Transit Design Standards Manual

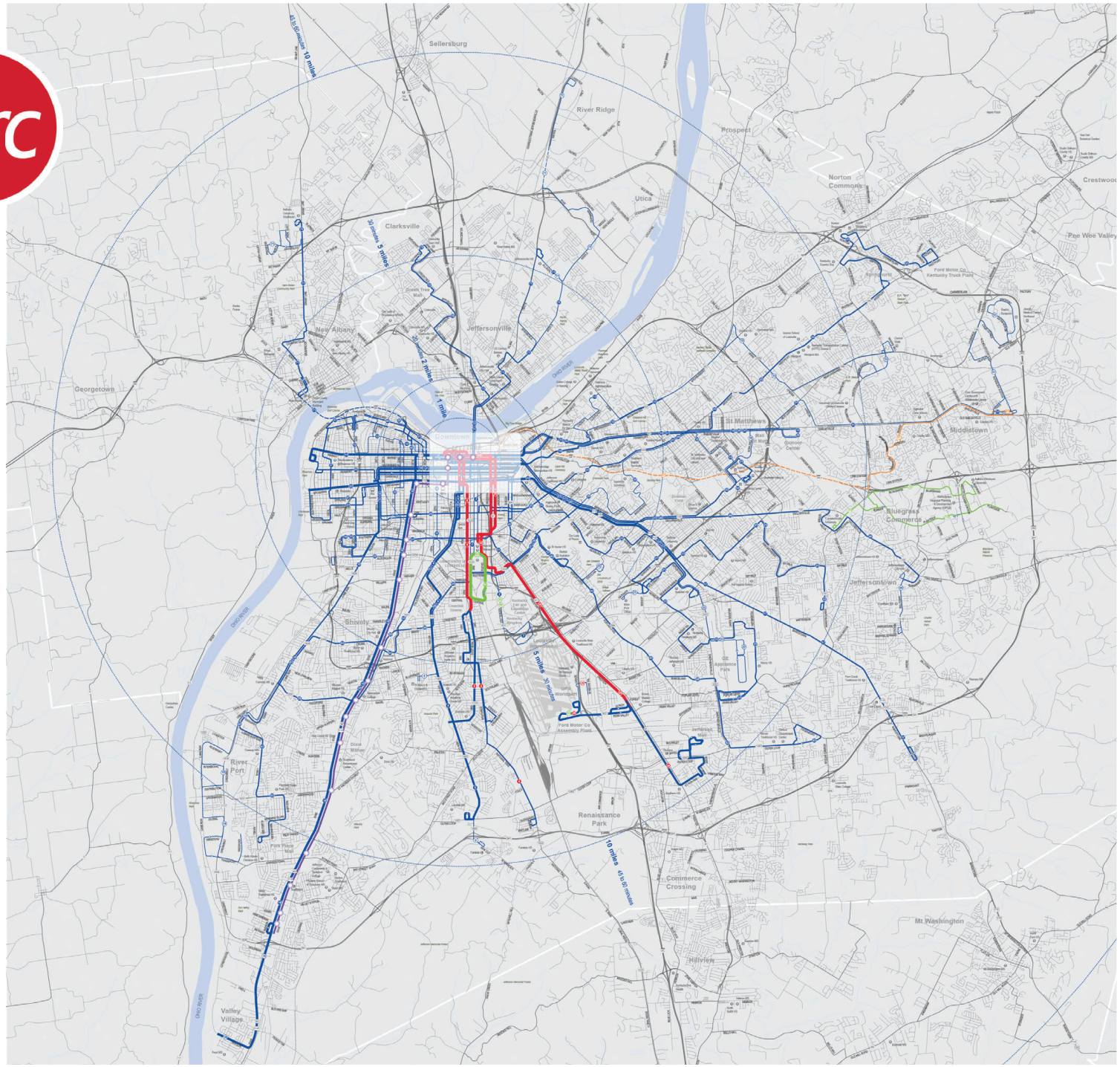
A Reference Guide

Transit Authority of River City

September 2013, updates April 2021

"[T]he attractiveness of public transport systems is boosted if users feel safe and comfortable walking or cycling to and from buses, light rail, and trains. Good public space and good public transport system[s] are simply two sides of the same coin."

- Jan Gehl, Cities for People



City

Point of Interest

Park

Bus Depot or Transit Center

Hospital

Middle School (MS)
High School (HS)
College or University

Government Building

Library

Frequent Routes

Route Name	Fare
Fourth Street	$1.75
Preston	$1.75

Heavy red lines indicate where Frequent Routes operate every 10-15 minutes on weekdays from 7:00 a.m. to 6:00 p.m. Frequent Routes operate 7 days a week. Less frequent service on branches for Routes 4 and 28 are indicated with the navy blue line typical of Standard Routes. Follow the route marker and route line for geographic coverage for each route.

Standard Routes

Route Name	Fare
Second Street	$1.75
Sixth Street	$1.75
Twelfth Street	$1.75
Market Street	$1.75
Bardstown Road	$1.75
Dixie Highway	$1.75
Muhammad Ali Blvd	$1.75
Chestnut Street	$1.75
Twenty Second Street	$1.75
Broadway	$1.75
Oak - Westport Crosstown	$1.75
Hill Street	$1.75
Eastern Parkway	$1.75
Shelbyville Road	$1.75
Taylorsville Road	$1.75
Poplar Level Road	$1.75
Crums Lane	$1.75
Jeffersonville-Louisville-New Albany	$1.75
Clarksville	$1.75

Navy blue lines indicate where Standard Routes operate. With the exception of Route 22, Standard Routes operate 7 days a week. Follow the route marker and route line for geographic coverage for each route.

Express Routes

Route Name	Fare
Plainview Express	$ 2.75

Solid orange lines indicate where Express Routes operate. The vehicle will not make stops while in closed door service, indicated by a dashed orange line. Streets and bus stops on which Express Routes operate may differ between morning and evening commutes. Express Fare required on all Express Routes.

Bus Rapid Transit Routes

Route Name	Fare
Dixie BRT	$1.75

Solid purple lines indicate where Bus Rapid Transit Routes operate. Route 10 is currently Louisville's only BRT line travelling along Dixie HWY into downtown. It features a new Transit Signal Priority system and stops with digital pylons providing real-time communication with Rapid riders.

Circulator Routes

Route Name	Fare
Medical Center Circulator	$ 0.75
Bluegrass Circulator	$ 1.75
UPS - UofL - Downtown Shuttle	$ 1.75
Cardinal Shuttle	$ 1.75
UPS - West Louisville	$ 1.75
California Shopper*	$ 0.75
In-Town Shopper*	$ 0.75
Old Louisville Shopper*	$ 0.75
Bashford - Oxmoor Shopper*	$ 0.75
Southern Indiana Shopper*	$ 0.75

Green lines indicate where weekday Circulator Routes operate. The days, hours, and fare schedule vary between each Circulator Route. Shopper Shuttles and the Trolley Hops operate as infrequently as once a month, make complex turns, and therefore are not shown on the system map. Consult pocket schedules and online resources for more information.

