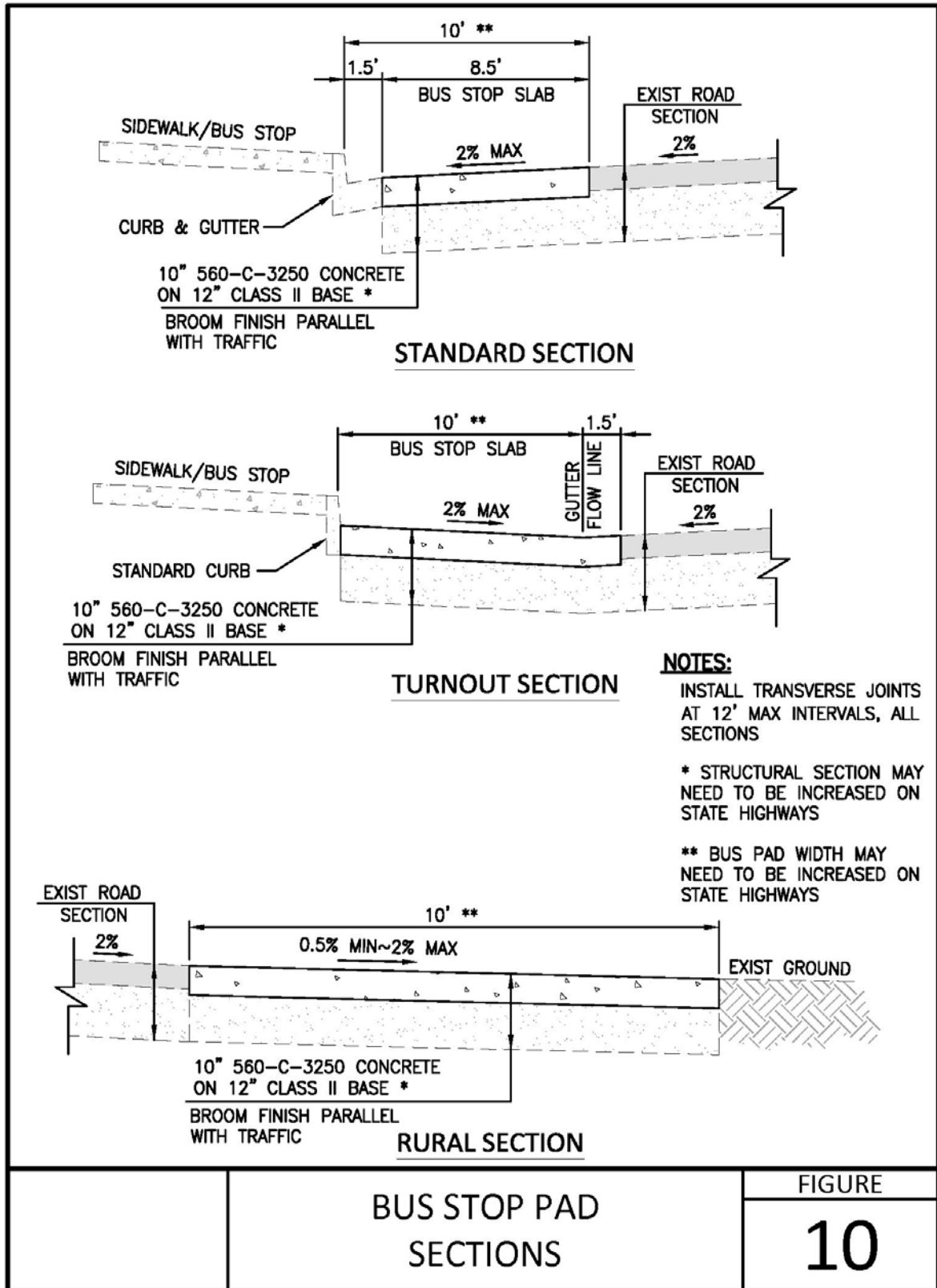
In general, shelters should be constructed of anodized, painted, or powder coated aluminum or steel, with powder coated steel being preferred for durability reasons. The standard “IVT Blue” color for the shelters and furnishings is RAL 5013. Glass and plastic panels should be avoided in favor of perforated metal panels to minimize “scratchitti.” Shelters should be mounted to a four-inch thick concrete pad matching the adjacent sidewalk, attached with anchor bolts according to the manufacturer’s recommendations. The pad grades are required to meet all ADA regulations (i.e., less than 2% slope in any direction). Pads for urban stops are at top of curb/sidewalk level, while rural bus stops are typically flush with the adjacent roadway. If possible, shelters should be oriented facing north or east to maximize shade opportunities, and summertime heat radiation should also be taken into account when specifying the shelter height and roof materials.

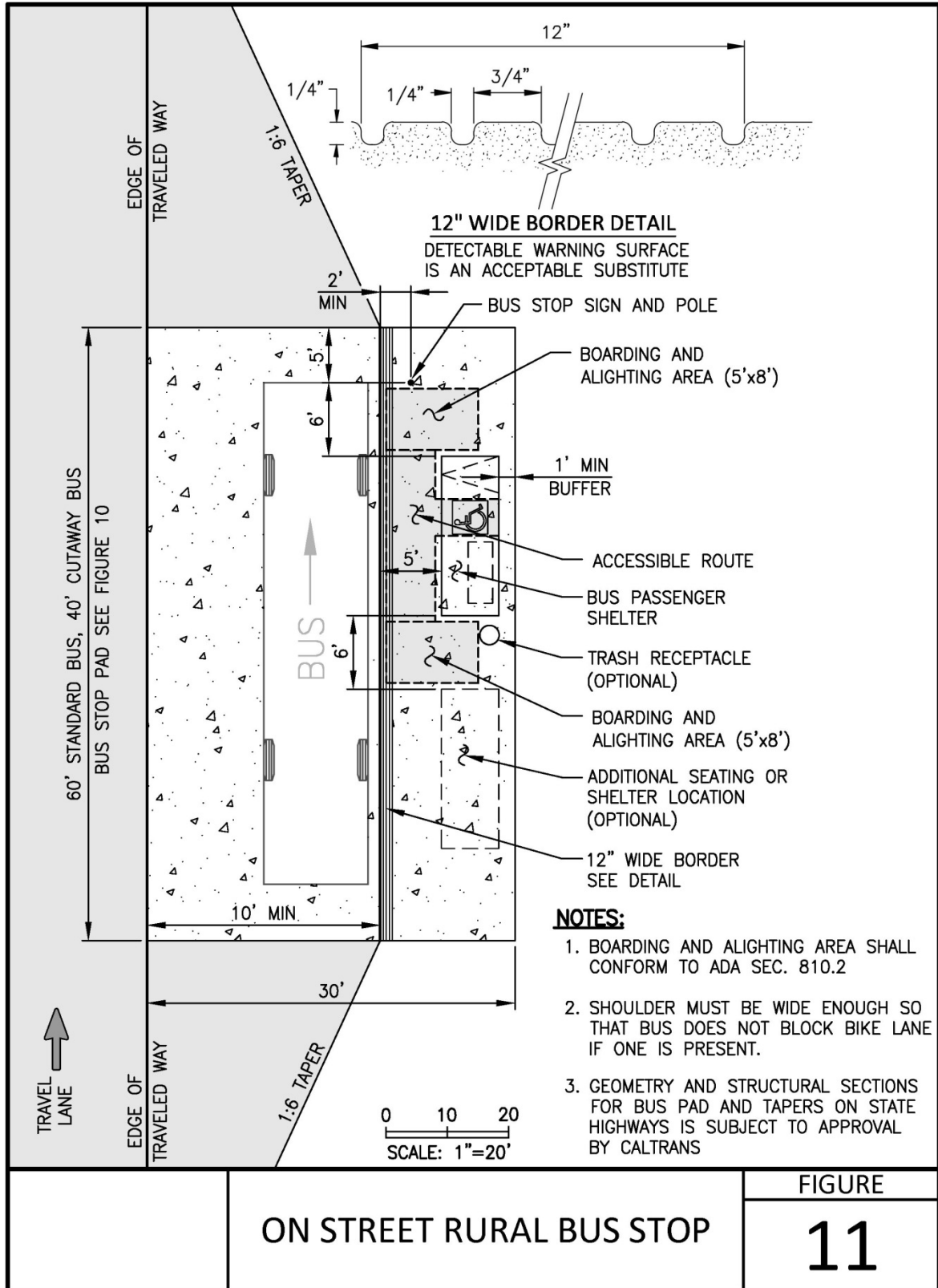


Typical non-advertising “catalog” shelter



Typical advertising shelter





Shelters should be ordered with the matching bench and trash receptacle, as described in the sections below. Shelters should be internally lit using local low voltage power or solar power (solar is preferred), and it is strongly recommended that the shelter and benches be grounded as shown in [Figure 12](#) to provide an additional level of safety for waiting passengers. All power and grounding conductors should be concealed to reduce vandalism, and under no circumstances should the shelter be connected directly or indirectly to street lighting or other high voltage power systems. Standard advertising and non-advertising shelters are illustrated in [Figure 13](#) and [Figure 14](#).

5.6.3 Benches

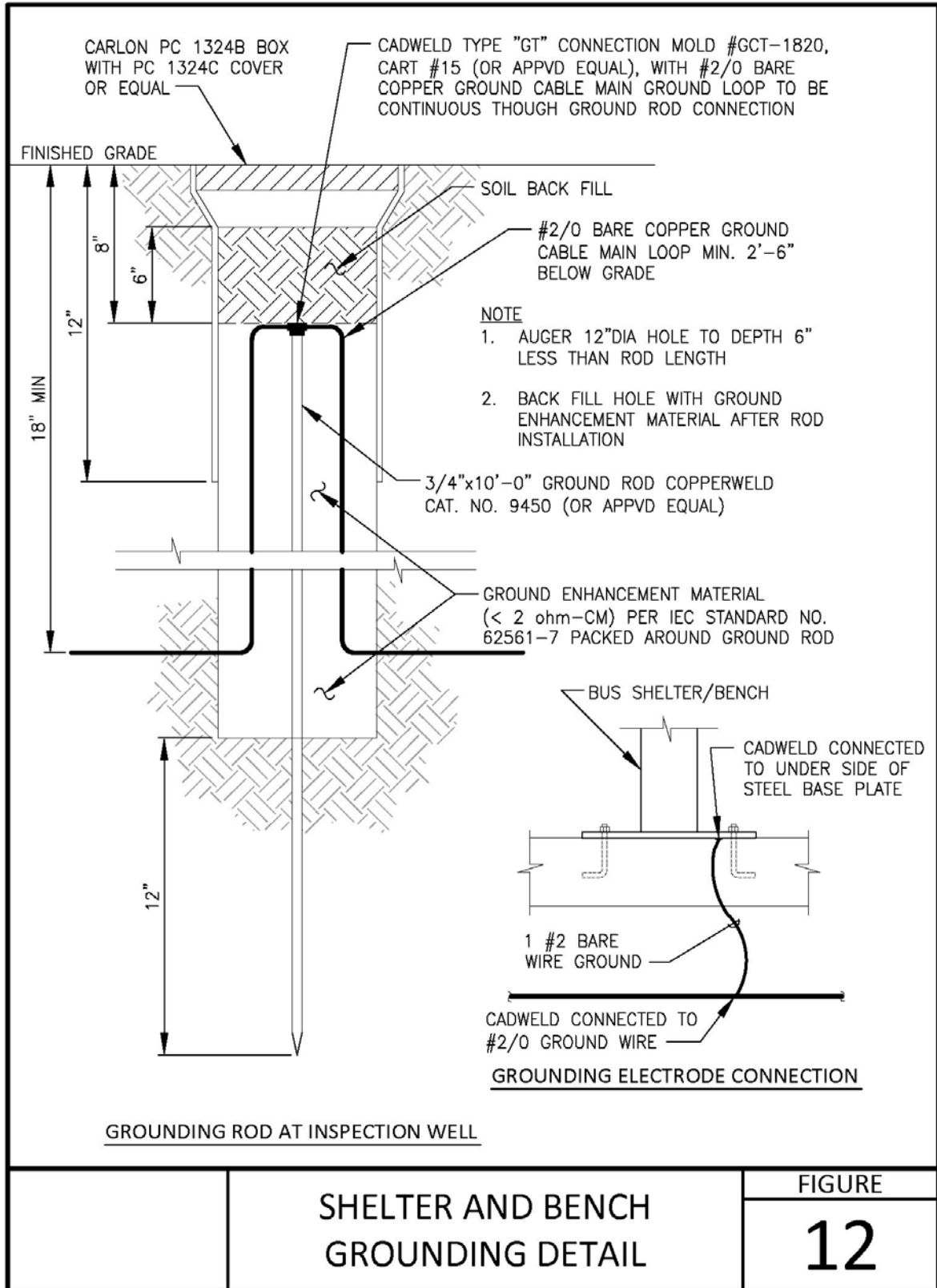
The standard bench is an eight-foot, perforated metal bench with no backrest and four seats separated by anti-vagrant bars. The bars prevent the bench from being used for extended stays or as a place to sleep. Benches should be ordered with and match the shelter, with a seat height between 17 and 19 inches to conform to ADA guidelines. Benches should be anchored to the concrete pad in the same manner as the shelter, and should be grounded as described above. Benches are typically mounted offset in the shelter to provide space for one wheelchair within the shelter.

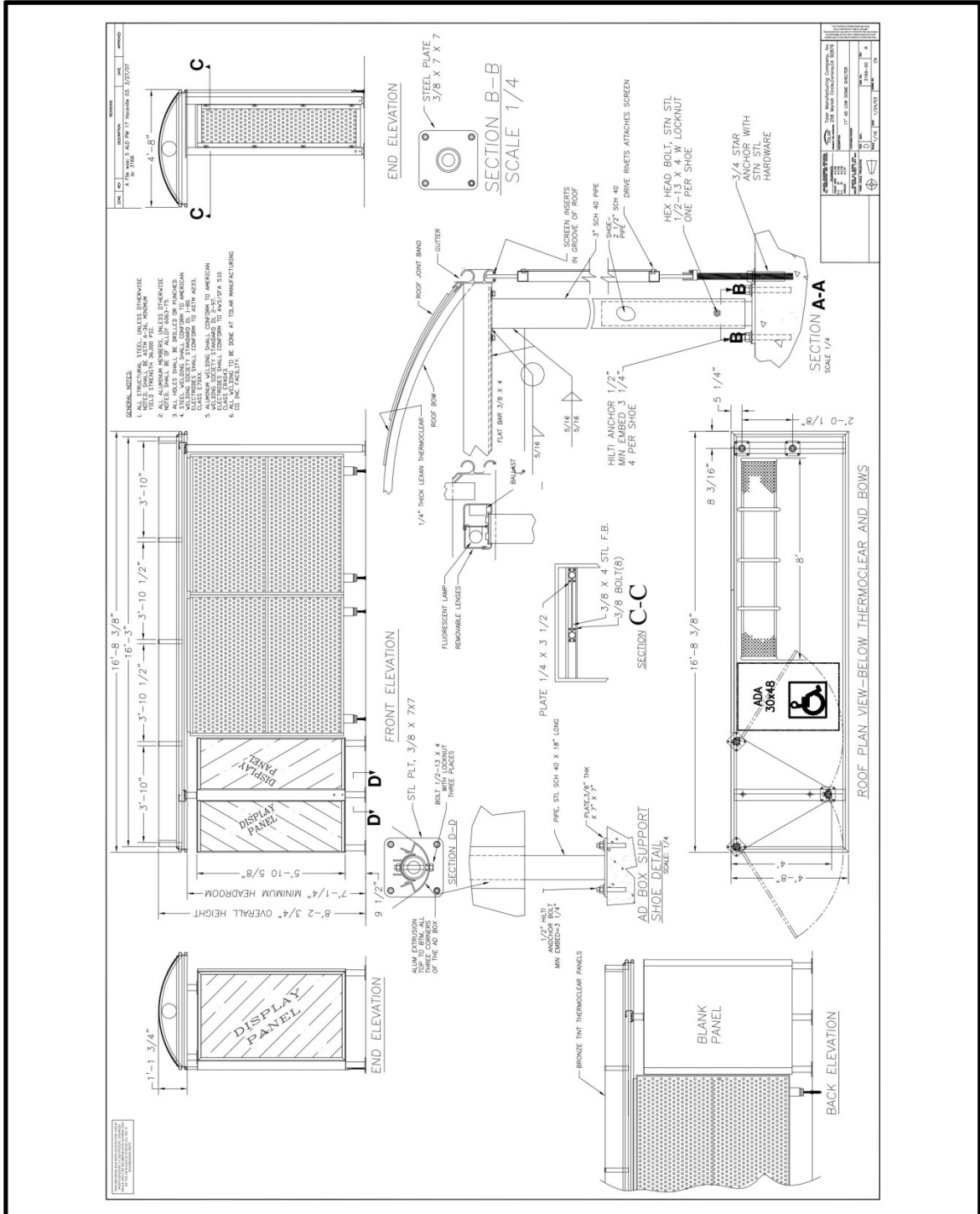
5.6.4 Trash Receptacles

Trash receptacles should also match the shelter. The standard receptacle is a perforated metal version matching the standard bench. Trash receptacles may be either freestanding / anchored to the concrete pad or attached to the shelter. Receptacles should have a secured lid to prevent scavenging, with a side door to provide for easy emptying, as well as a stainless steel liner to contain liquids and prevent spills and staining of the passenger waiting area.

5.6.5 Bike Racks

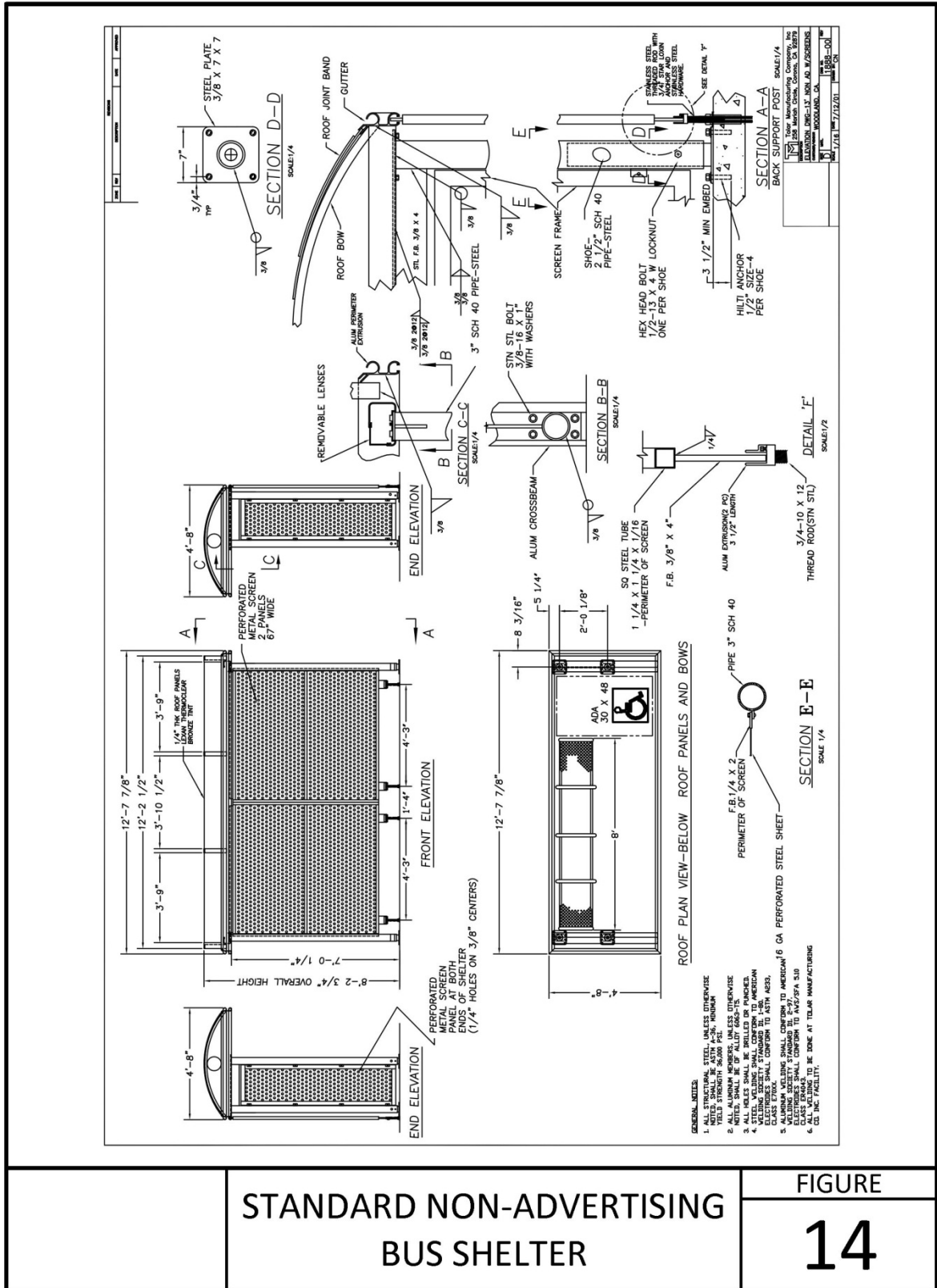
Bike racks should be provided at stops with significant bicycle traffic (i.e., two or more bikes at the stop), and the racks should match the shelter and other furnishings. The standard bike rack is an “Inverted U Bike Loop” and requires an area approximately 4 feet by 8 feet to install four loops. The bike rack should be installed on a four-inch thick concrete pad in the street parkway adjacent to the shelter, in a location that does not block the sidewalk or accessible path of travel.