Mobile Ticket Pricing

The fares listed above reflect cash payments. Mobile tickets, with special rates shown below, can be purchased through the TARC Mobile App.

Route Name	Fare
Single Ride	$ 1.50
24-Hour Pass	$ 3.50
7-Day Pass	$ 15.00
30-Day Pass	$ 50.00

TARC Routes, TARC level of service per routes, and places of regional interest and places of interest to TARC customers illustrated by TARC.

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Minor Updates in May 2021:

EXECUTIVE SUMMARY

As the local public transit provider in the Louisville region, the Transit Authority of River City (TARC), has developed the *Transit Design Standards Manual* to encourage the coordination of local development and transit service. This manual serves as a reference to help local jurisdictions and the development community to accommodate transit within their development plans. By designing for public transportation in the initial development process, TARC's transit vehicles can be accommodated; thereby promoting transit as a feasible and equitable alternative mode of transportation. Coordinating land use and transportation planning not only results in providing effective transit service, but may lead to a reduction in traffic congestion.

Although TARC deals primarily with transit needs within the public right-of-way, the agency encourages property owners and developers to consider the transportation needs of the site's users when locating and designing buildings and amenities within a new or redeveloped site. By providing the infrastructure, access routes, facilities, and amenities, a new development can help to make public transit an attractive and efficient mode of travel within the community.

TARC encourages local jurisdictions and developers to follow these recommendations and work with TARC in planning for public transportation in conjunction with new or redeveloped properties. Working with TARC through the development review process will promote design options that support transit-supportive development and support standards found within the ADA's Public Right-of-Way Accessibility Guidelines.

This manual is organized into several sections that correspond with facility design.

Section 1 (*Introduction*) pertains to the purpose of this manual, its goals and objectives, relationship to other planning documents, and provides an overview of TARC, mobility, and the transit network.

Section 2 (*Roadway Infrastructure*) pertains to the specific transit needs within the travel way including bus stop placement, roadway requirements, and fleet characteristics.

Section 3 (*Bus Stop Design*) defines location, design, and dimensional guidelines for transit facilities and amenities within the curb-side public right-of-way.

Section 4 (*Appendices*) includes a glossary of transit-related terms, dimensional graphic standards, amenity cut sheets/specifications, and references.

ACKNOWLEDGEMENTS

This manual was completed by the Transit Authority of River City Planning Department. Maps were developed by TARC Planning staff along with the guidelines, graphics, and tables with some modified from outside transit agency reports or manuals. Any material used from outside agencies will have the source provided.

The TARC Planning department would like to thank the following organizations for providing assistance or insight into the development of this document:

- **Louisville Metro Government**
- **National Association of City Transportation Officials**
- **WeGo Public Transit**
- **Palm Tran**

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INTRODUCTION

PURPOSE OF THIS MANUAL

The purpose of the Transit Design Standards Manual is to serve as a guide for TARC's transportation facilities instillation, improvements, and maintenance system-wide. These standards apply to the bus stop infrastructure, signage, passenger facilities, and any other amenities that could be installed in conjuction with TARC bus stops. This document should be viewed from operating and design perspectives for dimensional and operating characteristics. The goal is to adopt the manual as an appendix to the Land Development Code, thereby ensuring regulatory support for transportation planning, infrastructure, and the implementation of passenger facilities in the TARC service area.

The updated transit design standards should assist Louisville Metro Public Works, the Louisville Metro Planning Commission, the Kentucky Transportation Cabinet (KYTC), and the Kentuckiana Regional Planning & Development Agency (KIPDA) with the development process, streamline development plan review and communication between TARC, public agencies, the development community, and the public. Public transit is an important part of the community infrastructure; consistent approach to planning and implementation should result in safer transit operations, high quality passenger facilities and reduce cost for installation and maintenance in the long term.

The Transit Design Standards Manual will serve as a clear and uniform guide for design and placement of transit-related (bus) facilities and amenities. The manual will also emphasize the importance of transit facilities through compliance with the ADA's Public Right-of-Way Guidelines (PROWAG). TARC has developed this manual to encourage planners, designers, and local jurisdictions to include transit-supportive design standards within all new and redeveloped projects.

Who Will Use This Manual?

The following professionals will find the Transit Design Standards Manual useful in their work:

- Transit administrators and planners, supervisors of construction, and all personnel who oversee the development, alteration, and construction of transit facilities.
- Architectural and engineering staff who need an overview of accessibility regulations throughout a facility before preparing detailed designs.
- Federal, state, and local government officials who review facility plans and may be involved in choosing key stations or ruling on disproportionate costs.
- Agencies (both public and private) who work to promote economic development, improve access to employment opportunities, and advocate for transit users with disabilities.

Disclaimer:

These design guidelines are intended to provide accurate, authoritative direction for general situations. They are not intended to provide site-specific, detailed public transit, engineering, architectural, construction, legal or other information. The reader will need to adjust the information contained in the guidelines to site-specific needs, constraints, and to all applicable laws, regulations, and codes. Further, if the reader desires expert advice concerning any of the technical references contained in these guidelines, the reader is encouraged to retain the services of appropriate expert(s). These guidelines are provided with the understanding that TARC is not engaged in the rendering of any professional service.

TARC Mission Statement

To explore and implement transportation opportunities that enhance the social, economic and environmental well-being of the Greater Louisville community.

Goals and Objectives

Goal 1: Advocate for inclusive, attractive, functional and accessible design for transit facilities by promoting public transit as a convenient and alternative mode of transportation.

Objectives:

- Prioritize universal accessibility standards in the design and implementation of transit facilities.
- Consider and incorporate multi-modal transportation options in the design and placement of transit facilities.
- Accommodate neighborhood needs in the design and placement of transit facilities and amenities to enhance transit ridership.

Goal 2: Encourage transit-supportive development

Objectives:

- Coordinate with land owners, developers, architects, engineers, agencies, and local jurisdictions to ensure proper transit stop design, placement, and installation.
- Promote consistency of standards and guidelines for new or redeveloped transit facilities and amenities.
- Provide pedestrian facilities that are safe, direct, and barrier free for all new or redevelopment projects regardless of land use to ensure a continuous connected pedestrian system.

TARC OVERVIEW

Transit Authority of River City, (TARC) was founded in 1974 when voters in Louisville and Jefferson County voted to increase occupational tax to finance a municipal bus service. TARC provides public transportation to Jefferson county in Kentucky, and Clark and Floyd counties in southern Indiana. Today, TARC serves more than 15 million customers who travel almost 65 million miles annually.

TARC owns and operates 109 paratransit vehicles and 225 buses, and has more than 600 employees, 337 of those being coach operators. TARC operates 31 routes, providing transit for an average of 41,000 riders each weekday. TARC operates a combination of express, local, circulator, and demand-response services. (Statistics from fiscal year 2020).

TARC provides connections to jobs, education, and activity centers, enhancing economic development and reducing pollution and congestion. TARC provides transportation for a variety of customers, including the elderly and persons with disabilities. The front of every fixed-route bus has priority seating for senior citizens and persons in wheelchairs. Wheelchair lifts for easier boarding and bike racks are now standard. TARC also provides door-to-door service, known as TARC 3, for those who are unable to ride fixed-route buses due to a disability (ADA obligation).

RELATIONSHIP TO PLANNING DOCUMENTS

Within the Louisville-Jefferson County Metropolitan Area, a number of planning documents have included provisions involving alternate modes of transportation, specifically, public transportation. Notable documents include Plan 2040, the Land Development Code, and Horizon 2035.

The Transit Design Standards Manual is intended to complement and incorporate local and federal planning documents as they pertain to public transit by combining them into a single reference guide including minimum dimensional requirements and design standards along with illustrative graphic and photographic examples.

Plan 2040

The Comprehensive Plan, Plan 2040, represents the vision of Louisville and Jefferson County as a plan for a more livable, attractive, mobile, efficient and environmentally sensitive community. This document is primarily about how to plan for both demographic and economic changes in regards to land use, with the goal of enhancing the quality of life within the community. Plan 2040 includes strategies and guidelines to determine whether proposed land use changes are in agreement. The Kentucky Revised Statutes (KRS 100) require a comprehensive plan to include a Mobility Strategy (goals and objectives) and Mobility plan element (Goals, Objectives & Plan Element 4.2).

The Mobility plan element identifies the importance of incorporating a public mass transit system that is safe, economical, accessible, and efficient. Also, the Mobility plan element encourages the development of a public transit system that increases personal mobility and travel choices, conserves energy resources, preserves air quality, and fosters economic growth. The Mobility plan element goals 1, 2, and 3 encourage the design of transportation facilities to be safe, attractive, efficient and accessible, especially for those who are elderly or disabled.

Land Development Code

The regulations and requirements established within the Land Development Code, LDC, are in accordance with the comprehensive plan, Plan 2040, with consideration to prevailing land uses, growth characteristics, and the character of respective districts to encourage the most appropriate use of land throughout Louisville and Jefferson County. The Land Development Code provides the regulations needed to implement applicable goals, objectives and policies pertaining to the strategies and plan elements adopted by Plan 2040.

Transit standards within the Land Development Code can be found in Chapter 5 Part 9, Chapter 6 Part 4 and Appendix 6F. The LDC's transit standards focus on circulation, connectivity and accessibility by outlining minimum design requirements. Appendix 6F includes a Transit Design Standards Manual designed to ensure that all developments are accessible by any means of transport and that all developments provide a physical place for transit passengers to access the transit vehicle and their final destination. Requirements for review or additional transit amenities for developments are based on size, scale, or particular use.

Horizon 2035

The Metropolitan Transportation Plan, Horizon 2035, was prepared by the Kentuckiana Regional Planning and Development Agency, KIPDA, to provide a 20-year vision of how the transportation network within the Louisville Metropolitan Planning Area will function and appear in the future. The goal of the transportation plan is to develop both strategies and actions whose cumulative impact benefits the region, leading to the more efficient movement of people and goods.

The plan outlines six regional priorities to serve as guides for identifying diverse transportation issues. Horizon 2035, in accordance with 23 CFR 450.322 (b) provides "both long-range and short-range strategies/ actions

that lead to the development of an integrated multi-modal transportation system to facilitate the safe and efficient movement of people and goods in addressing current and future transportation demand."

The Alternate Modes regional priority addresses connectivity and the importance of transit, bicycle, and pedestrian modes of transportation and ensures the choice to use alternate modes as a substitute to the single occupancy vehicle. The benefits of alternative modes (public transit, paratransit, ridesharing, bicycle, and pedestrian) can translate to improved air quality, less wear and tear on roadways, and better health.

Public Rights-of-Way Accessibility Guidelines

The Americans with Disabilities Act of 1990 (ADA) is legislation that prohibits discrimination based on disability. Title II of the act addresses public services, including transportation, provided by public entities and concentrates on accessibility, both physical and policy, for those with disabilities. To further clarify accessible provisions required within the public right-of-way, the ADA has established the Public Rights-of-Way Accessibility Guidelines (Draft), or PROWAG, as a stand-alone document that uses transportation industry standards, terms, and measures to determine accessible standards and guidelines. All newly designed and constructed facilities (temporary or permanent) located within the public right-of-way shall comply with PROWAG requirements. All altered portions of existing facilities located in the public right-of-way shall comply with PROWAG to the maximum extent feasible.

*Note: For the purpose of the Transit Design Standards Manual, standards that do not directly pertain to public transportation have been omitted from this document.

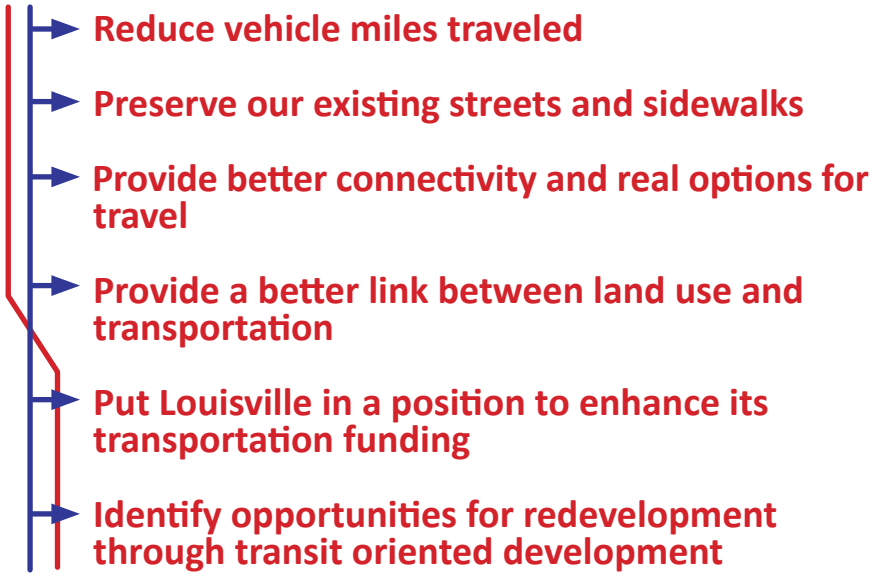
Transit Cooperative Research Program

TCRP, sponsored by the Federal Transit Administration, has produced a variety of reports focused on public transit. For the purpose of this design standards manual, TCRP Report 19: Guidelines for the Location and Design of Bus Stops has been used as a reference for visual graphics and figures to demonstrate minimum standards and design preferences.