STANDARD ADVERTISING BUS SHELTER

FIGURE 13

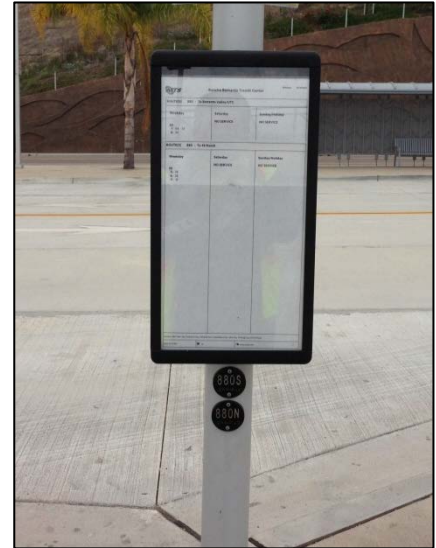


STANDARD NON-ADVERTISING BUS SHELTER

FIGURE 14

5.6.6 Map and Schedule Cases

A transit system map/schedule should be provided at each stop via one of three methods. Local stops typically use a small map case or “cassette,” which can be attached to the pole supporting the bus stop sign. Busier stops or those serving multiple routes are better served by a larger map/schedule cases attached to the shelter, which are available from the shelter manufacturer. Transfer stations typically feature a large double-sided freestanding map/schedule case separate from the shelter or a wall-mounted map case. Standard size for the map cases is 22 inches by 34 inches, with the long axis oriented vertically. The small cassettes, maps, and schedules are the only items furnished by the transit agency; the larger map cases need to be procured and installed by the developer.



Typical cassette map case

5.6.7 News Racks

A desired amenity for many passengers is the ability to have a newspaper or other periodical to read while riding the bus. However, there are a number of issues related to the presence of news racks at transit stops. News racks are typically installed by private vendors and may be chained to a shelter or sign or bolted to the sidewalk to prevent their removal, creating the potential to block accessible pedestrian paths. News racks may be vandalized or poorly maintained, affecting appearance of the stop. Some news racks may display adult-oriented material that some passengers find objectionable. Also, removal or relocation of news racks, once installed, can be problematic due to First Amendment rights and difficulties in locating the owners. It is recommended that an area for news racks be designated by the agency or that fixed modular news racks be provided at bus stops if there is a high demand for that particular amenity.

5.6.8 Lighting

Bus stops should be located adjacent to a street light to provide lighting for the immediate area. Additionally, shelters should be internally lit, preferably using solar power. Locations of bus stops in urban areas should be selected on the basis of whether adequate lighting is available on roadways and walking paths approaching the stop. The preferred lighting level is two foot-candles minimum.



Bus stop lighting and security cameras

5.6.9 Security

In addition to lighting, other features should be incorporated into the layout and design of the bus stop to enhance security. Security depends to large a degree on visibility from the public street, and stops should be located so they are not screened by vegetation, walls, buildings, or other obstructions. The front of the shelter should be oriented towards the street. Secluded locations for stops should be avoided, and operating hours should be clearly posted. Stops located near a telephone with no charge 911 capability or those within visual range of security cameras are also desirable assets. Special attention should be paid to carefully locating transit stops in high crime areas.

5.7 Maintenance Considerations

All furnishings and amenities installed at bus stops should be sturdy, durable, vandal resistant, and easy to clean and repair. Basic maintenance will normally be performed by the local municipality, but it may also be the responsibility of the transit agency or a maintenance contractor under contract to either party. Recommended basic maintenance activities are as shown in Table 1. Intervals should be based upon location and passenger usage.



Power washing bus platform

Goal	Activity
Clean bus platform	Power wash platform and sidewalk with water quality controls, remove gum, etc.
Clean furnishings	Wipe down shelters, benches, and other furnishings
Repair vandalism	Repair/replace damaged furnishings
Provide safety/security lighting	Check and replace lamps (and batteries for solar)
Remove trash	Empty trash receptacle
Provide current route/schedule information	Restock/replace schedules and route maps
Clearly mark bus zone	Repaint red curb and legends

Table 1: Recommended Basic Maintenance Activities for On Street Bus Stops

5.8 Permit Considerations

Placement and construction of bus stops within public rights of way by transit agencies or their contractors typically requires an encroachment permit from the agency that owns the right of way and maintains the roadway. These agencies within Imperial County and their contacts include:

<p>City of Brawley, Department of Public Works 160 S. Western Avenue Brawley, CA 92227 Phone: (760) 344-5800 Fax: (760) 344-5612</p>	<p>City of Calipatria, Public Works Department 525 South Sorensen Calipatria, CA 92233 Phone: (760) 348-4145</p>
<p>City of Calexico 608 Heber Avenue Calexico, CA 92231 Phone: (760) 768-2110</p>	<p>City of El Centro, Public Works Department 1275 Main Street El Centro, CA 92243 Phone: (760) 337-4510</p>
<p>City of Holtville 121 West Fifth Street Holtville, CA 92250 Phone: (760) 356-2912 Fax: (760) 356-1863</p>	<p>City of Imperial 420 South Imperial Avenue Imperial, CA 92251 Phone: (760) 355-4371</p>
<p>City of Westmorland 355 South Center Street Westmorland, CA 92281 Phone: (760) 344-3411 Fax: (760) 344-5307</p>	<p>County of Imperial, Department of Public Works Permit Specialist 155 South 11th Street El Centro, CA 92243 Phone: (760) 482-4462 Fax: (760) 352-1272</p> <p><i>Jurisdiction includes all roadways outside incorporated cities and outside Indian reservations, but excludes State Highways.</i></p>
<p>Caltrans District 11 Permit Office 4050 Taylor Street, MS 110 San Diego, CA 92110 Phone: (619) 688-6158 Fax: (619) 688-6157</p> <p><i>Jurisdiction includes State Highways 7, 78, 86, 98, 111, 115, 118 and Interstate 8.</i></p>	



Section 6

Off Street Transit Transfer Stations

- Transfer Station Locations
- Sidewalks, Ramps, and Accessibility Requirements
- Parking and “Park & Ride” Facilities
- Bus Bays and Circulation
- Wayfinding and Informational Signs
- Integration with Transit Oriented Development
- Station Amenities
- Maintenance Considerations
- Intelligent Transportation Systems
- Transit Priority



Section 6: Off Street Transit Transfer Stations

Transit transfer stations should be characterized by strong design presence. Whether it consists of passenger shelters, new station architecture or new wayfinding and signage, the design should emphasize great concepts at many levels. The design of these components needs to address aesthetics, durability and maintenance as a minimum.

- **Aesthetics:** Aesthetics should be defined as those attributes that attract the eye pleasantly, carry a meaningful message or philosophy and are memorable.
- **Durability:** Durability should be defined as those qualities that make materials long lasting and maintain or even enhance their aesthetic qualities for long durations.
- **Maintenance:** Maintenance, better defined as low or zero maintenance, should reflect the ability to reduce or even ignore general maintenance of elements in the shelters, stations or signage.

6.1 Transit Transfer Station Locations

Off street transit stations typically accommodate more routes, different types of transit vehicles, and a larger volume of passengers who may stay for longer periods. For these reasons transit station improvements and amenities are more extensive and more permanent than those found at curbside bus stops. Typically, buses circulate within transit stations; onsite parking for riders may be provided, requiring a site with adequate area to allow multiple buses to circulate, enter, and exit bus bays without blocking other movements. “Park & Ride” facilities may also feature surface or structured parking stalls and the parking may be exclusive or shared with adjacent development. Transit stations are ideally located within a short walk of a major destination where there is a high demand for transit, including civic centers, employment centers, airports, shopping malls, educational institutions, hospitals, and border crossings. These locations also typically provide services and support facilities (e.g., restrooms, vendors, and security staff) to enhance the transit experience.



Locating bus stops near civic centers provides a destination for many transit users

6.2 Sidewalks, Ramps, and Accessibility Requirements

Transit stations and adjacent improvements are required to comply with ADA regulations. Relevant sections of ADA related to transit station improvements include:

- Section 206.3, “Accessible Routes”
- Section 208, “Parking Spaces”
- Section 403, “Walking Surfaces”
- Section 406, “Curb Ramps”
- Section 602, “Drinking Fountains”
- Section 810, “Transportation Facilities”
- Section 903, “Benches”

This is not a comprehensive list and there are many advisory standards in addition to the mandatory requirements. Excerpts of the relevant ADA regulations may be found in [Appendix D](#). Additional details may be found at www.ada.gov. Additionally, off street transit stations and related facilities are required to be designed in compliance with the current edition of the California Building Code, which mandates additional safety and accessibility requirements depending on the improvements proposed at the site.

6.3 Parking and “Park & Ride” Facilities

Exclusive or shared off street parking should be provided at transit stations where there is a high commuter volume, at destinations that may attract riders, or at strategic locations to encourage drivers of single-occupancy vehicles to use transit. Parking may be free or provided as an incentive with a transit pass; metered parking is not typically used by transit patrons due to the length of stay. Standard parking stalls should be 8.5 feet wide by 18 feet long, and a percentage of standard disabled and van stalls (including loading areas) are required to be incorporated into each parking area according to Section 208 of the ADA. Curbs at disabled stalls are required to be flush or have compliant ramps behind the curb line; ramps within the accessible loading areas are not allowed. Parking areas should be paved with a minimum of 3 inches of asphalt concrete over 6 inches of aggregate base and may have either 90 degree or angled parked, with angled parking reserved for driveways with one-way circulation. If at all possible, parking areas and access to them should be completely separated from bus circulation on the site to avoid traffic conflicts and delays. Parking areas should be clearly posted and striped as such and should be striped, lighted, and landscaped in compliance with local codes.



Sabre Springs/Penasquitos Transit Station, where parking is separated from the bus bays

6.4 Bus Bays and Circulation

Bus bays and circulation routes onsite should be designed for the largest vehicle expected to use them now or in the future, which in most cases is a 45-foot coach bus. Bus bays themselves may be onsite or on the adjacent public street, either parallel to the curb or angled “sawtooth” bays. Recommended dimensions are shown in [Figure 15](#).

All buses must be able to safely enter, exit, and pass other parked buses within the station when all the bays are occupied. Turning movements for each type of vehicle must be checked using Softdesk Autoturn software or a similar graphical method that accounts for the overhang of the body and deployed bike rack, with a horizontal clearance to any obstruction of a minimum of two feet. Vertical clearances along the bus route should also be checked, and they should provide a minimum of 14 feet clearance along the bus path. Turning movements for 40-foot city buses and 45-foot coach buses are shown in Figures 4 and 5, respectively, on pages 9 and 10. Bus bays and bus lanes should be paved with a minimum of 8 inches of concrete over aggregate base as required by local soils conditions, with expansion or control joints at 15-foot maximum spacing. Bus bays should slope at no more than 2% longitudinally, and should provide positive drainage to an approved outlet. Boarding and alighting areas should conform to ADA Section 810 as illustrated in Figures 6, 7, and 11 on pages 12, 14, and 20, respectively.



Angled “sawtooth” bus bays

graphical method that accounts for the



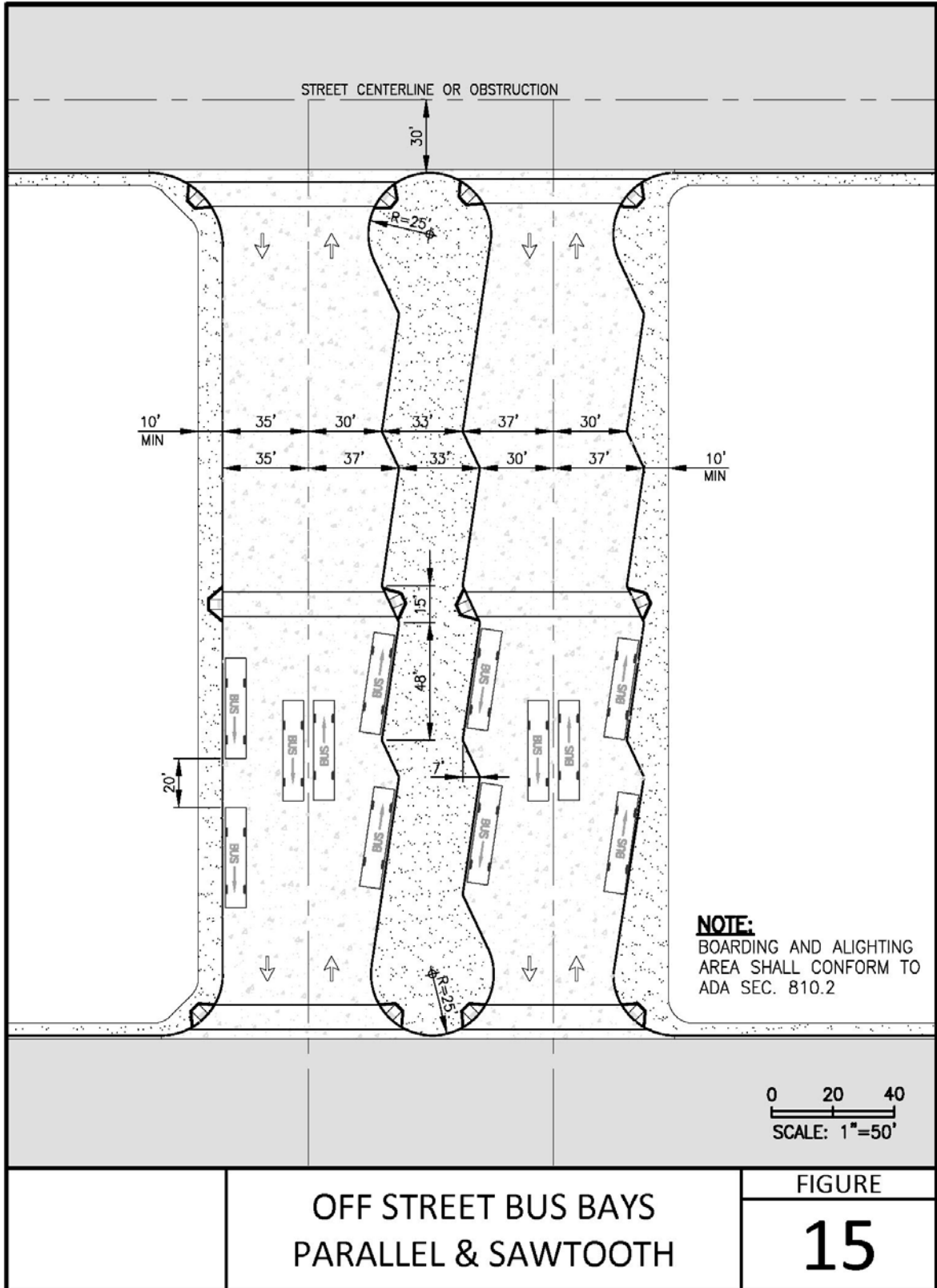
Designing turning movements for buses

6.5 Wayfinding and Informational Signs

Higher volume transit stations may have a significant number of riders who are not familiar with the local area, and these riders would benefit from wayfinding and informational signage. Great wayfinding and signage design is characterized by clear, easy to read, high contrast or unambiguous colored pictographs and text. Consider graphics by iconic companies such as Apple or Volkswagen to get the idea. Keep in mind also that competition from surrounding urban signage will threaten the messages that need to be conveyed by the graphics on shelters, stations or free-standing signs associated with both. Signs should be bilingual and the station name / location should be clearly visible from the arriving bus.



Section 6: Off Street Transfer Stations and Transit Stations



6.6 Integration with Transit Oriented Development

Co-locating and integrating transit facilities with development has many benefits, including:

- Reducing automobile travel
- Reducing congestion
- Reducing parking requirements
- Reducing greenhouse gases
- Providing amenities for transit users
- Providing shared functions used by both transit and development patrons.



Transit Oriented Development Grossmont Transit Station

Ideal locations for transit stations include civic centers, employment centers, regional shopping areas, border crossings, medical complexes, and educational facilities where walking and biking can be encouraged, parking can be shared, and the development can support transit ridership. Multi-family housing including affordable, senior, and low income housing also provides excellent transit oriented development (TOD) opportunities where car ownership may be proportionately less and transit can reduce transportation costs for families on fixed incomes. Transit facilities can be located within or directly adjacent to a TOD, and ideally serve multiple modes of travel (e.g., on a bike route or pedestrian path, in close proximity to a railroad or airport). Successful TODs clearly define construction, operations and maintenance responsibilities between all of the stakeholders, and provide benefits to all parties. Regional land use planning efforts for many metropolitan areas now identify HQTAs, specific areas suitable for TODs.

6.7 Station Amenities

6.7.1 Architectural Considerations

Larger stations should employ architecture that embrace regional aspects and speak eloquently of its attributes, history, culture and folklore. Keeping in mind the other important precepts (durability and maintenance), designers should explore the unique local climatic conditions to develop strong architectural concepts tying larger stations with shelters, architectural references with local context or climatic realities and up to date sustainable concepts.



Designers are also encouraged to employ every means available within economically constraints to harness passive methods of cooling and ventilating larger roof area, which can become heat refracting sources during hot weather. In addition, rain events should also be considered when shelter is provided to protect passengers waiting for transportation, particularly when wind is added to the condition.

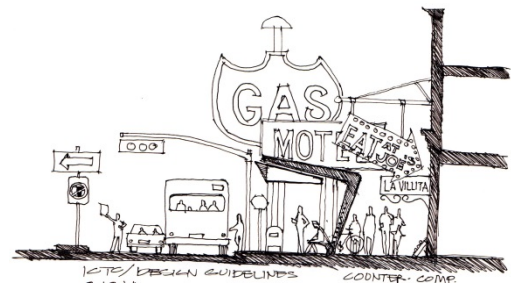


6.7.2 Passenger Shelters

Shelters should project a strong aesthetic concept, incorporating local imagery to create a memorable branding for the system. The imagery created should be strong enough to compete with the plethora of commercial signs and businesses surrounding them and serve to attract passengers as well.