Move Louisville

Move Louisville is the city's 20-year muliti-modal plan. It takes a holistic approach to the city's transportation system, which is a $5 billion asset that includes roadways, bus networks, sidewalks, bike infrastructure and trails. the plan calls for making sure Louisville streets serve all people and introducing fast and reliable premium transit options that could include street cars, rail, or Bus Rapid Transit, which has already been implemented along Dixie Highway in 2019.

Move Louisville seeks to prioritize our limited transportation dollars by recommnding policies and projects that will:



While each of the priority projects included in the plan will address the mobility needds of our community, improving our transit network is an integral part of Move Louisville. Move Louisville positions Louisville for attracting federal and state funds and leveraging existing local dollars with new funds. The plan addresses transit priority projects and funding streams on pages 69 to 72 and 88 to 91, respectively.

MOBILITY

Louisville's comprehensive plan, Plan 2040, stresses the importance of a multi-modal transportation network within the region. Although, Louisville mainly uses single-occupant vehicles for transport, the plan encourages provisions for an efficient, safe, and attractive system of roadways, transit routes, sidewalks, and other pathways for the timely movement of people and goods by all methods of travel including transit, bicycling, and walking. Providing the appropriate street-side infrastructure in regards to public transit, will support various modes of travel.

Transit Supportive Development

Transit-supportive development focuses on providing a balanced transportation system, where walking, biking, and riding public transit work in conjunction with the private automobile. Maintaining a balanced transportation system allows the people of a community to have alternative choices that accommodate all modes of travel to perform everyday trips. TARC promotes transit-supportive design in new or redeveloped land within the Louisville Metro area. Transit-supportive development can only be achieved if interconnected street networks become a priority.

Walk to TARC
Sidewalks & ADA Ramps

Bike to TARC
Bike Paths & Racks

Park & TARC
Single-Use & Shared Lots

SHARED MOBILITY

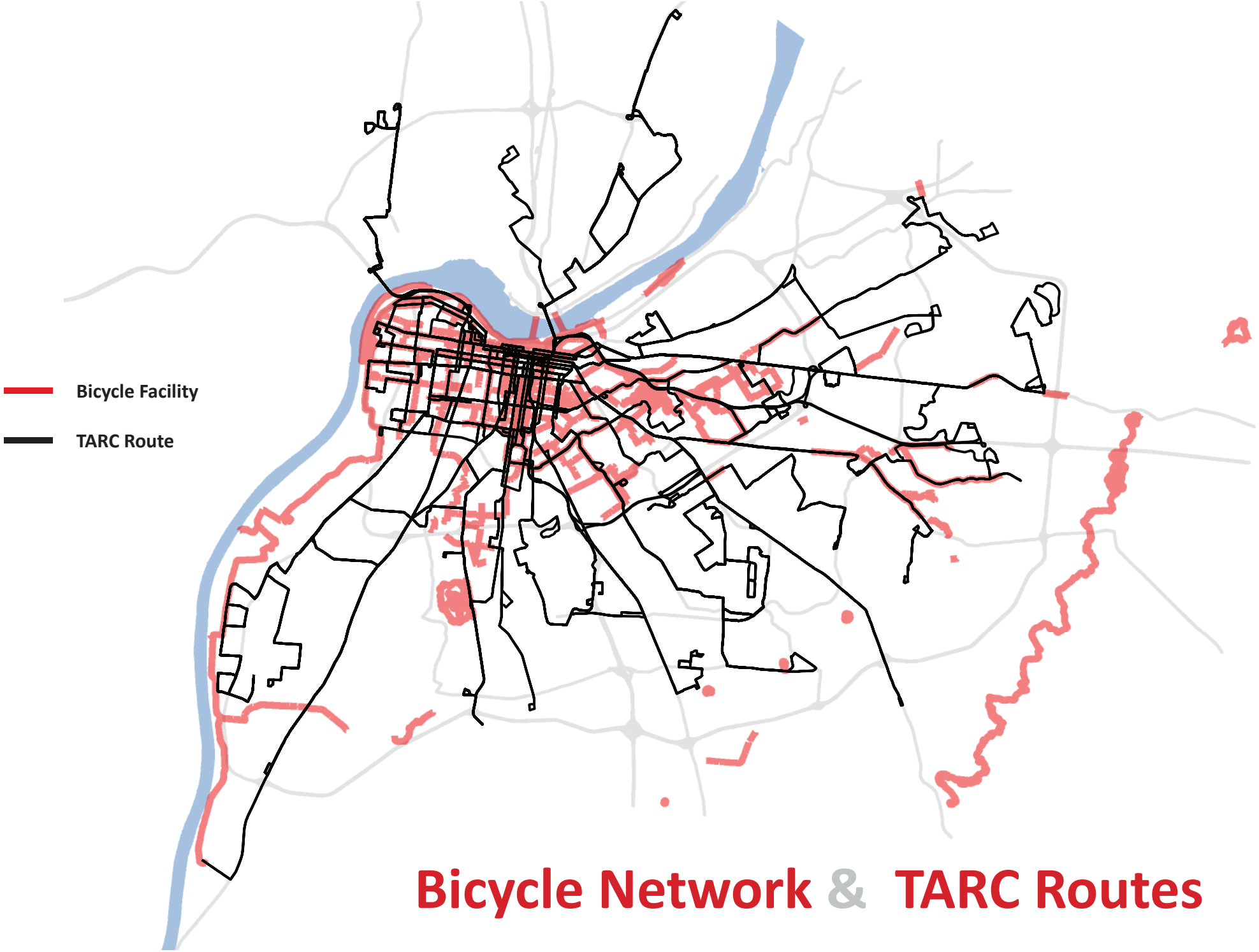
Transportation options throughout the Louisville region will continue to change in the future and TARC's system and infrastructure need to be prepared to adapt and accomodate the different modes available to potential users. When possible, transit facilities should allow for compatible space for alternate modes such as bicycles and scooters.

Space for shared mobility should be co-located with other infrastructure such as bicycle racks, lanes, docking stations (see LouVelo map at right) and designated scooter parking zones. The map of Louisville's bike infrastructure on the following page illustrates how interconnected the two networks are in the region.