Designers should research the area's rich history and other cultural traits to formulate a strong design idea that will transcend dating or trends and be useful and attractive. One way to achieve this is to incorporate the current graphics and color schemes used by the system to easily integrate with a known memorable identification.



Although pre-fabricated shelters could be a possibility for the system, designers should explore iconic new shapes embodying the precepts defined above to establish an enduring mark in the region. These structures should be governed by judicious planning in terms of their layout and placement on their usually restricted sites. Often shelters need to be incorporated in sidewalks with little space and share the space with a variety of other "street furniture", light standards, signs and landscaping.

One of the most important aspect of good shelter design is recognizing how the shelter relates to the bus stop and how passengers will queue up to the bus and facilitate orderly and safe boarding for the young and old, the able-bodied and the impaired. Although generally small in nature, shelters need to protect people from the elements, such as the sun and rain, and sometimes wind as well. Another consideration is to plan shelter architecture for good circulation flow within the protected area and its surrounding context so that passengers can stand under the shelter or close to it and see the incoming bus clearly.



6.7.3 Benches

Benches at transit stations may be selected from a catalog, may be a custom design specific to the station, or may be integrated into the station art or architecture. In all cases the same durability and accessibility criteria apply as at bus stops. Benches should be anchored to the station platform or sidewalk, or should be heavy enough to be immovable. Seating height should be between 17 and 19 inches, and should provide a higher level of comfort (such as a backrest) for longer stays. Again, armrests or dividers should be incorporated to discourage sleeping on benches. At a minimum, four seats should be provided per bus bay, including a wheelchair seating area.



Transfer station benches

Although seating can be selected from commercial “off-the-shelf” products, seating integrated into the shelter structure minimizes fixed points in the sidewalk, eases cleaning and maintenance and can offer greater durability. Keep in mind that modern shelters can be prefabricated, galvanized or powder-coated during fabrication and moved to the site already assembled even if custom-made.



6.7.4 Trash Receptacles

Trash receptacles are typically selected from a catalog to match the rest of the furnishings at the station. Similarly, trash receptacles can be easily appended to the shelter structure making servicing easy and minimizing the number of fixtures populating the station’s limited footprint. The tops and lids should be designed to discourage scavenging, while the receptacle itself should allow for quick and easy emptying by maintenance staff. A stainless steel liner should be provided to reduce spills and stains from discarded coffee cups and other liquids. Regional transit stations should also provide a covered, lockable trash enclosure for an onsite dumpster, with a concrete pad to prevent pavement damage by the trash truck.



Typical transfer station bench and trash receptacle

6.7.5 Map and Schedule Cases

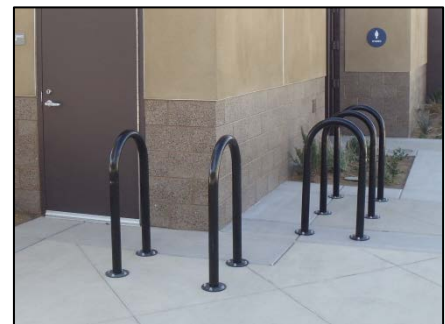
Map and schedule cases at off street stations should be wall-mounted or platform-mounted single or double cases to hold full-size (22" wide x 34" high) transit schedules or maps. At least two cases should be provided within visual range of the bus bays.



Typical map and schedule case

6.7.6 Bike Racks, Lockers, and Bike Stations

Bicycle facilities provided at transit stations should be scaled relative to the amount of bike traffic at the station. Bike racks are functional and inexpensive, but offer the least protection against weather and theft. Bike lockers occupy more room but provide more protection and may be accessed with a key or magnetic card. Bike stations offer fully enclosed bike storage and repair facilities at large regional transit stations, but are more costly and take up more space. Bike lockers and bike stations typically require utility connections. Both accessible paths and bike routes need to be taken into account when locating bicycle parking, and the site design should discourage locking bicycles to trees, fences, or poles where they may become a hazard to pedestrians.



"Inverted U Bike Loop" bike rack

6.7.7 Lighting

Lighting levels at transit stations should be a minimum of 5 foot-candles on transit platforms and 2 foot-candles in parking areas and driveways. Lighting fixtures should be low voltage, energy efficient, and mounted above eight feet to reduce vandalism, with the exception of theater lighting, lighted bollards, and similar fixtures. Ground-mounted landscape lighting, lighting fixtures exposed to irrigation, and delicate decorative fixtures are strongly discouraged. Lighting system design should conform to the National Electrical Code and should provide flexibility in operations via use of timers, night circuits, or separate breakers for each circuit. Weatherproof 120V electrical outlets located in the base of lighting fixtures are recommended to facilitate maintenance and repair activities.



Typical transfer station lighting

6.7.8 Security

Security at transit stations is provided through a number of different design and operations aspects. Lighting levels should be a minimum of two foot-candles throughout the site. Sightlines are a key element to allow proper surveillance by police or security forces, and bushy vegetation, walls, and other obstructions that block views from adjacent streets should be avoided. Off street transit stations should have full coverage from fixed or remotely controlled video cameras monitored by local law enforcement or security staff, and they should also feed a digital video recorder. Camera locations should be selected in advance to ensure proper sightlines and coverage. A free 911 telephone or emergency call button should be located centrally onsite in case of emergency. The transit station should also be designed to avoid providing hiding places such as alcoves, dense vegetation, or columns wider than 24 inches in diameter. If restrooms are located at the transit station, they should be monitored and closed after business hours.



Typical transfer station security mounted on light pole

6.7.9 Telephones

Because many people do not carry mobile phones with them, a telephone capable of calling 911 free of charge in case of emergency is a desirable amenity from a safety and security perspective. Pay telephones, if provided, are normally furnished and operated by a private contractor under agreement with the local transit agency, and require power and communications conduits to the phone location. Telephones are also required to be ADA compliant.



Free 911 telephone

6.7.10 Vending, Concessions, and News Racks

A morning newspaper and cup of coffee can enhance the transit experience for many riders, and many transit stations offer concessions onsite. Concessions may be offered via vending machines, portable carts, or vendors operating out of onsite buildings. Specific onsite areas should be identified for vending machines, news racks, and carts. These areas should be provided with electrical and water utilities and, in some cases, sewer and network connections. Food concession areas can be expected to require more frequent cleanings and should have a special surface to facilitate that task. News racks can present a separate set of issues, as discussed in Section 5.6.7.



Typical transfer station vending area

6.7.11 Drinking Fountains

Drinking fountains are a desirable amenity for those who may not choose to bring or buy their own refreshments. Fountains should be vandal resistant and provide chilled or cooled water, given summertime temperatures in the Valley. Note that there are specific accessibility requirements for drinking fountains.

6.7.12 Car Sharing and Bike Sharing

As more people forego car ownership due to cost and other factors, car sharing and bike sharing has increased in popularity, particularly among transit users. Consideration should be given to allocating space at transit stations for these functions, which are typically operated by a vendor. Some of the car/bike sharing systems require electrical power and network connectivity for check in/check out functions, and shared cars may be plug-in hybrids or fully electric cars that require a charging station.

6.7.13 Pest and Vector Controls

Pests and vectors are a public health issue and are not any more desirable at a transit station than they would be in your home. These can include insects, rodents, birds, or larger animals drawn by food or shelter opportunities. Trash receptacles and dumpsters should have the ability to be closed and locked, emptied frequently, and located away from passenger waiting areas. Pigeons are prevalent in the Valley and inadvertently providing convenient roosting and nesting locations on ledges, roofs, and in alcoves should be avoided. Deterrents such as bird spikes, netting, and low voltage electrical wires can also be used.

6.7.14 Landscaping and Irrigation Systems

Landscaping at transit stations enhances the quality of the space for passengers and should be durable, low maintenance, and consistent with the local environment. Trees and shrubs that drop leaves or flowers and generate pollen or sap should be avoided. Irrigation systems should be drip type or other low water use systems, utilizing reclaimed water if available, and irrigation spray should be directed away from sensitive elements such as electrical fixtures and communication cabinets. Landscaping can be very effectively utilized at transit stations to provide shade, create windbreaks and, along with other site amenities such as fencing, direct pedestrian traffic to proper routes and safe crossing locations. Quick disconnect couplings should be provide at regular intervals throughout the site to facilitate maintenance functions including power washing of the platform, sidewalks and other areas.

6.7.14 Restrooms

Many transit riders, particularly those with limited mobility, find public restrooms to be a desirable amenity at major transit nodes; however, they can present long-term maintenance and security issues if not managed properly. Public restrooms, if provided, should be maintained by the local municipality or a private developer rather than the transit agency. All restrooms are required to be ADA accessible, and should be located at a staffed facility with limited hours for security reasons. All regional transit transfer stations should have a private restroom for transit operators which should have a minimum of one locked, accessible, unisex toilet. The operator's toilet room is typically co-located in a building onsite along with a utility/communications room and a maintenance storage room. Furnishings should be as durable as possible, and should include a flush valve toilet, sink, stainless steel mirror, floor drain, and a locking cabinet for supplies.



Transfer station restrooms

6.7.15 Vertical Circulation

Transit facilities should be located on one level if at all possible. Elevators are costly to install and maintain, typically requiring two elevators to provide redundancy and maintain service at all times. Stairways and escalators do not comply with accessibility codes and need to be supplemented with accessible ramps or elevators. If it is absolutely necessary to provide access to transit facilities, elevators or escalators should be operated and maintained by the project owner or developer rather than the local transit agency.

6.8 Maintenance Considerations

All furnishings and amenities installed at transit stations should be sturdy, durable, vandal resistant, and easy to clean and repair. Basic maintenance will normally be performed by the local agency, but may also be the responsibility of the transit agency or a maintenance contractor under contract to either party. Off street transit facilities require a significantly higher level of regular maintenance than standard bus stops due to the higher level of traffic. Recommended basic maintenance activities are as shown in Table 2. Intervals should be based upon location and passenger usage.

Goal	Activity
Clean bus platform	Power wash platform and sidewalk with water quality controls, remove gum
Clean furnishings	Wipe down shelters, benches and other furnishings, remove graffiti
Repair vandalism	Repair/replace damaged furnishings
Provide safety/security Lighting	Check and replace lamps (and batteries for solar)
Remove trash	Empty trash receptacle
Provide current route/schedule information	Restock/replace schedules and route maps
Clearly mark bus zone	Repaint red curb and legends

Table 2: Recommended Basic Maintenance Activities for Off Street Transit Transfer Stations

6.9 Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) is a broad term that covers a wide variety of technology and network based transit amenities that may be located at regional transit stations. As the system expands, ITS features may include those described in the following subsections.

6.9.1 Security Cameras

Regional transit facilities are recommended to have full site coverage from either fixed or remotely controlled pan-tilt-zoom digital video cameras. The video may be recorded either on- or off-site, and monitored in real time by local law enforcement or security staff at the site. Camera locations must be carefully selected during design to provide sightlines and coverage, are typically mounted on structures and light poles, and require electrical and network connections.

6.9.2 Fare Vending and Validation

Fares are currently collected using cash or pre-printed ticket books, but many transit agencies are transitioning to coded “smart cards” to reduce cash handling requirements and related demands on transit drivers. Validators perform check-in and check-out functions when customers ride the bus using smart cards, and may be mounted on the bus itself.



Typical fare vending and validation machines

6.9.3 Customer Information and Trip Planning Kiosks

Interactive kiosks allow transit riders to plan their trips (particularly useful where multiple bus changes may occur), vend trip tickets, recharge transit smart cards, and perform other functions.

6.9.4 Changeable Message Signs (“Next Bus”)

Changeable message signs may either display strictly transit information or may be mixed with advertising as a revenue-generating opportunity for the transit agency. When paired with vehicle locating systems, changeable message signs can also display “Next Bus” information, displaying when passengers can expect the next bus for their route to arrive at the station.



“Next Bus” changeable message sign

6.9.5 Digital Public Address Systems

Digital public address systems are highly flexible and can provide paging, background music, transit announcements, or emergency announcements. They can also provide audio information for the visually impaired to supplement visual data. Note that public address systems are required to convey visual information to supplement audio messages in accordance with Section 810.7 of the ADA.

6.9.6 Wireless Service

Many commuters and students like to be able to work on their laptops or tablets while waiting for their bus, and wireless connectivity at transit stations allows them to do this. It also allows for direct delivery of transit information to customer's wireless devices.

6.9.7 Communications Enclosures and Equipment

ITS functions require equipment found in any typical computer network, including routers, modems, switches, and power supplies. This equipment is typically mounted on standard-sized racks within a utility or communications room or in a stand-alone cabinet or enclosure. The communications room would normally be co-located in a driver's or public restroom building, be securely locked, air conditioned, and properly sized for current and future needs. ITS cabinets commonly used are similar to standard Caltrans traffic signal cabinets. They should be secure, constructed of stainless steel for corrosion resistance, located out of the range of irrigation overspray, and be mounted to a concrete pad that also provides a working area for the technician when the doors are open. ITS cabinets are also required to be air conditioned, and there are units available that are specifically designed for this purpose.



Communications room located in restroom building

The conduit required to provide these future amenities is relatively inexpensive and should be installed at the time the station is developed.

The conduit required to provide these future amenities is relatively inexpensive and should be installed at the time the station is developed.

6.10 Transit Priority

The benefits of transit can be diluted or reduced when the buses serving the system are mired in the traffic congestion of urban areas. Transit priority gives buses priority over private automobiles through a number of different methods.

6.10.1 Dedicated Bus Lanes and Guideways

Roadway lanes exclusively reserved for transit vehicles are common in many urban areas. Typically the lanes along the curb are dedicated for transit with local stops, and the lanes along or within the median are reserved for express buses with no stops. Entirely separate exclusive roadways or “guideways” are also being provided for transit vehicles in many congested areas.

6.10.2 Queue Jumpers

Modified traffic signals allow transit vehicles in dedicated lanes to proceed before other vehicles receive a green light, allowing buses to proceed without being delayed by other traffic. They can also allow buses to make traffic movements that would be difficult in heavy traffic, or would not be permitted for other vehicles.

6.10.3 Dedicated Driveways

Separate entrances, exits, and circulation paths for transit vehicles are becoming standard for regional transit facilities. These dedicated driveways reduce delays, congestion and conflicts with private vehicles.

6.10.4 Vehicle Location Systems

Global positioning system (GPS) devices can now provide real time tracking of transit vehicles, which provides a number of benefits. “Next Bus” signs can give waiting passengers an estimate of when their bus is about to arrive. Passengers can be redirected to other routes if their original route is delayed by traffic. Real time incident management can also, for example, redirect routes around an accident on a major thoroughfare.

6.10.5 Express and Rapid Bus Service

Express and rapid bus routes are characterized by longer routes with fewer stops to reduce delays for passengers along heavily traveled corridors. Because they don’t need local stops, these services tend use freeways more than local roadways to avoid delays and obtain higher speeds, and may use different types of transit vehicles. These routes typically service regional stops with easy and direct access to and from major highways.



Appendices



- A. New/Relocated On-Street Bus Stop Checklist
- B. Glossary
- C. List of Acronyms
- D. Excerpts from ADA Regulations

Appendix A

New/Relocated On-Street Bus Stop Checklist

NEW/RELOCATED ON-STREET BUS STOP CHECKLIST

Street _____ Side _____ Cross Street _____ Route _____ Direction _____

Proposed Bus Stop: Category I (sign only) Category II (sign, bench) Category III (sign, bench, shelter)
 Type of Stop: Urban (with curb) Rural (no curb)

No.	Criteria	Y	N	Comments
1.	Is the stop proposed on an existing route? If yes, specify route number.			
2.	Is proposed stop located on the far side of intersection?			
3.	Are there conflicts with driveways, utilities, or trees?			
4.	Is the existing public street/roadway improved with curb, gutter, and/or sidewalk? Specify.			
5.	Is there space available for a full width (10 foot wide) sidewalk?			
6.	Is the existing street slope between 0.5 and 2% with positive drainage?			
7.	Is the existing sidewalk cross slope less than 2%?			
8.	Is there adequate lighting in the immediate area of the stop?			
9.	If a mid-block location, is there adequate room for bus transitions?			
10.	Will on-street parking stalls be lost? How many at 25 feet long?			
11.	Is there adequate roadway/shoulder width for a parked bus?			
12.	Is there an ADA-compliant pedestrian route from existing sidewalks to proposed bus stop location?			
13.	Is there marked crosswalk or signalized pedestrian crossing on pedestrian routes near stop?			
14.	Is the proposed stop on a bike route?			
15.	Is the proposed stop within view of any security cameras?			
16.	Is there enough area ridership to justify a bus stop location?			

FOR INTERNAL USE ONLY:

Location Approved Location Not Approved

By: _____ Title: _____ Date: _____

Notes:

Appendix B

Glossary

Glossary

Accessibility	The extent to which facilities are barrier free and useable by disabled persons, including wheelchair users. It also represents a measure of the ability or ease of all people to travel among various origins and destinations.
Accessory Pad	A paved area that is provided for bus patrons and may contain a bench shelter and/or other amenities.
Activity Center	An area with high population and concentrated activities that generate a large number of trips, such as a Central Business District, shopping center, business or industrial park, or recreational facility. Also known as a Trip Generator.
Americans with Disabilities Act of 1990 (ADA)	The law passed by Congress that makes it illegal to discriminate against people with disabilities in employment, services provided by state and local governments, public and private transportation, public accommodations, and telecommunications. The ADA requires that fixed-route transit be accessible and that complementary paratransit service be provided in the same geographic areas on the days and hours and fixed-route service.
ADAAG	Americans with Disabilities Act Accessibility Guidelines from the US Access Board. See: http://www.access-board.gov/adaag/html/adaag.htm
Alight	To get off a transit vehicle. Plural: “alightings.”
Approach Angle	A vehicle’s front clearance angle, which is formed by the base of the front vehicle tire, the front ground clearance height, and the roadway.
Arterial Street	A roadway that is designed to move large traffic volumes between various points within a region. Typically, these roadways have limited access and connect with smaller collector streets.
Board	To go onto or into a transit vehicle. Plural: “boardings.”
Bus Bulb	A bus stop where the sidewalk is extended into the parking lane, allowing a bus to pick up/drop off passengers without leaving the travel lane. Also known as a curb extension or Nub.
Bus Pull-Out Bay	A recessed bus stop area that allows a bus to leave the travel lanes to load and/or unload passengers. Also known as a Bus Turnout.

Bus Route Spacing	The distance between adjacent, parallel bus routes.
Bus Shelter	A building or other structure constructed at or near a bus stop that provides seating and protection from the weather for the comfort and convenience of waiting passengers.
Bus Stop	A point along a transit route at which passengers can board or alight from a bus. A bus stop is usually identified by a sign.
Bus Stop Infrastructure	The various elements that can be provided at a transit stop or station to help make transit more comfortable and convenient to patrons, including benches, shelters, lighting, vending machines, garbage receptacles, telephones, etc. These elements also are commonly referred to as “amenities.”
Bus Stop Spacing	The distance between consecutive transit stops.
Bus Stop Zone Length	The length of the portion of roadway that is signed or marked as being available for bus use to load and/or unload passengers.
Bus Turnaround	A roadway system that allows a bus to return to the street that it is serving in the opposite direction of travel.
Bus Turning Radii	The dimensions needed to accommodate bus turning movements.
Bus Turnout	See definition for Bus Pull-Out Bay.
Central Business District	The downtown retail trade and commercial area of a city or an area of very high land valuation, traffic flow, and concentration of retail business offices, theaters, hotels, and services.
Clear Space	The minimum unobstructed floor or ground space required to accommodate a single, stationary wheelchair and occupant (i.e., 30 inches in width by 48 inches in depth).
Collector Street	A roadway that serves internal traffic movements in an area by connecting several local streets with an arterial roadway.
Corner Curb Radii	The radius of the circle formed by the curve of the curb at the corner of two intersecting streets. It is used in street design as a measure of the sharpness of the corner.

Curb Ramp	A combined ramp and landing to accomplish a change of level at a curb in order to provide access to pedestrians using wheelchairs.
Departure Angle	A vehicle's rear clearance angle, which is formed by the base of the rear vehicle tire, the rear ground clearance height, and the roadway.
Discontinuous Sidewalk	A sidewalk that is constructed to connect a bus stop with the nearest intersection. The sidewalk does not extend beyond the bus stop.
Downstream	In the direction of traffic.
Dwell Time	The time a bus spends at a stop, measured as the interval between its stopping and starting.
Far-Side Stop	A bus stop that is located immediately across an intersection.
Fixed-Route	Transit service provided on a repetitive, fixed-schedule basis along a specific route, with vehicles stopping to pick up passengers at and deliver passengers to specific locations.
Floor to Area Ratio	Land use analysis quotient determined by dividing the gross floor area of all buildings on a given lot by the total area of the lot.
Frequency	The scheduled time interval between consecutive buses operating in the same direction on a given route. Also known as Headway.
Grid Street Pattern	A network of parallel and perpendicular streets intersecting at 90-degree angles, forming rectangular blocks of land that are typically equal in size and have perimeters measuring between 800 and 1600 feet.
Headway	The interval between the passing of the front ends of successive buses moving along the same lane in the same direction, usually expressed in minutes. Also known as Frequency.
Intermodal Facility	A higher level type of transit facility that is designed specifically to accommodate the meeting of two or more transit modes of travel. Typically includes expanded passenger infrastructure.
Kiosk	A freestanding, often cylindrical, device that displays transit maps and schedules and other passenger information. Kiosks typically are located at higher passenger volume stops.

Layover	Time built into a schedule between arrivals and departures, used for the recovery of delays and preparation for the return trip.
Local Street	A roadway that provides direct access to the adjacent land and typically accommodates a low volume of traffic.
Major Local Transit Stop	Similar to Standard Local Transit Stops, except with higher passenger boarding/alighting volumes. These stops typically are located at major activity centers or where routes intersect.
Mid-Block Stop	A bus stop that is located in between intersections.
Mixed-Use	In land use and transit planning, generally refers to different compatible land uses located within a single structure or in close proximity to each other.
Near-Side Stop	A bus stop that is located immediately before an intersection.
Nub	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 a curb extension or Bus Bulb.
Open Bus Bay	A bus bay designed with bay “open” to the upstream intersection.
Overhang	The portion of the vehicle body that extends beyond the front or rear axle.
Passenger Activity	The number of passenger boardings (“ons”) and alightings (“offs”) that occur at a transit stop during any particular time period.
Paratransit	Comparable transportation service required by the American with Disabilities Act of 1990 for individuals with disabilities who are unable, because of their disability , to use traditional fixed-route transportation systems.
Park & Ride	A higher-level type of bus facility that incorporates a parking lot at a transit facility to accommodate the automobile as an access mode to transit. Park-and-ride facilities also can be used to facilitate bicycle access to transit, as well as auto and bike access to vanpool/carpool services.
Person with Disabilities	People who, by reason of illness, injury, age, congenital malfunction, or other disability, are unable to use local transit facilities and services, without adequate facilities, as effectively as people who are not so affected.

Queue Jumper Bus Bay	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 bus bay.
Queue Jumper Lane	Right-turn lane upstream of an intersection that a bus can use to bypass queue traffic at a signal.
Roadway Geometry	The proportioning of the physical elements of a roadway, such as vertical and horizontal curves, lane widths, cross sections, and bus bays.
Shelter	A curb-side amenity designed to provide protection and relief from the elements and a place to sit while patrons wait for the bus.
Shuttle	A public or private vehicle that travels back and forth over a particular route, especially a short route or one that provides connections between transportation systems, employment centers, etc. Shuttle service may also provide connectivity between remote parking locations and large special events.
Sight Distance	The portion of the highway environment visible to the driver.
Standard Bus	A low floor “city” bus that is approximately 40 feet in length.
Standard Local Transit Stop	Bus stops that have the lowest passenger boarding/alighting volumes. These stops account for the majority of bus stops and provide for system access over a large geographical area.
Street-side Factors	Factors associated with the roadway that influences bus operations.
Superstop	A large bus staging area used where many routes come together at a point in the system. The intent of a Superstop is to not only serve as a transit system destination/transfer station, but also to act as a community focal point.
Tapers	The portion of lane provided at each end of a bus pull-out bay to accommodate bus speed changes when entering and exiting traffic.
Transfer Center	A fixed location where passengers interchange from one route or vehicle to another.
Transit Hub	A higher-level type of transit facility that includes an expanded bus staging area and considerable passenger infrastructure.

Transit-Oriented Development (TOD)	In general, TOD encompasses the specific tailoring of development patterns to be more conducive to transit use. Typically involves a mixed-use community or neighborhood surrounding a transit station, stop, or route that is designed to encourage transit use and pedestrian activity.
Turning Radius	The turning path of a vehicle established by the outer front overhang and the inner rear wheel.
Upstream	Toward the source of traffic.
Waiting Pad	A paved area that is provided for bus patrons and may contain a bench, shelter, and/or other infrastructure. Also known as a Landing Pad.
Wheelchair	A mobility aid belonging to any class of three- or four-wheeled devices, useable indoors, designed for and used by people with mobility impairments, whether operated manually or powered.
Wheelchair Lift	A device used to raise and lower a platform in a transit vehicle for accessibility by patrons that require the use of a wheelchair or similar mobility aid.

Appendix C

List of Acronyms

List of Acronyms

ADA	Americans with Disability Act
GPS	Global Positioning System
HQTA	High Quality Transit Area
ICTC	Imperial County Transportation Commission
ITS	Intelligent Transportation Systems
IVT	Imperial Valley Transit
RTP/SCS	Regional Transportation Plan/Sustainable Community Strategies
SCAG	Southern California Association of Governments
TOD	Transit Oriented Development

Appendix D

Excerpts from ADA Regulations

2010 ADA Standards (excerpts from www.ada.gov)

206 Accessible Routes

206.1 General. Accessible routes shall be provided in accordance with 206 and shall comply with Chapter 4.

206.2 Where Required. Accessible routes shall be provided where required by 206.2.

206.2.1 Site Arrival Points. At least one accessible route shall be provided within the site from accessible parking spaces and accessible passenger loading zones; public streets and sidewalks; and public transportation stops to the accessible building or facility entrance they serve.

EXCEPTIONS:

1. Where exceptions for alterations to qualified historic buildings or facilities are permitted by 202.5, no more than one accessible route from a site arrival point to an accessible entrance shall be required.
2. An accessible route shall not be required between site arrival points and the building or facility entrance if the only means of access between them is a vehicular way not providing pedestrian access.

Advisory 206.2.1 Site Arrival Points. Each site arrival point must be connected by an accessible route to the accessible building entrance or entrances served. Where two or more similar site arrival points, such as bus stops, serve the same accessible entrance or entrances, both bus stops must be on accessible routes. In addition, the accessible routes must serve all of the accessible entrances on the site.

Advisory 206.2.1 Site Arrival Points Exception 2. Access from site arrival points may include vehicular ways. Where a vehicular way, or a portion of a

vehicular way, is provided for pedestrian travel, such as within a shopping center or shopping mall parking lot, this exception does not apply.

206.2.2 Within a Site. At least one accessible route shall connect accessible buildings, accessible facilities, accessible elements, and accessible spaces that are on the same site.

EXCEPTION: An accessible route shall not be required between accessible buildings, accessible facilities, accessible elements, and accessible spaces if the only means of access between them is a vehicular way not providing pedestrian access.

Advisory 206.2.2 Within a Site. An accessible route is required to connect to the boundary of each area of sport activity. Examples of areas of sport activity include: soccer fields, basketball courts, baseball fields, running tracks, skating rinks, and the area surrounding a piece of gymnastic equipment. While the size of an area of sport activity may vary from sport to sport, each includes only the space needed to play. Where multiple sports fields or courts are provided, an accessible route is required to each field or area of sport activity.

206.2.3 Multi-Story Buildings and Facilities. At least one accessible route shall connect each story and mezzanine in multi-story buildings and facilities.

EXCEPTIONS:

1. In private buildings or facilities that are less than three stories or that have less than 3000 square feet (279 m²) per story, an accessible route shall not be required to connect stories provided that the building or facility is not a shopping center, a shopping mall, the professional office of a health care provider, a terminal, depot or other station used for specified public transportation, an airport

passenger terminal, or another type of facility as determined by the Attorney General.

2. Where a two story public building or facility has one story with an occupant load of five or fewer persons that does not contain public use space, that story shall not be required to be connected to the story above or below.
3. In detention and correctional facilities, an accessible route shall not be required to connect stories where cells with mobility features required to comply with [807.2](#), all common use areas serving cells with mobility features required to comply with 807.2, and all public use areas are on an accessible route.
4. In residential facilities, an accessible route shall not be required to connect stories where residential dwelling units with mobility features required to comply with [809.2](#) through 809.4, all common use areas serving residential dwelling units with mobility features required to comply with [809.2](#) through 809.4, and public use areas serving residential dwelling units are on an accessible route.
5. Within multi-story transient lodging guest rooms with mobility features required to comply with 806.2, an accessible route shall not be required to connect stories provided that spaces complying with 806.2 are on an accessible route and sleeping accommodations for two persons minimum are provided on a story served by an accessible route.
6. In air traffic control towers, an accessible route shall not be required to serve the cab and the floor immediately below the cab.
7. Where exceptions for alterations to qualified historic buildings or facilities are permitted by 202.5, an accessible route shall not be required to stories located above or below the accessible story.

Advisory 206.2.3 Multi-Story Buildings and Facilities. Spaces and elements located on a level not required to be served by an accessible route must fully

comply with this document. While a mezzanine may be a change in level, it is not a story. If an accessible route is required to connect stories within a building or facility, the accessible route must serve all mezzanines.

Advisory 206.2.3 Multi-Story Buildings and Facilities Exception 4. Where common use areas are provided for the use of residents, it is presumed that all such common use areas "serve" accessible dwelling units unless use is restricted to residents occupying certain dwelling units. For example, if all residents are permitted to use all laundry rooms, then all laundry rooms "serve" accessible dwelling units. However, if the laundry room on the first floor is restricted to use by residents on the first floor, and the second floor laundry room is for use by occupants of the second floor, then first floor accessible units are "served" only by laundry rooms on the first floor. In this example, an accessible route is not required to the second floor provided that all accessible units and all common use areas serving them are on the first floor.

206.2.3.1 Stairs and Escalators in Existing Buildings. In alterations and additions, where an escalator or stair is provided where none existed previously and major structural modifications are necessary for the installation, an accessible route shall be provided between the levels served by the escalator or stair unless exempted by 206.2.3 Exceptions 1 through 7.

206.2.4 Spaces and Elements. At least one accessible route shall connect accessible building or facility entrances with all accessible spaces and elements within the building or facility which are otherwise connected by a circulation path unless exempted by 206.2.3 Exceptions 1 through 7.

EXCEPTIONS:

1. Raised courtroom stations, including judges' benches, clerks' stations, bailiffs' stations, deputy clerks' stations, and court reporters' stations shall not be required to provide vertical access provided that the required clear floor space, maneuvering space, and, if appropriate, electrical service are installed at the time of initial construction to allow future installation of a means of vertical access complying with 405, 407, 408, or 410 without requiring substantial reconstruction of the space.
2. In assembly areas with fixed seating required to comply with [221](#), an accessible route shall not be required to serve fixed seating where wheelchair spaces required to be on an accessible route are not provided.
3. Accessible routes shall not be required to connect mezzanines where buildings or facilities have no more than one story. In addition, accessible routes shall not be required to connect stories or mezzanines where multi-story buildings or facilities are exempted by 206.2.3 Exceptions 1 through 7.

Advisory 206.2.4 Spaces and Elements. Accessible routes must connect all spaces and elements required to be accessible including, but not limited to, raised areas and speaker platforms.

Advisory 206.2.4 Spaces and Elements Exception 1. The exception does not apply to areas that are likely to be used by members of the public who are not employees of the court such as jury areas, attorney areas, or witness stands.

206.2.5 Restaurants and Cafeterias. In restaurants and cafeterias, an accessible route shall be provided to all dining areas, including raised or sunken dining areas, and outdoor dining areas.

EXCEPTIONS:

1. In buildings or facilities not required to provide an accessible route between stories, an accessible route shall not be required to a mezzanine dining area where the mezzanine contains less than 25 percent of the total combined area for seating and dining and where the same decor and services are provided in the accessible area.
2. In alterations, an accessible route shall not be required to existing raised or sunken dining areas, or to all parts of existing outdoor dining areas where the same services and decor are provided in an accessible space usable by the public and not restricted to use by people with disabilities.
3. In sports facilities, tiered dining areas providing seating required to comply with [221](#) shall be required to have accessible routes serving at least 25 percent of the dining area provided that accessible routes serve seating complying with 221 and each tier is provided with the same services.

Advisory 206.2.5 Restaurants and Cafeterias Exception 2. Examples of "same services" include, but are not limited to, bar service, rooms having smoking and non-smoking sections, lotto and other table games, carry-out, and buffet service. Examples of "same decor" include, but are not limited to, seating at or near windows and railings with views, areas designed with a certain theme, party and banquet rooms, and rooms where entertainment is provided.

206.2.6 Performance Areas. Where a circulation path directly connects a performance area to an assembly seating area, an accessible route shall directly connect the assembly seating area with the performance area. An accessible route shall be provided from performance areas to ancillary areas or facilities used by performers unless exempted by 206.2.3 Exceptions 1 through 7.

206.2.7 Press Boxes. Press boxes in assembly areas shall be on an accessible route.

EXCEPTIONS:

1. An accessible route shall not be required to press boxes in bleachers that have points of entry at only one level provided that the aggregate area of all press boxes is 500 square feet (46 m²) maximum.
2. An accessible route shall not be required to free-standing press boxes that are elevated above grade 12 feet (3660 mm) minimum provided that the aggregate area of all press boxes is 500 square feet (46 m²) maximum.

Advisory 206.2.7 Press Boxes Exception 2. Where a facility contains multiple assembly areas, the aggregate area of the press boxes in each assembly area is to be calculated separately. For example, if a university has a soccer stadium with three press boxes elevated 12 feet (3660 mm) or more above grade and each press box is 150 square feet (14 m²), then the aggregate area of the soccer stadium press boxes is less than 500 square feet (46 m²) and Exception 2 applies to the soccer stadium. If that same university also has a football stadium with two press boxes elevated 12 feet (3660 mm) or more above grade and one press box is 250 square feet (23 m²), and the second is 275 square feet (26 m²), then the aggregate area of the football stadium press boxes is more than 500 square feet (46 m²) and Exception 2 does not apply to the football stadium.

206.2.8 Employee Work Areas. Common use circulation paths within employee work areas shall comply with 402.

EXCEPTIONS:

1. Common use circulation paths located within employee work areas that are less than 1000 square feet (93 m²) and defined by permanently installed partitions, counters, casework, or furnishings shall not be required to comply with 402.

2. Common use circulation paths located within employee work areas that are an integral component of work area equipment shall not be required to comply with 402.
3. Common use circulation paths located within exterior employee work areas that are fully exposed to the weather shall not be required to comply with 402.

Advisory 206.2.8 Employee Work Areas Exception 1. Modular furniture that is not permanently installed is not directly subject to these requirements. The Department of Justice ADA regulations provide additional guidance regarding the relationship between these requirements and elements that are not part of the built environment. Additionally, the Equal Employment Opportunity Commission (EEOC) implements title I of the ADA which requires non-discrimination in the workplace. EEOC can provide guidance regarding employers' obligations to provide reasonable accommodations for employees with disabilities.

Advisory 206.2.8 Employee Work Areas Exception 2. Large pieces of equipment, such as electric turbines or water pumping apparatus, may have stairs and elevated walkways used for overseeing or monitoring purposes which are physically part of the turbine or pump. However, passenger elevators used for vertical transportation between stories are not considered "work area equipment" as defined in Section 106.5.

206.2.9 Amusement Rides. Amusement rides required to comply with 234 shall provide accessible routes in accordance with 206.2.9. Accessible routes serving amusement rides shall comply with Chapter 4 except as modified by 1002.2.

206.2.9.1 Load and Unload Areas. Load and unload areas shall be on an accessible route. Where load and unload areas have more than one loading or unloading position, at least one loading and unloading position shall be on an accessible route.

206.2.9.2 Wheelchair Spaces, Ride Seats Designed for Transfer, and Transfer Devices. When amusement rides are in the load and unload position, wheelchair spaces complying with 1002.4, amusement ride seats designed for transfer complying with 1002.5, and transfer devices complying with 1002.6 shall be on an accessible route.

206.2.10 Recreational Boating Facilities. Boat slips required to comply with 235.2 and boarding piers at boat launch ramps required to comply with 235.3 shall be on an accessible route. Accessible routes serving recreational boating facilities shall comply with Chapter 4, except as modified by 1003.2.

206.2.11 Bowling Lanes. Where bowling lanes are provided, at least 5 percent, but no fewer than one of each type of bowling lane, shall be on an accessible route.

206.2.12 Court Sports. In court sports, at least one accessible route shall directly connect both sides of the court.

206.2.13 Exercise Machines and Equipment. Exercise machines and equipment required to comply with 236 shall be on an accessible route.

206.2.14 Fishing Piers and Platforms. Fishing piers and platforms shall be on an accessible route. Accessible routes serving fishing piers and platforms shall comply with Chapter 4 except as modified by 1005.1.

206.2.15 Golf Facilities. At least one accessible route shall connect accessible elements and spaces within the boundary of the golf course. In addition, accessible routes serving golf car rental areas; bag drop areas; course weather shelters complying with 238.2.3; course toilet rooms; and practice putting greens, practice teeing grounds, and teeing stations at driving ranges complying with 238.3 shall comply with Chapter 4 except as modified by 1006.2.

EXCEPTION: Golf car passages complying with 1006.3 shall be permitted to be used for all or part of accessible routes required by 206.2.15.

206.2.16 Miniature Golf Facilities. Holes required to comply with 239.2, including the start of play, shall be on an accessible route. Accessible routes serving miniature golf facilities shall comply with Chapter 4 except as modified by 1007.2.

206.2.17 Play Areas. Play areas shall provide accessible routes in accordance with 206.2.17. Accessible routes serving play areas shall comply with Chapter 4 except as modified by 1008.2.

206.2.17.1 Ground Level and Elevated Play Components. At least one accessible route shall be provided within the play area. The accessible route shall connect ground level play components required to comply with 240.2.1 and elevated play components required to comply with 240.2.2, including entry and exit points of the play components.

206.2.17.2 Soft Contained Play Structures. Where three or fewer entry points are provided for soft contained play structures, at least one entry point shall be on an accessible route. Where four or more entry points are provided for soft contained play structures, at least two entry points shall be on an accessible route.

206.3 Location. Accessible routes shall coincide with or be located in the same area as general circulation paths. Where circulation paths are interior, required accessible routes shall also be interior.

Advisory 206.3 Location. The accessible route must be in the same area as the general circulation path. This means that circulation paths, such as vehicular ways designed for pedestrian traffic, walks, and unpaved paths that are designed to be routinely used by pedestrians must be accessible or have an accessible route

nearby. Additionally, accessible vertical interior circulation must be in the same area as stairs and escalators, not isolated in the back of the facility.