Bikes-on-Board

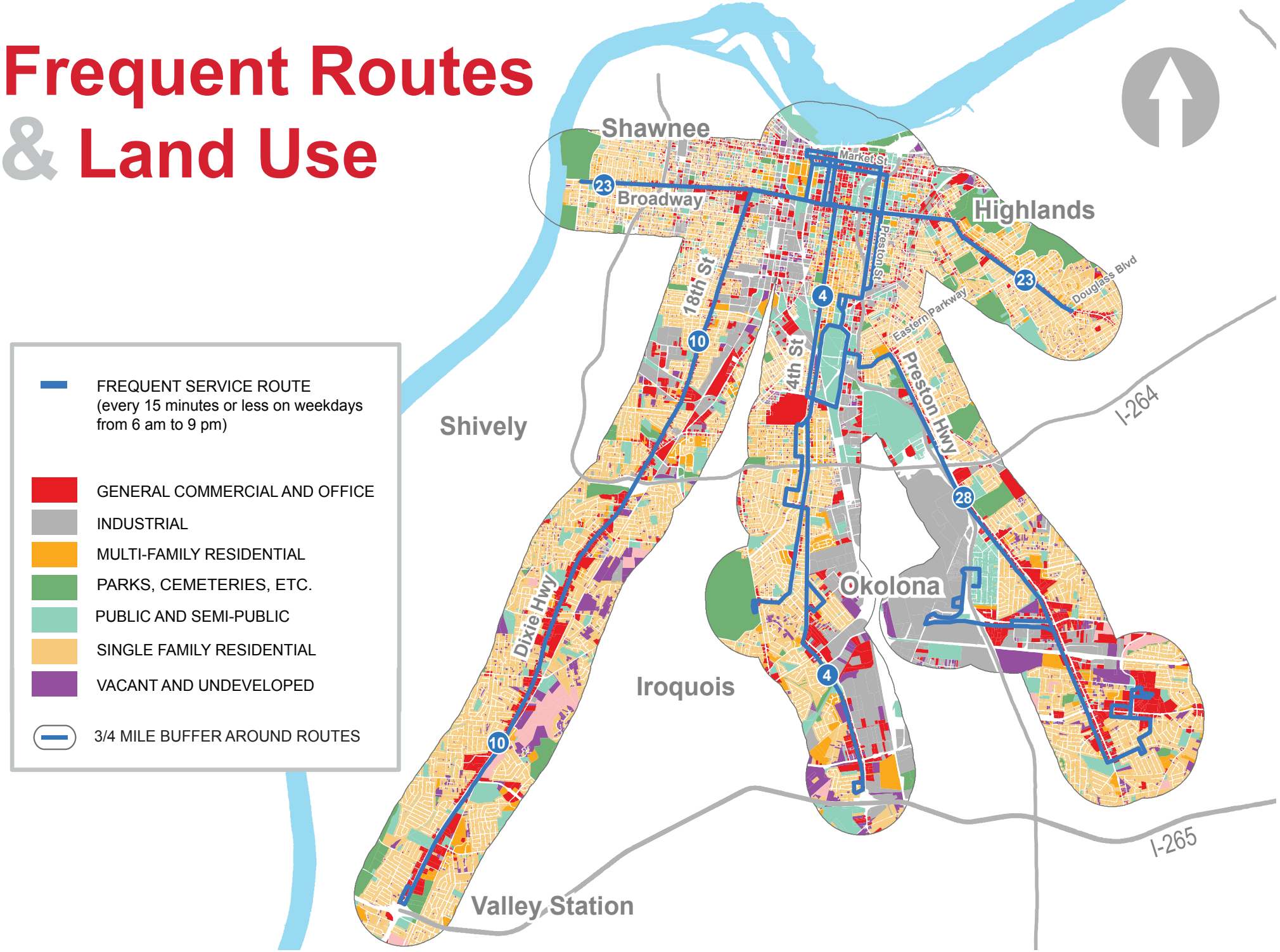
All TARC buses are equipped with deployable bicycle racks. Bicycle racks allow bicyclists to bring their bikes with them while they are TARC passengers. The bike racks are front mounted and can accommodate 3 bicycles. When deployed, the bicycle racks are 83-in long by 35.5-in wide. When extended, the bicycle rack increases the transit vehicle's turning radius by 3'1.

A transit rider utilizing the bike rack on the front of a TARC bus.



Bicycle Network & TARC Routes

Frequent Routes & Land Use



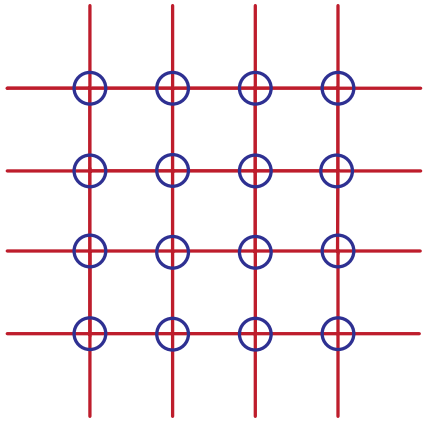
STREET NETWORK

Street networks connect people to each other and to destinations by forming an effective, flexible framework within a community. Well connected street networks improve mobility by allowing people to travel more directly by foot, bike, (or to) public transit, or by a single occupant vehicle. Highly connected street networks reduce vehicle miles traveled, traffic congestion, and vehicle delay. By allowing traffic to diffuse across the larger street network connectivity can be maximized, especially when demand becomes excessive on an individual route.

A transit-supportive street network is interconnected and provides safe, direct, and convenient access to various uses or to transportation alternatives, such as transit stops. Interconnected street patterns provide multiple routes for pedestrians and direct access through the neighborhood to the transit stop allowing a centrally located bus stop to serve a greater area.

Contemporary Street Network:

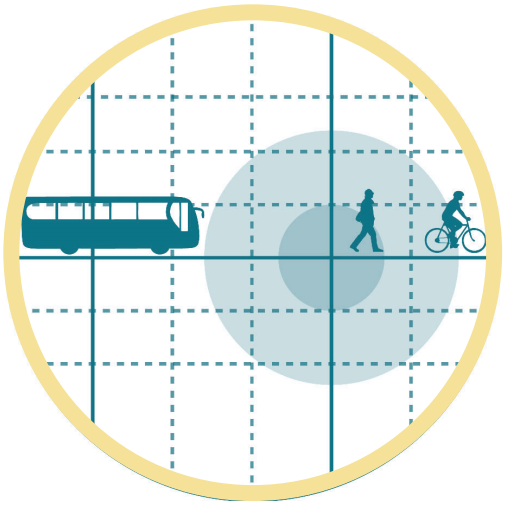
- Disconnected road network
- Increased walking distance
- Abundance of parking lots
- Less proximity to transit