206.4 Entrances. Entrances shall be provided in accordance with 206.4. Entrance doors, doorways, and gates shall comply with 404 and shall be on an accessible route complying with 402.

EXCEPTIONS:

1. Where an alteration includes alterations to an entrance, and the building or facility has another entrance complying with 404 that is on an accessible route, the altered entrance shall not be required to comply with 206.4 unless required by 202.4.

2. Where exceptions for alterations to qualified historic buildings or facilities are permitted by 202.5, no more than one public entrance shall be required to comply with 206.4. Where no public entrance can comply with 206.4 under criteria established in 202.5 Exception, then either an unlocked entrance not used by the public shall comply with 206.4; or a locked entrance complying with 206.4 with a notification system or remote monitoring shall be provided.

206.4.1 Public Entrances. In addition to entrances required by 206.4.2 through 206.4.9, at least 60 percent of all public entrances shall comply with 404.

206.4.2 Parking Structure Entrances. Where direct access is provided for pedestrians from a parking structure to a building or facility entrance, each direct access to the building or facility entrance shall comply with 404.

206.4.3 Entrances from Tunnels or Elevated Walkways. Where direct access is provided for pedestrians from a pedestrian tunnel or elevated walkway to a

building or facility, at least one direct entrance to the building or facility from each tunnel or walkway shall comply with 404.

206.4.4 Transportation Facilities. In addition to the requirements of 206.4.2, 206.4.3, and 206.4.5 through 206.4.9, transportation facilities shall provide entrances in accordance with 206.4.4.

206.4.4.1 Location. In transportation facilities, where different entrances serve different transportation fixed routes or groups of fixed routes, at least one public entrance serving each fixed route or group of fixed routes shall comply with 404.

EXCEPTION: Entrances to key stations and existing intercity rail stations retrofitted in accordance with 49 CFR 37.49 or 49 CFR 37.51 shall not be required to comply with 206.4.4.1.

206.4.4.2 Direct Connections. Direct connections to other facilities shall provide an accessible route complying with 404 from the point of connection to boarding platforms and all transportation system elements required to be accessible. Any elements provided to facilitate future direct connections shall be on an accessible route connecting boarding platforms and all transportation system elements required to be accessible.

EXCEPTION: In key stations and existing intercity rail stations, existing direct connections shall not be required to comply with 404.

206.4.4.3 Key Stations and Intercity Rail Stations. Key stations and existing intercity rail stations required by Subpart C of 49 CFR part 37 to be altered, shall have at least one entrance complying with 404.

206.4.5 Tenant Spaces. At least one accessible entrance to each tenancy in a facility shall comply with 404.

EXCEPTION: Self-service storage facilities not required to comply with 225.3 shall not be required to be on an accessible route.

206.4.6 Residential Dwelling Unit Primary Entrance. In residential dwelling units, at least one primary entrance shall comply with 404. The primary entrance to a residential dwelling unit shall not be to a bedroom.

206.4.7 Restricted Entrances. Where restricted entrances are provided to a building or facility, at least one restricted entrance to the building or facility shall comply with 404.

206.4.8 Service Entrances. If a service entrance is the only entrance to a building or to a tenancy in a facility, that entrance shall comply with 404.

206.4.9 Entrances for Inmates or Detainees. Where entrances used only by inmates or detainees and security personnel are provided at judicial facilities, detention facilities, or correctional facilities, at least one such entrance shall comply with 404.

206.5 Doors, Doorways, and Gates. Doors, doorways, and gates providing user passage shall be provided in accordance with 206.5.

206.5.1 Entrances. Each entrance to a building or facility required to comply with 206.4 shall have at least one door, doorway, or gate complying with 404.

206.5.2 Rooms and Spaces. Within a building or facility, at least one door, doorway, or gate serving each room or space complying with these requirements shall comply with 404.

206.5.3 Transient Lodging Facilities. In transient lodging facilities, entrances, doors, and doorways providing user passage into and within guest rooms that are not required to provide mobility features complying with 806.2 shall comply with 404.2.3.

EXCEPTION: Shower and sauna doors in guest rooms that are not required to provide mobility features complying with 806.2 shall not be required to comply with 404.2.3.

206.5.4 Residential Dwelling Units. In residential dwelling units required to provide mobility features complying with [809.2](#) through 809.4, all doors and doorways providing user passage shall comply with 404.

206.6 Elevators. Elevators provided for passengers shall comply with 407. Where multiple elevators are provided, each elevator shall comply with 407.

EXCEPTIONS:

1. In a building or facility permitted to use the exceptions to 206.2.3 or permitted by 206.7 to use a platform lift, elevators complying with 408 shall be permitted.
2. Elevators complying with 408 or 409 shall be permitted in multi-story residential dwelling units.

206.6.1 Existing Elevators. Where elements of existing elevators are altered, the same element shall also be altered in all elevators that are programmed to respond to the same hall call control as the altered elevator and shall comply with the requirements of 407 for the altered element.

206.7 Platform Lifts. Platform lifts shall comply with 410. Platform lifts shall be permitted as a component of an accessible route in new construction in accordance with 206.7. Platform lifts shall be permitted as a component of an accessible route in an existing building or facility.

206.7.1 Performance Areas and Speakers' Platforms. Platform lifts shall be permitted to provide accessible routes to performance areas and speakers' platforms.

206.7.2 Wheelchair Spaces. Platform lifts shall be permitted to provide an accessible route to comply with the wheelchair space dispersion and line-of-sight requirements of 221 and [802](#).

206.7.3 Incidental Spaces. Platform lifts shall be permitted to provide an accessible route to incidental spaces which are not public use spaces and which are occupied by five persons maximum.

206.7.4 Judicial Spaces. Platform lifts shall be permitted to provide an accessible route to: jury boxes and witness stands; raised courtroom stations including, judges' benches, clerks' stations, bailiffs' stations, deputy clerks' stations, and court reporters' stations; and to depressed areas such as the well of a court.

206.7.5 Existing Site Constraints. Platform lifts shall be permitted where existing exterior site constraints make use of a ramp or elevator infeasible.

Advisory 206.7.5 Existing Site Constraints. This exception applies where topography or other similar existing site constraints necessitate the use of a platform lift as the only feasible alternative. While the site constraint must reflect exterior conditions, the lift can be installed in the interior of a building. For example, a new building constructed between and connected to two existing buildings may have insufficient space to coordinate floor levels and also to provide ramped entry from the public way. In this example, an exterior or interior platform lift could be used to provide an accessible entrance or to coordinate one or more interior floor levels.

206.7.6 Guest Rooms and Residential Dwelling Units. Platform lifts shall be permitted to connect levels within transient lodging guest rooms required to provide mobility features complying with 806.2 or residential dwelling units required to provide mobility features complying with [809.2](#) through 809.4.

206.7.7 Amusement Rides. Platform lifts shall be permitted to provide accessible routes to load and unload areas serving amusement rides.

206.7.8 Play Areas. Platform lifts shall be permitted to provide accessible routes to play components or soft contained play structures.

206.7.9 Team or Player Seating. Platform lifts shall be permitted to provide accessible routes to team or player seating areas serving areas of sport activity.

Advisory 206.7.9 Team or Player Seating. While the use of platform lifts is allowed, ramps are recommended to provide access to player seating areas serving an area of sport activity.

206.7.10 Recreational Boating Facilities and Fishing Piers and Platforms. Platform lifts shall be permitted to be used instead of gangways that are part of accessible routes serving recreational boating facilities and fishing piers and platforms.

206.8 Security Barriers. Security barriers, including but not limited to, security bollards and security check points, shall not obstruct a required accessible route or accessible means of egress.

EXCEPTION: Where security barriers incorporate elements that cannot comply with these requirements such as certain metal detectors, fluoroscopes, or other similar devices, the accessible route shall be permitted to be located adjacent to security screening devices. The accessible route shall permit persons with disabilities passing around security barriers to maintain visual contact with their personal items to the same extent provided others passing through the security barrier.

208 Parking Spaces

208.1 General. Where parking spaces are provided, parking spaces shall be provided in accordance with 208.

EXCEPTION: Parking spaces used exclusively for buses, trucks, other delivery vehicles, law enforcement vehicles, or vehicular impound shall not be required to comply with 208 provided that lots accessed by the public are provided with a passenger loading zone complying with 503.

208.2 Minimum Number. Parking spaces complying with 502 shall be provided in accordance with Table 208.2 except as required by 208.2.1, 208.2.2, and 208.2.3. Where more than one parking facility is provided on a site, the number of accessible spaces provided on the site shall be calculated according to the number of spaces required for each parking facility.

Total Number of Parking Spaces Provided in Parking Facility	Minimum Number of Required Accessible Parking Spaces
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4

101 to 150	5
Table 208.2 Parking Spaces (continued)	
Total Number of Parking Spaces Provided in Parking Facility	Minimum Number of Required Accessible Parking Spaces
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1000	2 percent of total
1001 and over	20, plus 1 for each 100, or fraction thereof, over 1000

Advisory 208.2 Minimum Number. The term "parking facility" is used Section 208.2 instead of the term "parking lot" so that it is clear that both parking lots and parking structures are required to comply with this section. The number of parking spaces required to be accessible is to be calculated separately for each parking facility; the required number is not to be based on the total number of parking spaces provided in all of the parking facilities provided on the site.

208.2.1 Hospital Outpatient Facilities. Ten percent of patient and visitor parking spaces provided to serve hospital outpatient facilities shall comply with 502.

Advisory 208.2.1 Hospital Outpatient Facilities. The term "outpatient facility" is not defined in this document but is intended to cover facilities or units that are located in hospitals and that provide regular and continuing medical treatment without an overnight stay. Doctors' offices, independent clinics, or other facilities not located in hospitals are not considered hospital outpatient facilities for purposes of this document.

208.2.2 Rehabilitation Facilities and Outpatient Physical Therapy Facilities. Twenty percent of patient and visitor parking spaces provided to serve rehabilitation facilities specializing in treating conditions that affect mobility and outpatient physical therapy facilities shall comply with 502.

Advisory 208.2.2 Rehabilitation Facilities and Outpatient Physical Therapy Facilities. Conditions that affect mobility include conditions requiring the use or assistance of a brace, cane, crutch, prosthetic device, wheelchair, or powered mobility aid; arthritic, neurological, or orthopedic conditions that severely limit one's ability to walk; respiratory diseases and other conditions which may require the use of portable oxygen; and cardiac conditions that impose significant functional limitations.

208.2.3 Residential Facilities. Parking spaces provided to serve residential facilities shall comply with 208.2.3.

208.2.3.1 Parking for Residents. Where at least one parking space is provided for each residential dwelling unit, at least one parking space complying with 502

shall be provided for each residential dwelling unit required to provide mobility features complying with 809.2 through 809.4.

208.2.3.2 Additional Parking Spaces for Residents. Where the total number of parking spaces provided for each residential dwelling unit exceeds one parking space per residential dwelling unit, 2 percent, but no fewer than one space, of all the parking spaces not covered by 208.2.3.1 shall comply with 502.

208.2.3.3 Parking for Guests, Employees, and Other Non-Residents. Where parking spaces are provided for persons other than residents, parking shall be provided in accordance with Table 208.2.

208.2.4 Van Parking Spaces. For every six or fraction of six parking spaces required by 208.2 to comply with 502, at least one shall be a van parking space complying with 502.

208.3 Location. Parking facilities shall comply with 208.3

208.3.1 General. Parking spaces complying with 502 that serve a particular building or facility shall be located on the shortest accessible route from parking to an entrance complying with 206.4. Where parking serves more than one accessible entrance, parking spaces complying with 502 shall be dispersed and located on the shortest accessible route to the accessible entrances. In parking facilities that do not serve a particular building or facility, parking spaces complying with 502 shall be located on the shortest accessible route to an accessible pedestrian entrance of the parking facility.

EXCEPTIONS:

1. All van parking spaces shall be permitted to be grouped on one level within a multi-story parking facility.

2. Parking spaces shall be permitted to be located in different parking facilities if substantially equivalent or greater accessibility is provided in terms of distance from an accessible entrance or entrances, parking fee, and user convenience.

Advisory 208.3.1 General Exception 2. Factors that could affect "user convenience" include, but are not limited to, protection from the weather, security, lighting, and comparative maintenance of the alternative parking site.

208.3.2 Residential Facilities. In residential facilities containing residential dwelling units required to provide mobility features complying with [809.2](#) through 809.4, parking spaces provided in accordance with 208.2.3.1 shall be located on the shortest accessible route to the residential dwelling unit entrance they serve. Spaces provided in accordance with 208.2.3.2 shall be dispersed throughout all types of parking provided for the residential dwelling units.

EXCEPTION: Parking spaces provided in accordance with 208.2.3.2 shall not be required to be dispersed throughout all types of parking if substantially equivalent or greater accessibility is provided in terms of distance from an accessible entrance, parking fee, and user convenience.

Advisory 208.3.2 Residential Facilities Exception. Factors that could affect "user convenience" include, but are not limited to, protection from the weather, security, lighting, and comparative maintenance of the alternative parking site.

209 Passenger Loading Zones and Bus Stops

209.1 General. Passenger loading zones shall be provided in accordance with 209.

209.2 Type. Where provided, passenger loading zones shall comply with 209.2.

209.2.1 Passenger Loading Zones. Passenger loading zones, except those required to comply with 209.2.2 and 209.2.3, shall provide at least one passenger loading zone complying with 503 in every continuous 100 linear feet (30 m) of loading zone space, or fraction thereof.

209.2.2 Bus Loading Zones. In bus loading zones restricted to use by designated or specified public transportation vehicles, each bus bay, bus stop, or other area designated for lift or ramp deployment shall comply with 810.2.

Advisory 209.2.2 Bus Loading Zones. The terms "designated public transportation" and "specified public transportation" are defined by the Department of Transportation at 49 CFR 37.3 in regulations implementing the Americans with Disabilities Act. These terms refer to public transportation services provided by public or private entities, respectively. For example, designated public transportation vehicles include buses and vans operated by public transit agencies, while specified public transportation vehicles include tour and charter buses, taxis and limousines, and hotel shuttles operated by private entities.

209.2.3 On-Street Bus Stops. On-street bus stops shall comply with 810.2 to the maximum extent practicable.

209.3 Medical Care and Long-Term Care Facilities. At least one passenger loading zone complying with 503 shall be provided at an accessible entrance to licensed medical care and licensed long-term care facilities where the period of stay exceeds twenty-four hours.

209.4 Valet Parking. Parking facilities that provide valet parking services shall provide at least one passenger loading zone complying with 503.

209.5 Mechanical Access Parking Garages. Mechanical access parking garages shall provide at least one passenger loading zone complying with 503 at vehicle drop-off and vehicle pick-up areas.

211 Drinking Fountains

211.1 General. Where drinking fountains are provided on an exterior site, on a floor, or within a secured area they shall be provided in accordance with 211.

EXCEPTION: In detention or correctional facilities, drinking fountains only serving holding or housing cells not required to comply with 232 shall not be required to comply with 211.

211.2 Minimum Number. No fewer than two drinking fountains shall be provided. One drinking fountain shall comply with 602.1 through 602.6 and one drinking fountain shall comply with 602.7.

EXCEPTION: Where a single drinking fountain complies with 602.1 through 602.6 and 602.7, it shall be permitted to be substituted for two separate drinking fountains.

211.3 More Than Minimum Number. Where more than the minimum number of drinking fountains specified in 211.2 are provided, 50 percent of the total number of drinking fountains provided shall comply with 602.1 through 602.6, and 50 percent of the total number of drinking fountains provided shall comply with 602.7.

EXCEPTION: Where 50 percent of the drinking fountains yields a fraction, 50 percent shall be permitted to be rounded up or down provided that the total number of drinking fountains complying with 211 equals 100 percent of drinking fountains.

305 Clear Floor or Ground Space

305.1 General. Clear floor or ground space shall comply with 305.

305.2 Floor or Ground Surfaces. Floor or ground surfaces of a clear floor or ground space shall comply with 302. Changes in level are not permitted.

EXCEPTION: Slopes not steeper than 1:48 shall be permitted.

305.3 Size. The clear floor or ground space shall be 30 inches (760 mm) minimum by 48 inches (1220 mm) minimum.

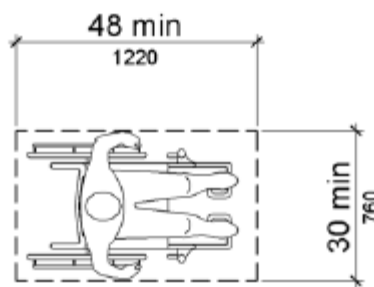


Figure 305.3 Clear Floor or Ground Space

305.4 Knee and Toe Clearance. Unless otherwise specified, clear floor or ground space shall be permitted to include knee and toe clearance complying with 306.

305.5 Position. Unless otherwise specified, clear floor or ground space shall be positioned for either forward or parallel approach to an element.

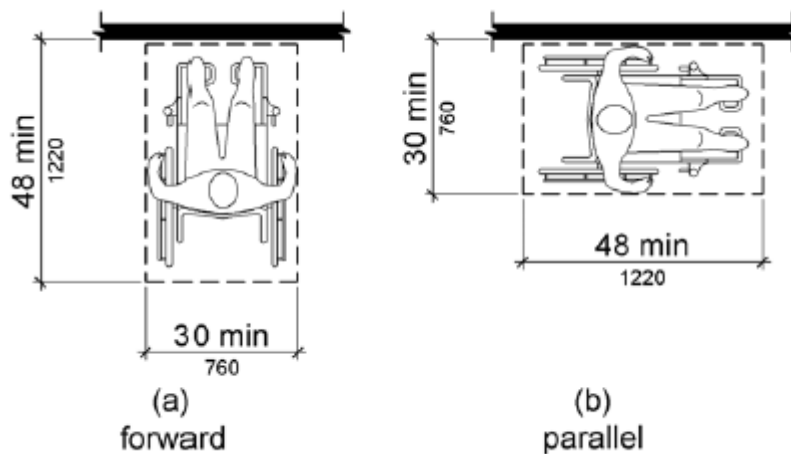


Figure 305.5 Position of Clear Floor or Ground Space

305.6 Approach. One full unobstructed side of the clear floor or ground space shall adjoin an accessible route or adjoin another clear floor or ground space.

305.7 Maneuvering Clearance. Where a clear floor or ground space is located in an alcove or otherwise confined on all or part of three sides, additional maneuvering clearance shall be provided in accordance with 305.7.1 and 305.7.2.

305.7.1 Forward Approach. Alcoves shall be 36 inches (915 mm) wide minimum where the depth exceeds 24 inches (610 mm).

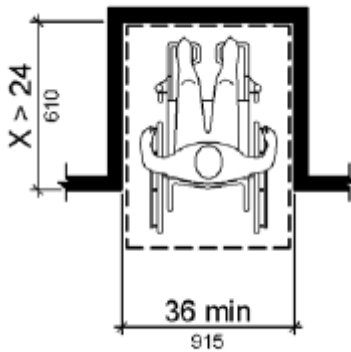


Figure 305.7.1 Maneuvering Clearance in an Alcove, Forward Approach

305.7.2 Parallel Approach. Alcoves shall be 60 inches (1525 mm) wide minimum where the depth exceeds 15 inches (380 mm).

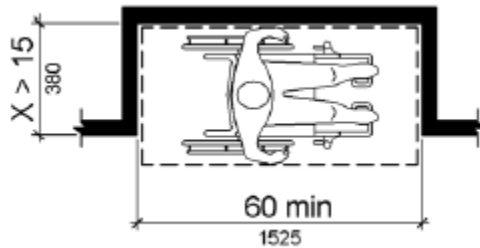


Figure 305.7.2 Maneuvering Clearance in an Alcove, Parallel Approach

306 Knee and Toe Clearance

306.1 General. Where space beneath an element is included as part of clear floor or ground space or turning space, the space shall comply with 306. Additional space shall not be prohibited beneath an element but shall not be considered as part of the clear floor or ground space or turning space.

Advisory 306.1 General. Clearances are measured in relation to the usable clear floor space, not necessarily to the vertical support for an element. When determining clearance under an object for required turning or maneuvering space, care should be taken to ensure the space is clear of any obstructions.

306.2 Toe Clearance.

306.2.1 General. Space under an element between the finish floor or ground and 9 inches (230 mm) above the finish floor or ground shall be considered toe clearance and shall comply with 306.2.

306.2.2 Maximum Depth. Toe clearance shall extend 25 inches (635 mm) maximum under an element.

306.2.3 Minimum Required Depth. Where toe clearance is required at an element as part of a clear floor space, the toe clearance shall extend 17 inches (430 mm) minimum under the element.

306.2.4 Additional Clearance. Space extending greater than 6 inches (150 mm) beyond the available knee clearance at 9 inches (230 mm) above the finish floor or ground shall not be considered toe clearance.

306.2.5 Width. Toe clearance shall be 30 inches (760 mm) wide minimum.

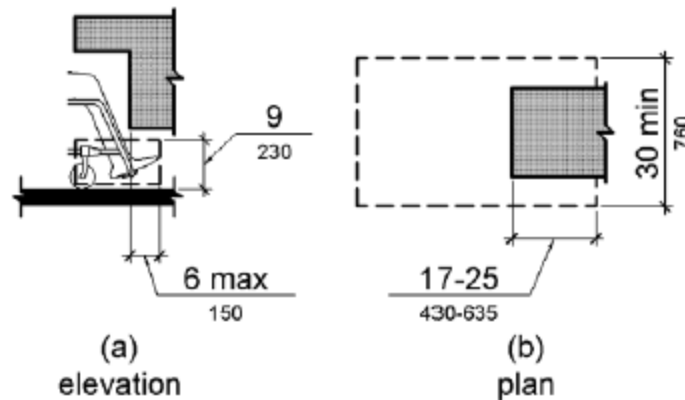


Figure 306.2 Toe Clearance

306.3 Knee Clearance.

306.3.1 General. Space under an element between 9 inches (230 mm) and 27 inches (685 mm) above the finish floor or ground shall be considered knee clearance and shall comply with 306.3.

306.3.2 Maximum Depth. Knee clearance shall extend 25 inches (635 mm) maximum under an element at 9 inches (230 mm) above the finish floor or ground.

306.3.3 Minimum Required Depth. Where knee clearance is required under an element as part of a clear floor space, the knee clearance shall be 11 inches (280 mm) deep minimum at 9 inches (230 mm) above the finish floor or ground, and 8 inches (205 mm) deep minimum at 27 inches (685 mm) above the finish floor or ground.

306.3.4 Clearance Reduction. Between 9 inches (230 mm) and 27 inches (685 mm) above the finish floor or ground, the knee clearance shall be permitted to reduce at a rate of 1 inch (25 mm) in depth for each 6 inches (150 mm) in height.

306.3.5 Width. Knee clearance shall be 30 inches (760 mm) wide minimum.

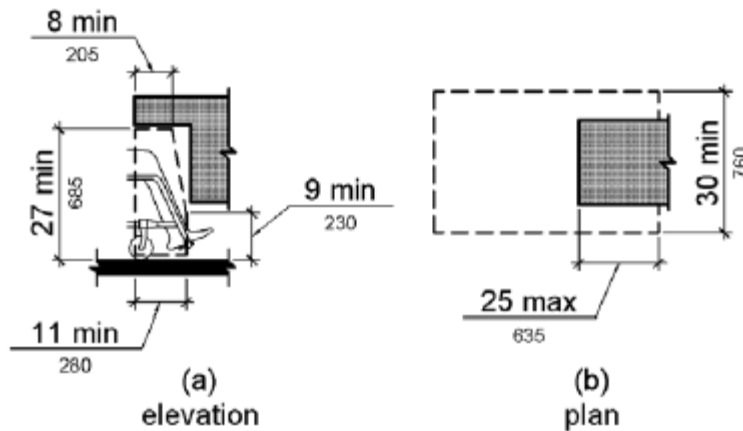


Figure 306.3 Knee Clearance

307 Protruding Objects

307.1 General. Protruding objects shall comply with 307.

307.2 Protrusion Limits. Objects with leading edges more than 27 inches (685 mm) and not more than 80 inches (2030 mm) above the finish floor or ground shall protrude 4 inches (100 mm) maximum horizontally into the circulation path.

EXCEPTION: Handrails shall be permitted to protrude 4 1/2 inches (115 mm) maximum.

Advisory 307.2 Protrusion Limits. When a cane is used and the element is in the detectable range, it gives a person sufficient time to detect the element with the cane before there is body contact. Elements located on circulation paths,

including operable elements, must comply with requirements for protruding objects. For example, awnings and their supporting structures cannot reduce the minimum required vertical clearance. Similarly, casement windows, when open, cannot encroach more than 4 inches (100 mm) into circulation paths above 27 inches (685 mm).

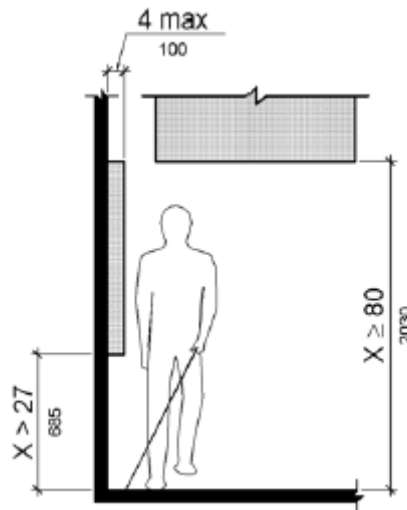


Figure 307.2 Limits of Protruding Objects

307.3 Post-Mounted Objects. Free-standing objects mounted on posts or pylons shall overhang circulation paths 12 inches (305 mm) maximum when located 27 inches (685 mm) minimum and 80 inches (2030 mm) maximum above the finish floor or ground. Where a sign or other obstruction is mounted between posts or pylons and the clear distance between the posts or pylons is greater than 12 inches (305 mm), the lowest edge of such sign or obstruction shall be 27 inches (685 mm) maximum or 80 inches (2030 mm) minimum above the finish floor or ground.

EXCEPTION: The sloping portions of handrails serving stairs and ramps shall not be required to comply with 307.3.

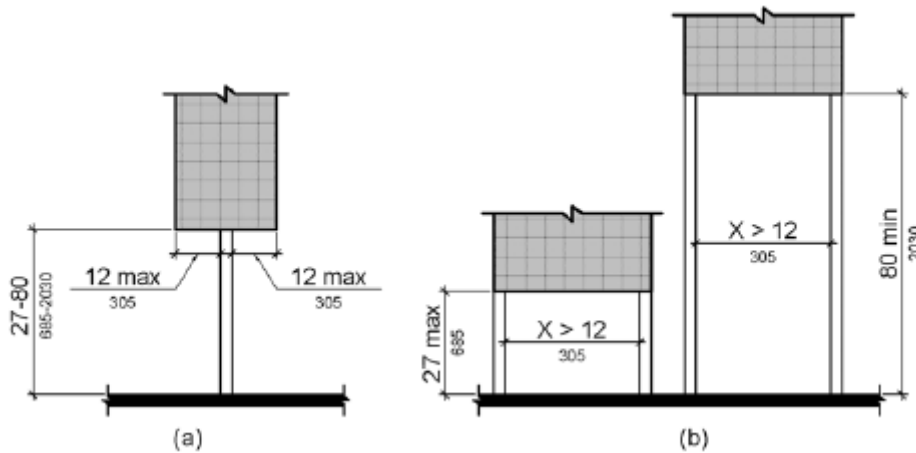


Figure 307.3 Post-Mounted Protruding Objects

307.4 Vertical Clearance. Vertical clearance shall be 80 inches (2030 mm) high minimum. Guardrails or other barriers shall be provided where the vertical clearance is less than 80 inches (2030 mm) high. The leading edge of such guardrail or barrier shall be located 27 inches (685 mm) maximum above the finish floor or ground.

EXCEPTION: Door closers and door stops shall be permitted to be 78 inches (1980 mm) minimum above the finish floor or ground.

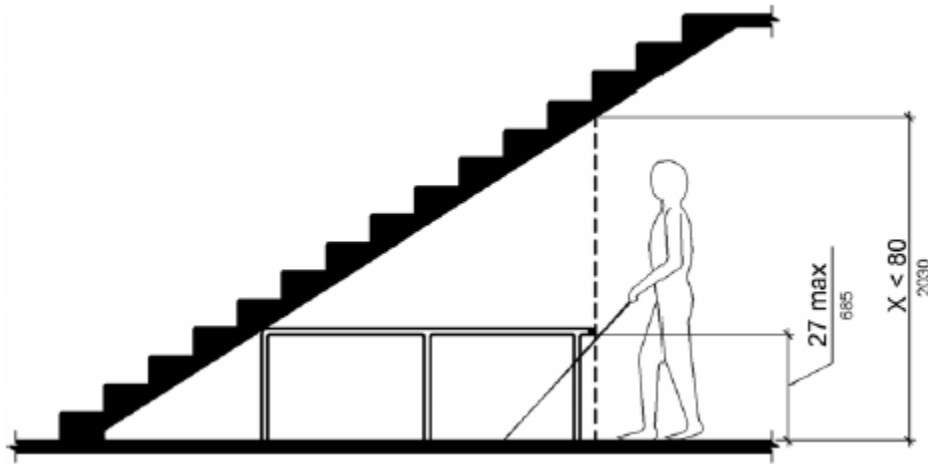


Figure 307.4 Vertical Clearance

307.5 Required Clear Width. Protruding objects shall not reduce the clear width required for accessible routes.

401 General

401.1 Scope. The provisions of Chapter 4 shall apply where required by Chapter 2 or where referenced by a requirement in this document.

402 Accessible Routes

402.1 General. Accessible routes shall comply with 402.

402.2 Components. Accessible routes shall consist of one or more of the following components: walking surfaces with a running slope not steeper than 1:20, doorways, ramps, curb ramps excluding the flared sides, elevators, and platform lifts. All components of an accessible route shall comply with the applicable requirements of Chapter 4.

Advisory 402.2 Components. Walking surfaces must have running slopes not steeper than 1:20, see 403.3. Other components of accessible routes, such as ramps (405) and curb ramps (406), are permitted to be more steeply sloped.

403 Walking Surfaces

403.1 General. Walking surfaces that are a part of an accessible route shall comply with 403.

403.2 Floor or Ground Surface. Floor or ground surfaces shall comply with 302.

403.3 Slope. The running slope of walking surfaces shall not be steeper than 1:20. The cross slope of walking surfaces shall not be steeper than 1:48.

403.4 Changes in Level. Changes in level shall comply with 303.

403.5 Clearances. Walking surfaces shall provide clearances complying with 403.5.

EXCEPTION: Within employee work areas, clearances on common use circulation paths shall be permitted to be decreased by work area equipment provided that the decrease is essential to the function of the work being performed.

403.5.1 Clear Width. Except as provided in 403.5.2 and 403.5.3, the clear width of walking surfaces shall be 36 inches (915 mm) minimum.

EXCEPTION: The clear width shall be permitted to be reduced to 32 inches (815 mm) minimum for a length of 24 inches (610 mm) maximum provided that reduced width segments are separated by segments that are 48 inches (1220 mm) long minimum and 36 inches (915 mm) wide minimum.

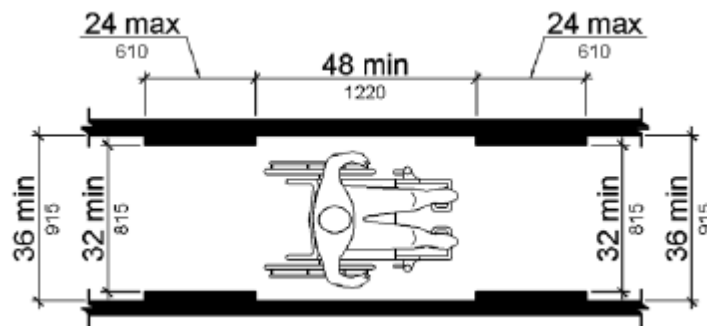


Figure 403.5.1 Clear Width of an Accessible Route

403.5.2 Clear Width at Turn. Where the accessible route makes a 180 degree turn around an element which is less than 48 inches (1220 mm) wide, clear width shall be 42 inches (1065 mm) minimum approaching the turn, 48 inches (1220 mm) minimum at the turn and 42 inches (1065 mm) minimum leaving the turn.

EXCEPTION: Where the clear width at the turn is 60 inches (1525 mm) minimum compliance with 403.5.2 shall not be required.

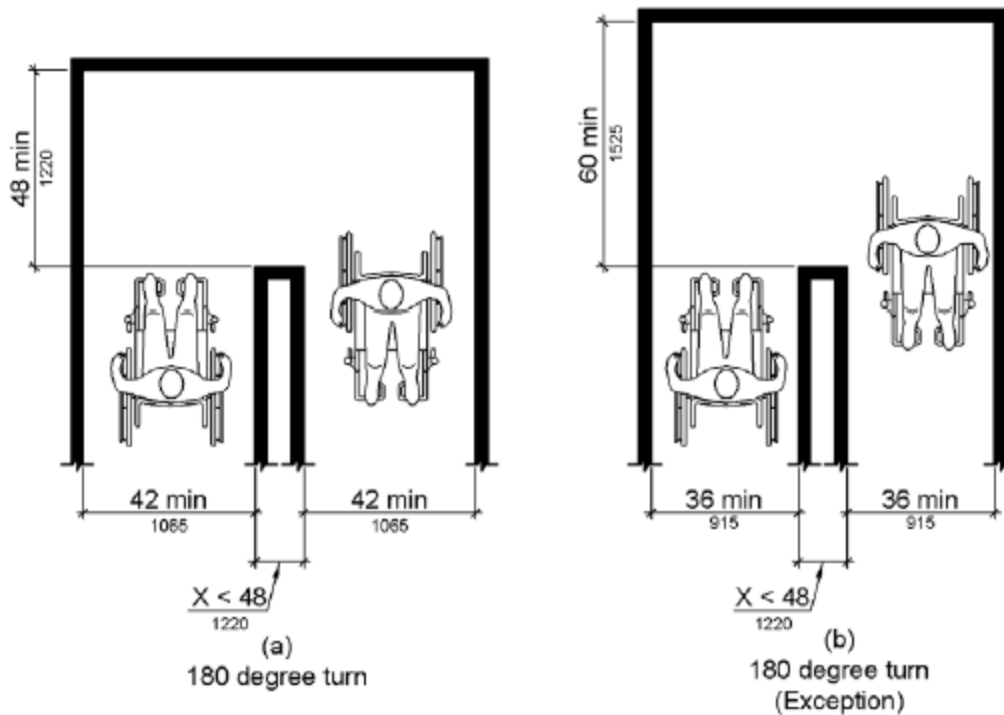


Figure 403.5.2 Clear Width at Turn

403.5.3 Passing Spaces. An accessible route with a clear width less than 60 inches (1525 mm) shall provide passing spaces at intervals of 200 feet (61 m) maximum. Passing spaces shall be either: a space 60 inches (1525 mm) minimum by 60 inches (1525 mm) minimum; or, an intersection of two walking surfaces providing a T-shaped space complying with 304.3.2 where the base and arms of the T-shaped space extend 48 inches (1220 mm) minimum beyond the intersection.

403.6 Handrails. Where handrails are provided along walking surfaces with running slopes not steeper than 1:20 they shall comply with 505.

Advisory 403.6 Handrails. Handrails provided in elevator cabs and platform lifts are not required to comply with the requirements for handrails on walking surfaces.

405 Ramps

405.1 General. Ramps on accessible routes shall comply with 405.

EXCEPTION: In assembly areas, aisle ramps adjacent to seating and not serving elements required to be on an accessible route shall not be required to comply with 405.

405.2 Slope. Ramp runs shall have a running slope not steeper than 1:12.

EXCEPTION: In existing sites, buildings, and facilities, ramps shall be permitted to have running slopes steeper than 1:12 complying with Table 405.2 where such slopes are necessary due to space limitations.

Table 405.2 Maximum Ramp Slope and Rise for Existing Sites, Buildings, and Facilities

Slope ¹	Maximum Rise
Steeper than 1:10 but not steeper than 1:8	3 inches (75 mm)
Steeper than 1:12 but not steeper than 1:10	6 inches (150 mm)

¹. A slope steeper than 1:8 is prohibited.

Advisory 405.2 Slope. To accommodate the widest range of users, provide ramps with the least possible running slope and, wherever possible, accompany ramps with stairs for use by those individuals for whom distance presents a greater barrier than steps, e.g., people with heart disease or limited stamina.

405.3 Cross Slope. Cross slope of ramp runs shall not be steeper than 1:48.

Advisory 405.3 Cross Slope. Cross slope is the slope of the surface perpendicular to the direction of travel. Cross slope is measured the same way as slope is measured (i.e., the rise over the run).

405.4 Floor or Ground Surfaces. Floor or ground surfaces of ramp runs shall comply with 302. Changes in level other than the running slope and cross slope are not permitted on ramp runs.

405.5 Clear Width. The clear width of a ramp run and, where handrails are provided, the clear width between handrails shall be 36 inches (915 mm) minimum.

EXCEPTION: Within employee work areas, the required clear width of ramps that are a part of common use circulation paths shall be permitted to be decreased by work area equipment provided that the decrease is essential to the function of the work being performed.

405.6 Rise. The rise for any ramp run shall be 30 inches (760 mm) maximum.

405.7 Landings. Ramps shall have landings at the top and the bottom of each ramp run. Landings shall comply with 405.7.

Advisory 405.7 Landings. Ramps that do not have level landings at changes in direction can create a compound slope that will not meet the requirements of this document. Circular or curved ramps continually change direction. Curvilinear ramps with small radii also can create compound cross slopes and cannot, by their nature, meet the requirements for accessible routes. A level landing is needed at the accessible door to permit maneuvering and simultaneously door operation.