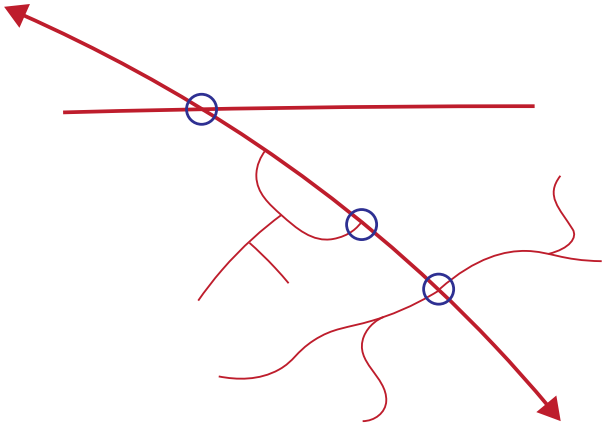
UNDESIRABLE
Frequent stops spaced at every block in street grid

Connected Grid Pattern:

- Diverse set of dense urban street types
- Proximity to transit infrastructure
- Built at a human-scale
- Encourages development



PREFERRED
Maintain stop pattern on main street with disconnected street context/ pattern of intersecting streets



TRANSIT NETWORK

The purpose of a transit network is to collect and distribute passengers around a larger area than would be possible by a single line. When lines cross or join, passengers are able to transfer from one to another, increasing the area in which they can travel by transit.

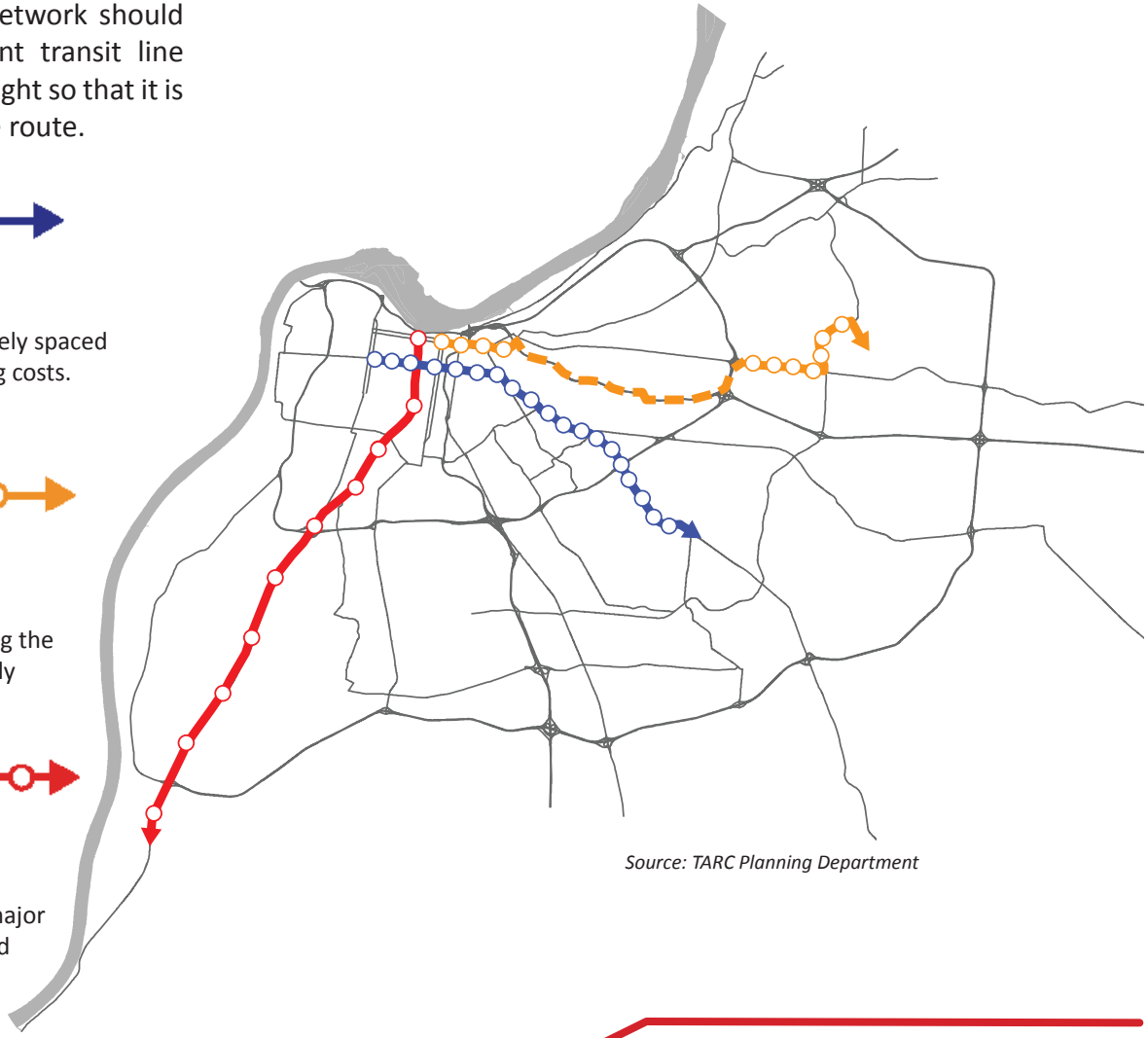
A good transit network provides a balance between mobility and access. To ensure mobility and efficient travel times, a transit network should avoid frequent stops spaced close together. An efficient transit line should connect multiple points but also be reasonably straight so that it is perceived as a direct route between any two points on the route.

Standard Fixed Route Service:
Bus stops are only 100's of feet apart and all stops are served. Closely spaced stops add to time of trip, to vehicle wear and tear, and to operating costs.

Standard Express Route Service:
Makes all stops like Standard Fixed Route until a specific point along the route where it becomes an express to the final destination. Typically operates on a highway, although not the most direct, but faster.

Limited Stop Service:
Makes all stops. Bus stops between 600 and 3000 feet apart depending on density. Limited stops have faster service. Stops at major intersections, activity centers, and transfer points. TARC's Bus Rapid Transit (BRT) is Limited Stop Service.

Accessible transit stops must be provided within a short walking distance of residential areas as well as activity generators. By spacing transit stops within ½-mile of each other, the majority of pedestrians or riders will have no more than a ¼-mile walking distance to reach a transit stop. This makes destinations more accessible by walking, and enlarges the capture area surrounding transit stations.