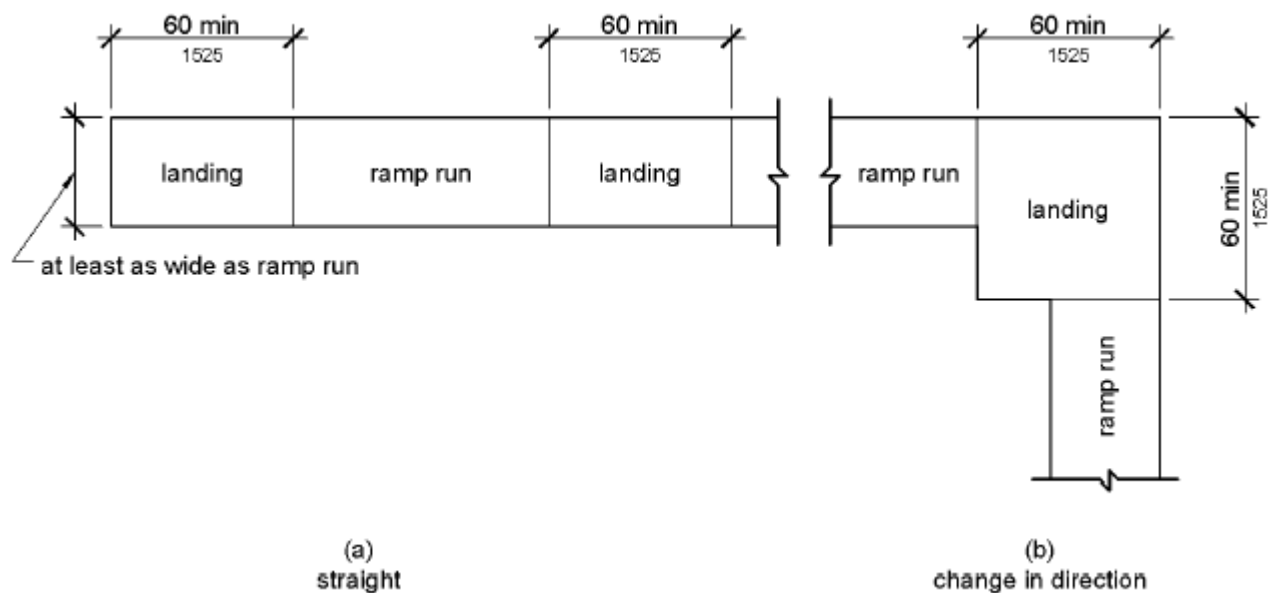


Figure 405.7 Ramp Landings

405.7.1 Slope. Landings shall comply with 302. Changes in level are not permitted.

EXCEPTION: Slopes not steeper than 1:48 shall be permitted.

405.7.2 Width. The landing clear width shall be at least as wide as the widest ramp run leading to the landing.

405.7.3 Length. The landing clear length shall be 60 inches (1525 mm) long minimum.

405.7.4 Change in Direction. Ramps that change direction between runs at landings shall have a clear landing 60 inches (1525 mm) minimum by 60 inches (1525 mm) minimum.

405.7.5 Doorways. Where doorways are located adjacent to a ramp landing, maneuvering clearances required by 404.2.4 and 404.3.2 shall be permitted to overlap the required landing area.

405.8 Handrails. Ramp runs with a rise greater than 6 inches (150 mm) shall have handrails complying with 505.

EXCEPTION: Within employee work areas, handrails shall not be required where ramps that are part of common use circulation paths are designed to permit the installation of handrails complying with 505. Ramps not subject to the exception to 405.5 shall be designed to maintain a 36 inch (915 mm) minimum clear width when handrails are installed.

405.9 Edge Protection. Edge protection complying with 405.9.1 or 405.9.2 shall be provided on each side of ramp runs and at each side of ramp landings.

EXCEPTIONS:

1. Edge protection shall not be required on ramps that are not required to have handrails and have sides complying with 406.3.
2. Edge protection shall not be required on the sides of ramp landings serving an adjoining ramp run or stairway.

3. Edge protection shall not be required on the sides of ramp landings having a vertical drop-off of 1/2 inch (13 mm) maximum within 10 inches (255 mm) horizontally of the minimum landing area specified in 405.7.

405.9.1 Extended Floor or Ground Surface. The floor or ground surface of the ramp run or landing shall extend 12 inches (305 mm) minimum beyond the inside face of a handrail complying with 505.

Advisory 405.9.1 Extended Floor or Ground Surface. The extended surface prevents wheelchair casters and crutch tips from slipping off the ramp surface.

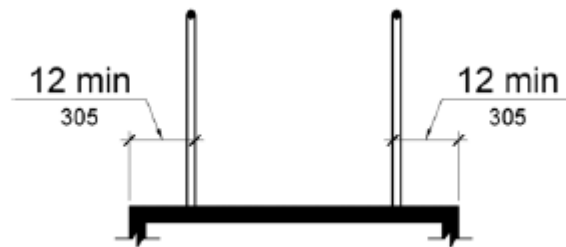


Figure 405.9.1 Extended Floor or Ground Surface Edge Protection

405.9.2 Curb or Barrier. A curb or barrier shall be provided that prevents the passage of a 4 inch (100 mm) diameter sphere, where any portion of the sphere is within 4 inches (100 mm) of the finish floor or ground surface.

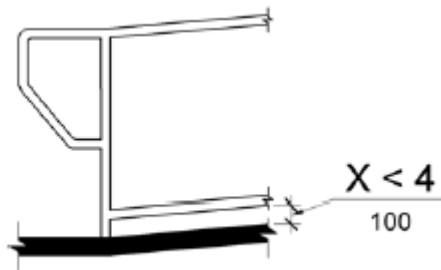


Figure 405.9.2 Curb or Barrier Edge Protection

405.10 Wet Conditions. Landings subject to wet conditions shall be designed to prevent the accumulation of water.

406 Curb Ramps

406.1 General. Curb ramps on accessible routes shall comply with 406, 405.2 through 405.5, and 405.10.

406.2 Counter Slope. Counter slopes of adjoining gutters and road surfaces immediately adjacent to the curb ramp shall not be steeper than 1:20. The adjacent surfaces at transitions at curb ramps to walks, gutters, and streets shall be at the same level.



Figure 406.2 Counter Slope of Surfaces Adjacent to Curb Ramps

406.3 Sides of Curb Ramps. Where provided, curb ramp flares shall not be steeper than 1:10.

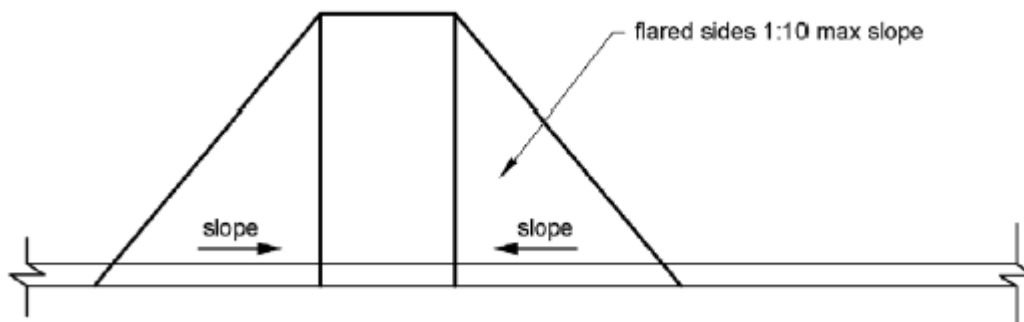


Figure 406.3 Sides of Curb Ramps

406.4 Landings. Landings shall be provided at the tops of curb ramps. The landing clear length shall be 36 inches (915 mm) minimum. The landing clear width shall be at least as wide as the curb ramp, excluding flared sides, leading to the landing.

EXCEPTION: In alterations, where there is no landing at the top of curb ramps, curb ramp flares shall be provided and shall not be steeper than 1:12.

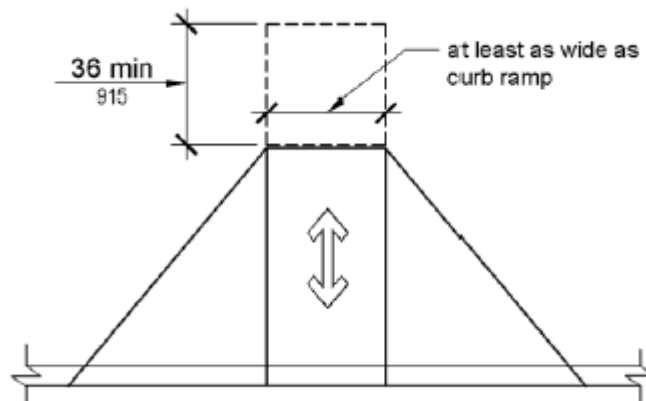


Figure 406.4 Landings at the Top of Curb Ramps

406.5 Location. Curb ramps and the flared sides of curb ramps shall be located so that they do not project into vehicular traffic lanes, parking spaces, or parking access aisles. Curb ramps at marked crossings shall be wholly contained within the markings, excluding any flared sides.

406.6 Diagonal Curb Ramps. Diagonal or corner type curb ramps with returned curbs or other well-defined edges shall have the edges parallel to the direction of

pedestrian flow. The bottom of diagonal curb ramps shall have a clear space 48 inches (1220 mm) minimum outside active traffic lanes of the roadway. Diagonal curb ramps provided at marked crossings shall provide the 48 inches (1220 mm) minimum clear space within the markings. Diagonal curb ramps with flared sides shall have a segment of curb 24 inches (610 mm) long minimum located on each side of the curb ramp and within the marked crossing.

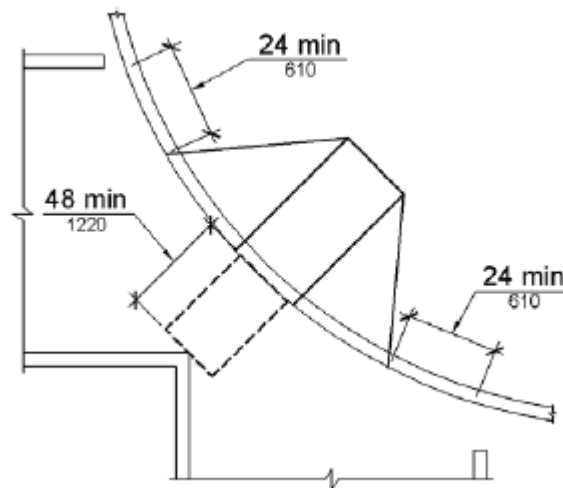


Figure 406.6 Diagonal or Corner Type Curb Ramps

406.7 Islands. Raised islands in crossings shall be cut through level with the street or have curb ramps at both sides. Each curb ramp shall have a level area 48 inches (1220 mm) long minimum by 36 inches (915 mm) wide minimum at the top of the curb ramp in the part of the island intersected by the crossings. Each 48 inch (1220 mm) minimum by 36 inch (915 mm) minimum area shall be oriented so that the 48 inch (1220 mm) minimum length is in the direction of the running slope of the curb ramp it serves. The 48 inch (1220 mm) minimum by 36 inch

(915 mm) minimum areas and the accessible route shall be permitted to overlap.

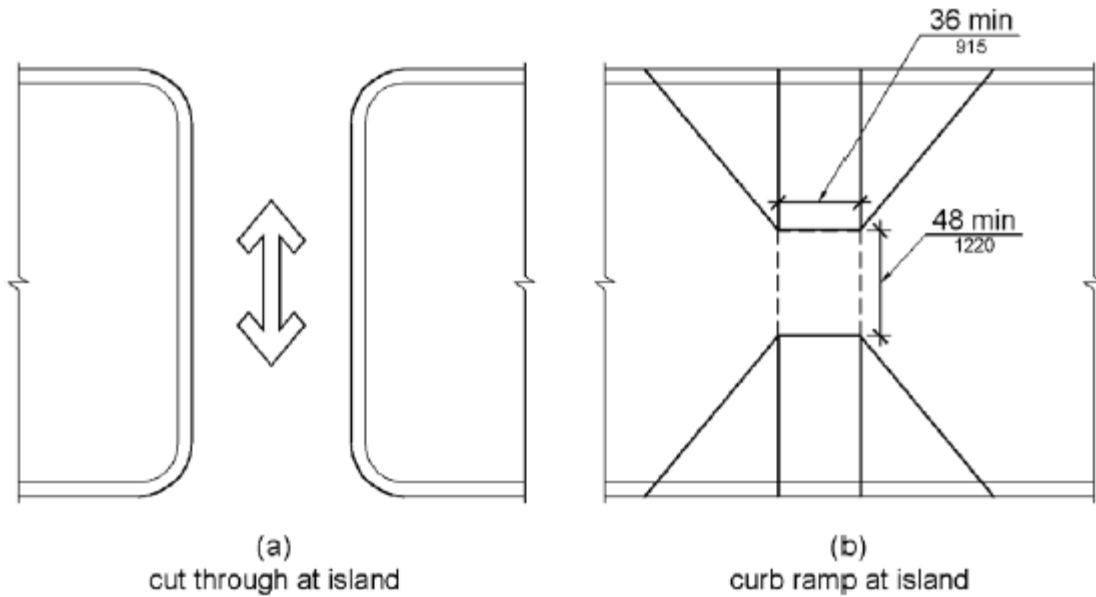


Figure 406.7 Islands in Crossings

601 General

601.1 Scope. The provisions of Chapter 6 shall apply where required by Chapter 2 or where referenced by a requirement in this document.

602 Drinking Fountains

602.1 General. Drinking fountains shall comply with 307 and 602.

602.2 Clear Floor Space. Units shall have a clear floor or ground space complying with 305 positioned for a forward approach and centered on the unit. Knee and toe clearance complying with 306 shall be provided.

EXCEPTION: A parallel approach complying with 305 shall be permitted at units for children's use where the spout is 30 inches (760 mm) maximum above the finish floor or ground and is 3 1/2 inches (90 mm) maximum from the front edge of the unit, including bumpers.

602.3 Operable Parts. Operable parts shall comply with 309.

602.4 Spout Height. Spout outlets shall be 36 inches (915 mm) maximum above the finish floor or ground.

602.5 Spout Location. The spout shall be located 15 inches (380 mm) minimum from the vertical support and 5 inches (125 mm) maximum from the front edge of the unit, including bumpers.

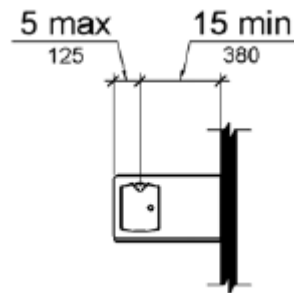


Figure 602.5 Drinking Fountain Spout Location

602.6 Water Flow. The spout shall provide a flow of water 4 inches (100 mm) high minimum and shall be located 5 inches (125 mm) maximum from the front of the unit. The angle of the water stream shall be measured horizontally relative to the front face of the unit. Where spouts are located less than 3 inches (75 mm) of the front of the unit, the angle of the water stream shall be 30 degrees maximum. Where spouts are located between 3 inches (75 mm) and 5 inches (125 mm) maximum from the front of the unit, the angle of the water stream shall be 15 degrees maximum.

Advisory 602.6 Water Flow. The purpose of requiring the drinking fountain spout to produce a flow of water 4 inches (100 mm) high minimum is so that a cup can be inserted under the flow of water to provide a drink of water for an individual who, because of a disability, would otherwise be incapable of using the drinking fountain.

602.7 Drinking Fountains for Standing Persons. Spout outlets of drinking fountains for standing persons shall be 38 inches (965 mm) minimum and 43 inches (1090 mm) maximum above the finish floor or ground.

703 Signs

703.1 General. Signs shall comply with 703. Where both visual and tactile characters are required, either one sign with both visual and tactile characters, or two separate signs, one with visual, and one with tactile characters, shall be provided.

703.2 Raised Characters. Raised characters shall comply with 703.2 and shall be duplicated in braille complying with 703.3. Raised characters shall be installed in accordance with 703.4.

Advisory 703.2 Raised Characters. Signs that are designed to be read by touch should not have sharp or abrasive edges.

703.2.1 Depth. Raised characters shall be 1/32 inch (0.8 mm) minimum above their background.

703.2.2 Case. Characters shall be uppercase.

703.2.3 Style. Characters shall be sans serif. Characters shall not be italic, oblique, script, highly decorative, or of other unusual forms.

703.2.4 Character Proportions. Characters shall be selected from fonts where the width of the uppercase letter "O" is 55 percent minimum and 110 percent maximum of the height of the uppercase letter "I".

703.2.5 Character Height. Character height measured vertically from the baseline of the character shall be 5/8 inch (16 mm) minimum and 2 inches (51 mm) maximum based on the height of the uppercase letter "I".

EXCEPTION: Where separate raised and visual characters with the same information are provided, raised character height shall be permitted to be 1/2 inch

(13 mm) minimum.

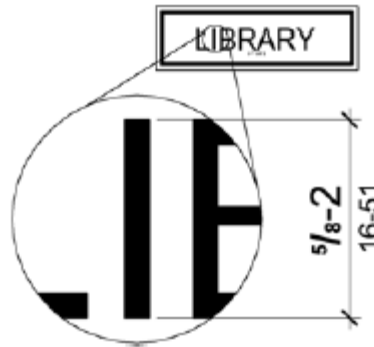


Figure 703.2.5 Height of Raised Characters

703.2.6 Stroke Thickness. Stroke thickness of the uppercase letter "I" shall be 15 percent maximum of the height of the character.

703.2.7 Character Spacing. Character spacing shall be measured between the two closest points of adjacent raised characters within a message, excluding word spaces. Where characters have rectangular cross sections, spacing between individual raised characters shall be 1/8 inch (3.2 mm) minimum and 4 times the raised character stroke width maximum. Where characters have other cross sections, spacing between individual raised characters shall be 1/16 inch (1.6 mm) minimum and 4 times the raised character stroke width maximum at the base of the cross sections, and 1/8 inch (3.2 mm) minimum and 4 times the raised character stroke width maximum at the top of the cross sections. Characters shall be separated from raised borders and decorative elements 3/8 inch (9.5 mm) minimum.

703.2.8 Line Spacing. Spacing between the baselines of separate lines of raised characters within a message shall be 135 percent minimum and 170 percent maximum of the raised character height.

703.3 Braille. Braille shall be contracted (Grade 2) and shall comply with 703.3 and 703.4.

703.3.1 Dimensions and Capitalization. Braille dots shall have a domed or rounded shape and shall comply with Table 703.3.1. The indication of an uppercase letter or letters shall only be used before the first word of sentences, proper nouns and names, individual letters of the alphabet, initials, and acronyms.

Table 703.3.1 Braille Dimensions	
Measurement Range	Minimum in Inches Maximum in Inches
Dot base diameter	0.059 (1.5 mm) to 0.063 (1.6 mm)
Distance between two dots in the same cell ¹	0.090 (2.3 mm) to 0.100 (2.5 mm)
Distance between corresponding dots in adjacent cells ¹	0.241 (6.1 mm) to 0.300 (7.6 mm)
Dot height	0.025 (0.6 mm) to 0.037 (0.9 mm)

Distance between corresponding dots from one cell directly below ¹	0.395 (10 mm) to 0.400 (10.2 mm)
1. Measured center to center.	

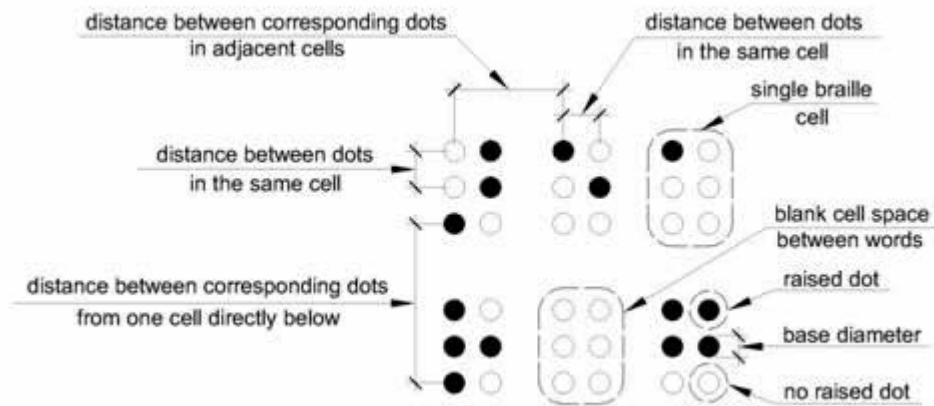


Figure 703.3.1 Braille Measurement

703.3.2 Position. Braille shall be positioned below the corresponding text. If text is multi-lined, braille shall be placed below the entire text. Braille shall be separated 3/8 inch (9.5 mm) minimum from any other tactile characters and 3/8 inch (9.5 mm) minimum from raised borders and decorative elements.

EXCEPTION: Braille provided on elevator car controls shall be separated 3/16 inch (4.8 mm) minimum and shall be located either directly below or adjacent to

the corresponding raised characters or symbols.

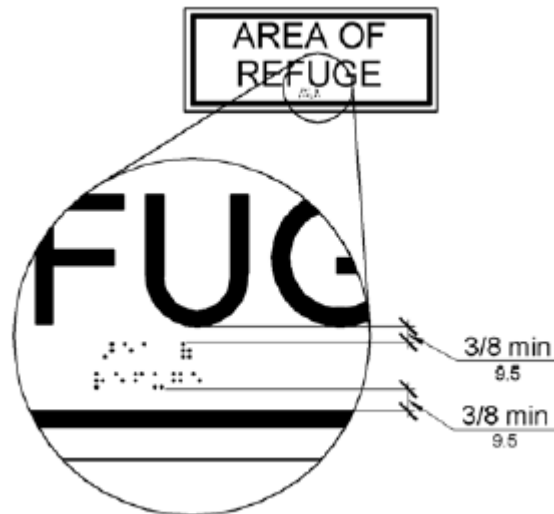


Figure 703.3.2 Position of Braille

703.4 Installation Height and Location. Signs with tactile characters shall comply with 703.4.

703.4.1 Height Above Finish Floor or Ground. Tactile characters on signs shall be located 48 inches (1220 mm) minimum above the finish floor or ground surface, measured from the baseline of the lowest tactile character and 60 inches (1525 mm) maximum above the finish floor or ground surface, measured from the baseline of the highest tactile character.

EXCEPTION: Tactile characters for elevator car controls shall not be required to comply with 703.4.1.

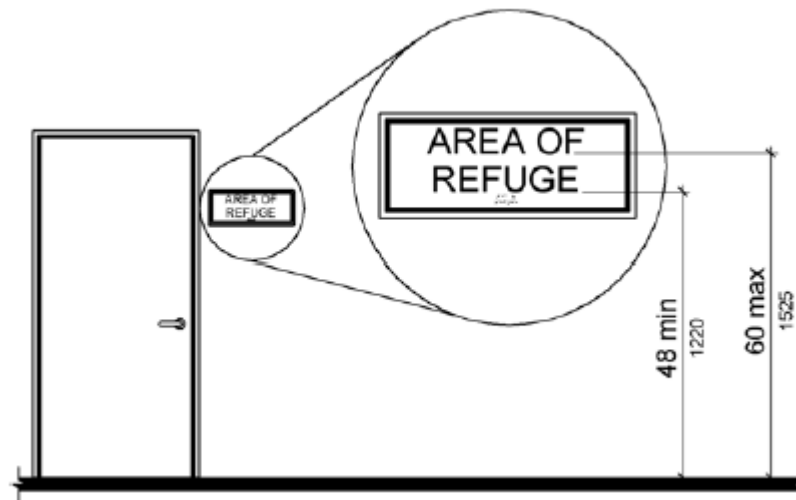


Figure 703.4.1 Height of Tactile Characters Above Finish Floor or Ground

703.4.2 Location. Where a tactile sign is provided at a door, the sign shall be located alongside the door at the latch side. Where a tactile sign is provided at double doors with one active leaf, the sign shall be located on the inactive leaf. Where a tactile sign is provided at double doors with two active leaves, the sign shall be located to the right of the right hand door. Where there is no wall space at the latch side of a single door or at the right side of double doors, signs shall be located on the nearest adjacent wall. Signs containing tactile characters shall be located so that a clear floor space of 18 inches (455 mm) minimum by 18 inches (455 mm) minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45 degree open position.

EXCEPTION: Signs with tactile characters shall be permitted on the push side of doors with closers and without hold-open devices.

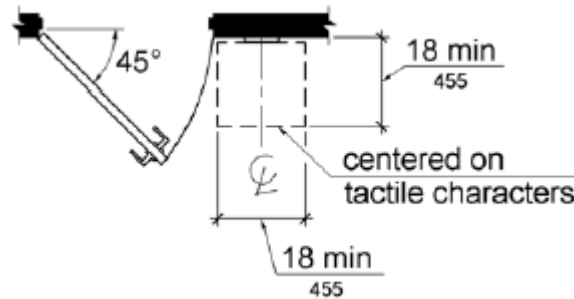


Figure 703.4.2 Location of Tactile Signs at Doors

703.5 Visual Characters. Visual characters shall comply with 703.5.

EXCEPTION: Where visual characters comply with 703.2 and are accompanied by braille complying with 703.3, they shall not be required to comply with 703.5.2 through 703.5.9.

703.5.1 Finish and Contrast. Characters and their background shall have a non-glare finish. Characters shall contrast with their background with either light characters on a dark background or dark characters on a light background.

Advisory 703.5.1 Finish and Contrast. Signs are more legible for persons with low vision when characters contrast as much as possible with their background. Additional factors affecting the ease with which the text can be distinguished from its background include shadows cast by lighting sources, surface glare, and the uniformity of the text and its background colors and textures.

703.5.2 Case. Characters shall be uppercase or lowercase or a combination of both.

703.5.3 Style. Characters shall be conventional in form. Characters shall not be italic, oblique, script, highly decorative, or of other unusual forms.

703.5.4 Character Proportions. Characters shall be selected from fonts where the width of the uppercase letter "O" is 55 percent minimum and 110 percent maximum of the height of the uppercase letter "I".

703.5.5 Character Height. Minimum character height shall comply with Table 703.5.5. Viewing distance shall be measured as the horizontal distance between the character and an obstruction preventing further approach towards the sign. Character height shall be based on the uppercase letter "I".

Table 703.5.5 Visual Character Height (text version)		
Height to Finish Floor or Ground From Baseline of Character	Horizontal Viewing Distance	Minimum Character Height
40 inches (1015 mm) to less than or equal to 70 inches (1780 mm)	less than 72 inches (1830 mm)	5/8 inch (16 mm)
	72 inches (1830 mm) and greater	5/8 inch (16 mm), plus 1/8 inch (3.2 mm) per foot (305

		mm) of viewing distance above 72 inches (1830 mm)
Greater than 70 inches (1780 mm) to less than or equal to 120 inches (3050 mm)	less than 180 inches (4570 mm)	2 inches (51 mm)
	180 inches (4570 mm) and greater	2 inches (51 mm), plus 1/8 inch (3.2 mm) per foot (305 mm) of viewing distance above 180 inches (4570 mm)
greater than 120 inches (3050 mm)	less than 21 feet (6400 mm)	3 inches (75 mm)
	21 feet (6400 mm) and greater	3 inches (75 mm), plus 1/8 inch (3.2 mm) per foot (305 mm) of viewing distance above 21 feet (6400 mm)

703.5.6 Height From Finish Floor or Ground. Visual characters shall be 40 inches (1015 mm) minimum above the finish floor or ground.

EXCEPTION: Visual characters indicating elevator car controls shall not be required to comply with 703.5.6.

703.5.7 Stroke Thickness. Stroke thickness of the uppercase letter "I" shall be 10 percent minimum and 30 percent maximum of the height of the character.

703.5.8 Character Spacing. Character spacing shall be measured between the two closest points of adjacent characters, excluding word spaces. Spacing between individual characters shall be 10 percent minimum and 35 percent maximum of character height.

703.5.9 Line Spacing. Spacing between the baselines of separate lines of characters within a message shall be 135 percent minimum and 170 percent maximum of the character height.

810 Transportation Facilities

810.1 General. Transportation facilities shall comply with 810.

810.2 Bus Boarding and Alighting Areas. Bus boarding and alighting areas shall comply with 810.2.

Advisory 810.2 Bus Boarding and Alighting Areas. At bus stops where a shelter is provided, the bus stop pad can be located either within or outside of the shelter.

810.2.1 Surface. Bus stop boarding and alighting areas shall have a firm, stable surface.

810.2.2 Dimensions. Bus stop boarding and alighting areas shall provide a clear length of 96 inches (2440 mm) minimum, measured perpendicular to the curb or vehicle roadway edge, and a clear width of 60 inches (1525 mm) minimum, measured parallel to the vehicle roadway.

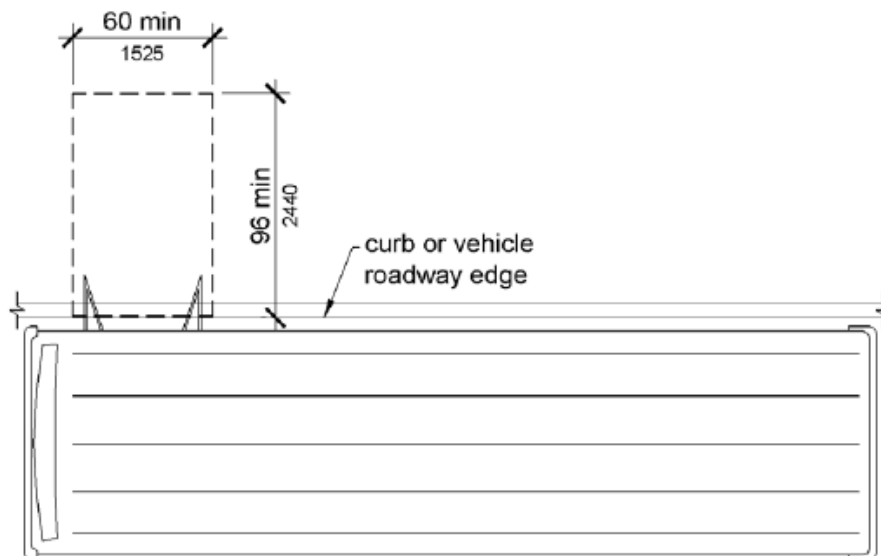


Figure 810.2.2 Dimensions of Bus Boarding and Alighting Areas

810.2.3 Connection. Bus stop boarding and alighting areas shall be connected to streets, sidewalks, or pedestrian paths by an accessible route complying with 402.

810.2.4 Slope. Parallel to the roadway, the slope of the bus stop boarding and alighting area shall be the same as the roadway, to the maximum extent practicable. Perpendicular to the roadway, the slope of the bus stop boarding and alighting area shall not be steeper than 1:48.

810.3 Bus Shelters. Bus shelters shall provide a minimum clear floor or ground space complying with 305 entirely within the shelter. Bus shelters shall be connected by an accessible route complying with 402 to a boarding and alighting area complying with 810.2.

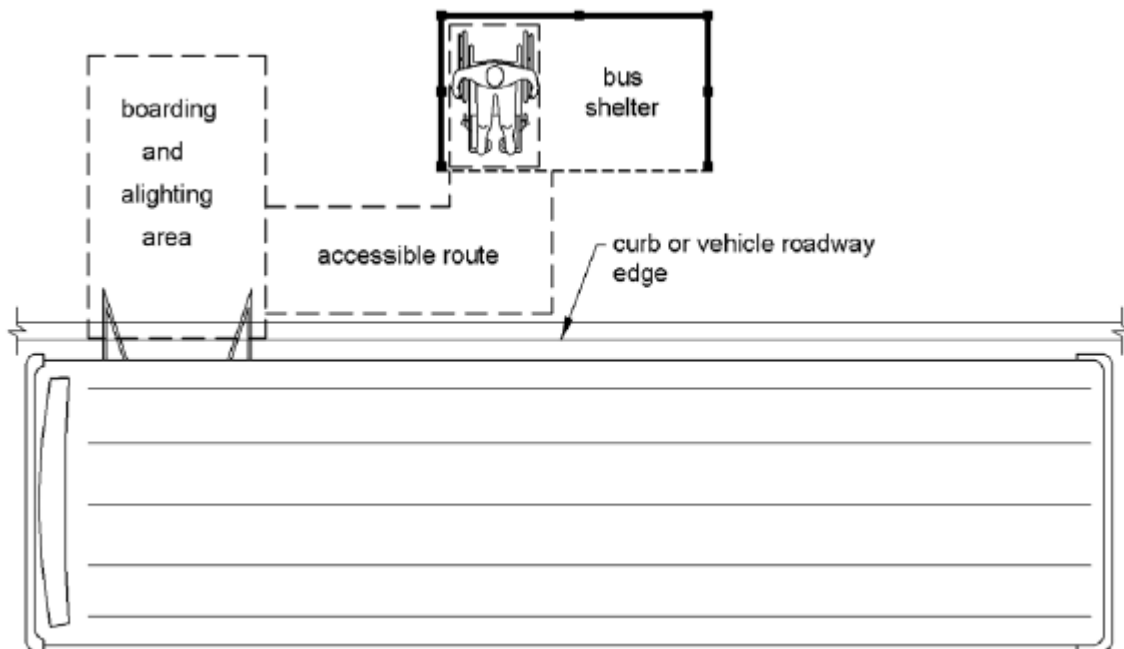


Figure 810.3 Bus Shelters

810.4 Bus Signs. Bus route identification signs shall comply with 703.5.1 through 703.5.4, and 703.5.7 and 703.5.8. In addition, to the maximum extent practicable, bus route identification signs shall comply with 703.5.5.

EXCEPTION: Bus schedules, timetables and maps that are posted at the bus stop or bus bay shall not be required to comply.

810.5 Rail Platforms. Rail platforms shall comply with 810.5.

810.5.1 Slope. Rail platforms shall not exceed a slope of 1:48 in all directions.

EXCEPTION: Where platforms serve vehicles operating on existing track or track laid in existing roadway, the slope of the platform parallel to the track shall be permitted to be equal to the slope (grade) of the roadway or existing track.

810.5.2 Detectable Warnings. Platform boarding edges not protected by platform screens or guards shall have detectable warnings complying with 705 along the full length of the public use area of the platform.

810.5.3 Platform and Vehicle Floor Coordination. Station platforms shall be positioned to coordinate with vehicles in accordance with the applicable requirements of 36 CFR Part 1192. Low-level platforms shall be 8 inches (205 mm) minimum above top of rail.

EXCEPTION: Where vehicles are boarded from sidewalks or street-level, low-level platforms shall be permitted to be less than 8 inches (205 mm).

Advisory 810.5.3 Platform and Vehicle Floor Coordination. The height and position of a platform must be coordinated with the floor of the vehicles it serves to minimize the vertical and horizontal gaps, in accordance with the ADA

Accessibility Guidelines for Transportation Vehicles (36 CFR Part 1192). The vehicle guidelines, divided by bus, van, light rail, rapid rail, commuter rail, intercity rail, are available at www.access-board.gov. The preferred alignment is a high platform, level with the vehicle floor. In some cases, the vehicle guidelines permit use of a low platform in conjunction with a lift or ramp. Most such low platforms must have a minimum height of eight inches above the top of the rail. Some vehicles are designed to be boarded from a street or the sidewalk along the street and the exception permits such boarding areas to be less than eight inches high.

810.6 Rail Station Signs. Rail station signs shall comply with 810.6.

EXCEPTION. Signs shall not be required to comply with 810.6.1 and 810.6.2 where audible signs are remotely transmitted to hand-held receivers, or are user- or proximity-actuated.

Advisory 810.6 Rail Station Signs Exception. Emerging technologies such as an audible sign systems using infrared transmitters and receivers may provide greater accessibility in the transit environment than traditional Braille and raised letter signs. The transmitters are placed on or next to print signs and transmit their information to an infrared receiver that is held by a person. By scanning an area, the person will hear the sign. This means that signs can be placed well out of reach of Braille readers, even on parapet walls and on walls beyond barriers. Additionally, such signs can be used to provide wayfinding information that cannot be efficiently conveyed on Braille signs.

810.6.1 Entrances. Where signs identify a station or its entrance, at least one sign at each entrance shall comply with 703.2 and shall be placed in uniform locations to the maximum extent practicable. Where signs identify a station that has no defined entrance, at least one sign shall comply with 703.2 and shall be placed in a central location.

810.6.2 Routes and Destinations. Lists of stations, routes and destinations served by the station which are located on boarding areas, platforms, or mezzanines shall comply with 703.5. At least one tactile sign identifying the specific station and complying with 703.2 shall be provided on each platform or boarding area. Signs covered by this requirement shall, to the maximum extent practicable, be placed in uniform locations within the system.

EXCEPTION: Where sign space is limited, characters shall not be required to exceed 3 inches (75 mm).

Advisory 810.6.2 Routes and Destinations. Route maps are not required to comply with the informational sign requirements in this document.

810.6.3 Station Names. Stations covered by this section shall have identification signs complying with 703.5. Signs shall be clearly visible and within the sight lines of standing and sitting passengers from within the vehicle on both sides when not obstructed by another vehicle.

Advisory 810.6.3 Station Names. It is also important to place signs at intervals in the station where passengers in the vehicle will be able to see a sign when the vehicle is either stopped at the station or about to come to a stop in the station. The number of signs necessary may be directly related to the size of the lettering displayed on the sign.

810.7 Public Address Systems. Where public address systems convey audible information to the public, the same or equivalent information shall be provided in a visual format.

810.8 Clocks. Where clocks are provided for use by the public, the clock face shall be uncluttered so that its elements are clearly visible. Hands, numerals and digits shall contrast with the background either light-on-dark or dark-on-light. Where clocks are installed overhead, numerals and digits shall comply with 703.5.

810.9 Escalators. Where provided, escalators shall comply with the sections 6.1.3.5.6 and 6.1.3.6.5 of ASME A17.1 (incorporated by reference, see "Referenced Standards" in Chapter 1) and shall have a clear width of 32 inches (815 mm) minimum.

EXCEPTION: Existing escalators in key stations shall not be required to comply with 810.9.

810.10 Track Crossings. Where a circulation path serving boarding platforms crosses tracks, it shall comply with 402.

EXCEPTION: Openings for wheel flanges shall be permitted to be 2 1/2 inches (64 mm) maximum.



Figure 810.10 (Exception) Track Crossings

903 Benches

903.1 General. Benches shall comply with 903.

903.2 Clear Floor or Ground Space. Clear floor or ground space complying with 305 shall be provided and shall be positioned at the end of the bench seat and parallel to the short axis of the bench.

903.3 Size. Benches shall have seats that are 42 inches (1065 mm) long minimum and 20 inches (510 mm) deep minimum and 24 inches (610 mm) deep maximum.

903.4 Back Support. The bench shall provide for back support or shall be affixed to a wall. Back support shall be 42 inches (1065 mm) long minimum and shall extend from a point 2 inches (51 mm) maximum above the seat surface to a point 18 inches (455 mm) minimum above the seat surface. Back support shall be 2 1/2 inches (64 mm) maximum from the rear edge of the seat measured horizontally.

Advisory 903.4 Back Support. To assist in transferring to the bench, consider providing grab bars on a wall adjacent to the bench, but not on the seat back. If provided, grab bars cannot obstruct transfer to the bench.

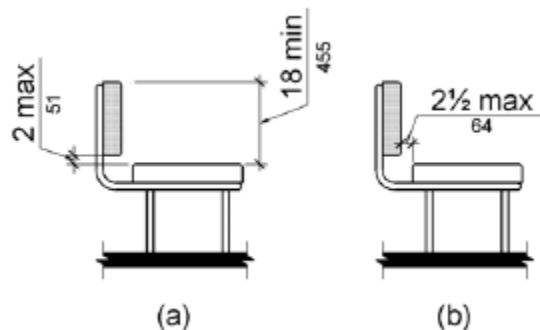


Figure 903.4 Bench Back Support

903.5 Height. The top of the bench seat surface shall be 17 inches (430 mm) minimum and 19 inches (485 mm) maximum above the finish floor or ground.

903.6 Structural Strength. Allowable stresses shall not be exceeded for materials used when a vertical or horizontal force of 250 pounds (1112 N) is applied at any point on the seat, fastener, mounting device, or supporting structure.

903.7 Wet Locations. Where installed in wet locations, the surface of the seat shall be slip resistant and shall not accumulate water.