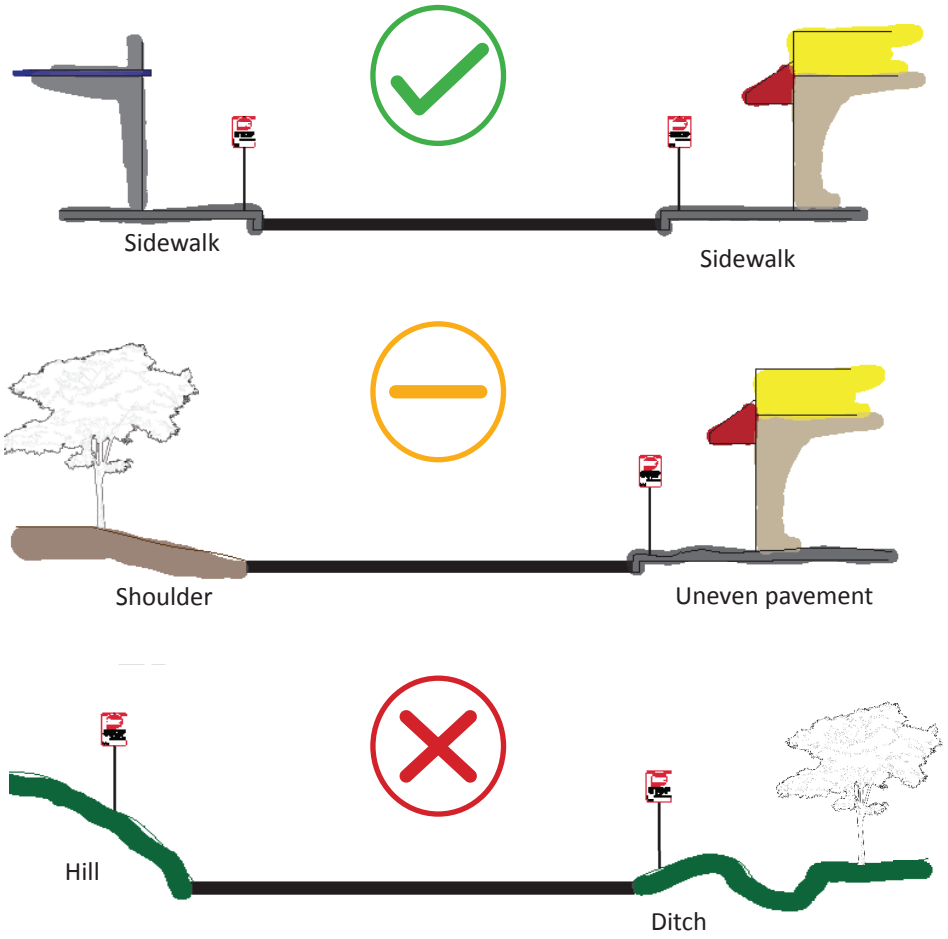
Source: TARC Planning Department

ROADWAY INFRASTRUCTURE

ROADWAY REQUIREMENTS

Roadway infrastructure includes those features within the travel way that deal with roadway requirements, fleet characteristics, bus stop zone types and placement.

Roadways and intersections with bus traffic should be designed to accommodate the size, weight, and turning radius of TARC buses. Key roadway design features, such as lane width, lateral and vertical clearances, pavement, road grade, and minimum turning radii are typically based on the standard 40-ft bus.



Source: TARC Planning Department

PREFERRED
For all new or redeveloped sites

ACCEPTABLE
TARC should only locate new stops on existing streets with plan to make improvements. No new (re)development should be permitted without improvement to stop and pathways.

UNDESIRABLE
New stops should not be placed where a hill or swale lies within the public right-of-way.

Street Pavement

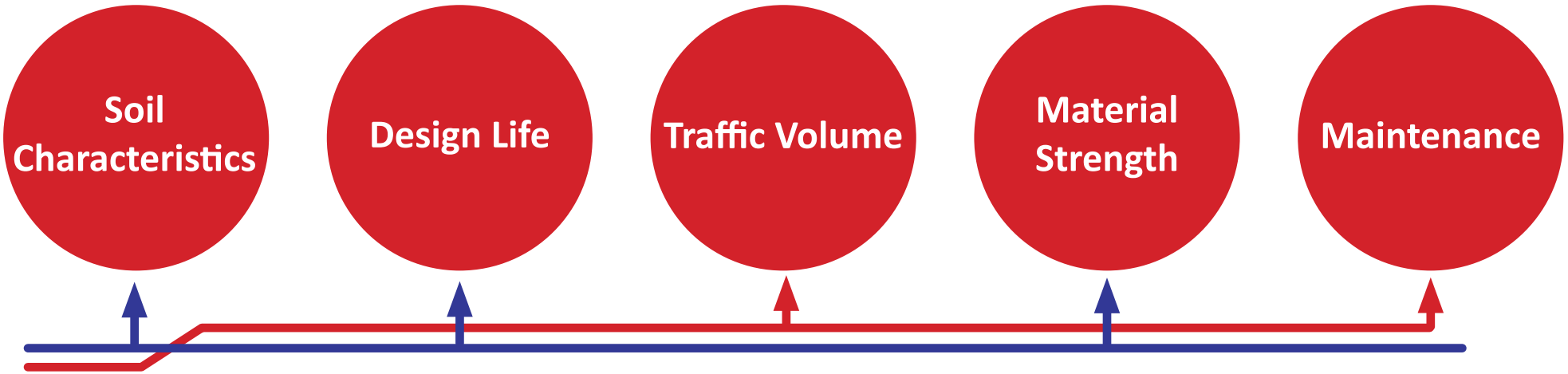
Roadway pavements and turnouts, or bus bays, must have sufficient strength to accommodate repetitive bus axel loads of 40,000-lbs (2 tons) to coordinate with the maximum gross loaded vehicle weight. Although pavement designs will depend on specific on-site soil conditions and topography, areas where buses start, stop, and turn are important considerations. Reinforced concrete is recommended to reduce pavement failure problems that are experienced with asphalt. Developers are encouraged to provide concrete bus pads for the full length of the bus stop zone. Bus pads are a minimum of 11-ft wide (12-ft preferred). No parking signs are required to properly designate a bus stop zone. Pavement design for all street classifications shall conform to the current pavement design standards established by the Director of Public Works.

Road Grade and Alignment

Selection of roadway grade should be based on bus performance characteristics for grade ascents and descents under a transit vehicle's fully loaded conditions. Road grades should avoid crests and sags that can cause harm to the transit vehicle. Crests in road grade can cause a bus to "bottom out," while sags, or road surface depressions, can leave a bus suspended, or "hung-up," on its front and rear overhangs. Crests and sags commonly occur at intersections or where a driveway crosses a sidewalk or joins a street. Typically, the maximum grade for a 40-ft bus is between 6-8%. The recommended grade change between a street and driveway is less than 6%.

Bus stops located at curves make it difficult for operators to stop parallel to the curb and also reduces sight distance. Also, avoid placing bus stops on steep grade if slippery winter conditions prevail. Preferred bus stop location is on sections of roadway that are relatively straight and flat.

Pavement Design Considerations



Lane Width and Corner Radius

A traffic lane used by buses should be wide enough for a maximum bus width of 10’-6” including mirrors, and be designed to allow adequate maneuvering space and avoid sideswipe accidents. When a bicycle lane and bus stop are both present, an operator must be able to see cyclists in both directions while approaching the stop. To accommodate transit vehicles, both public and private roadways should maintain a 12-ft minimum lane width to allow for proper bus maneuverability.

The radius of street intersections should be designed to allow buses to turn at appropriate operating speeds without “jumping” the curb line or encroaching into adjacent traffic lanes. A typical 40-ft bus requires a minimum of 55-ft outside corner radius and a minimum 30-ft inside corner radius. See Table 1 for fleet characteristics and specifications for varying vehicle turning radii.

Corner radius design criteria:

- Angle of intersection
- Transit vehicle turning radii and operating speeds
- Number and width of roadway lanes
- Allowable bus encroachment into other traffic lanes
- On-street parking
- Pedestrians

Additional corner radii will be required under the following conditions:

- Buses turning at speeds greater than 10 mph
- Turns in areas with sight distance limitations
- Turns involving changes in pavement grade
- Turns in areas which restrict the movement of bus overhang
- Buses equipped with bike racks

- 40-ft bus minimum turning path
- 12-ft desired lane width and clearance
- 55-ft desired exterior turning radius

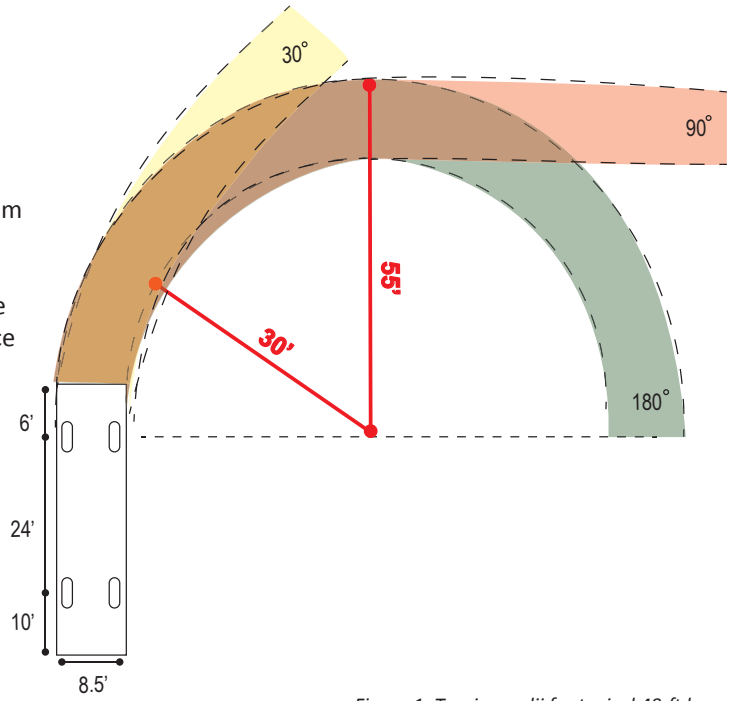


Figure 1: Turning radii for typical 40-ft bus
Source: TARC Planning Department

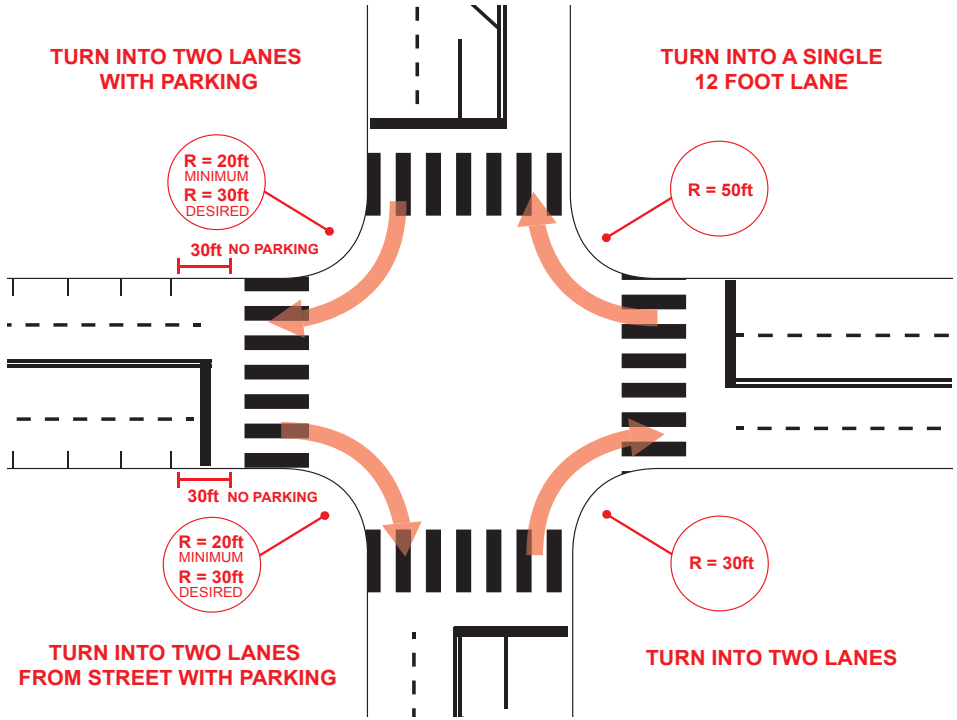


Figure 2: Minimum corner radii by lane type
Source: TARC Planning Department

Curb Height and Clearance

Where possible, locate bus stops where an optimal 6-in curb height exists, although 6 to 9-in curb heights are suitable. Low or absent curbs make boarding and alighting difficult for riders, while higher curb heights may interfere with wheelchair lifts.

When a bus travels along the curb-side lane, roadside obstructions should not interfere with regular transit operation and boarding and alighting of riders. When buses pull out of the bus stop zone to reenter traffic, the rear of the bus may pivot and extend over the curb line. If above grade obstacles are located too close to the street, buses could sideswipe these fixtures, damaging both the fixed object and/or the bus.

Curb-side obstruction placement criteria:

- A minimum of 12-ft above the street surface
- A minimum of 2-ft from the curb edge (or street) to facilitate lateral clearance (rear overhand swing should be checked, possibly requiring a lateral clearance greater than 2-ft)

Recovery and Layover Locations

A layover or recovery location provides a safe, non-intrusive area where a bus can sit before beginning the next scheduled trip or route. During selection of a recovery area, the impact on the surrounding neighborhood must be considered, especially visibility, traffic, and environmental considerations. Off-street locations at the end of the line are desirable recovery locations, and are often suitable as Park-and-TARC facilities if located within a parking lot.

Typical recovery location characteristics:

- At the end of a line or route
- Out of the flow of traffic or turn lane
- Near a bus turn-around
- Near well-lit public areas, such as restaurants and gas stations
- Unobstructed driveways, curb cuts, or business egress

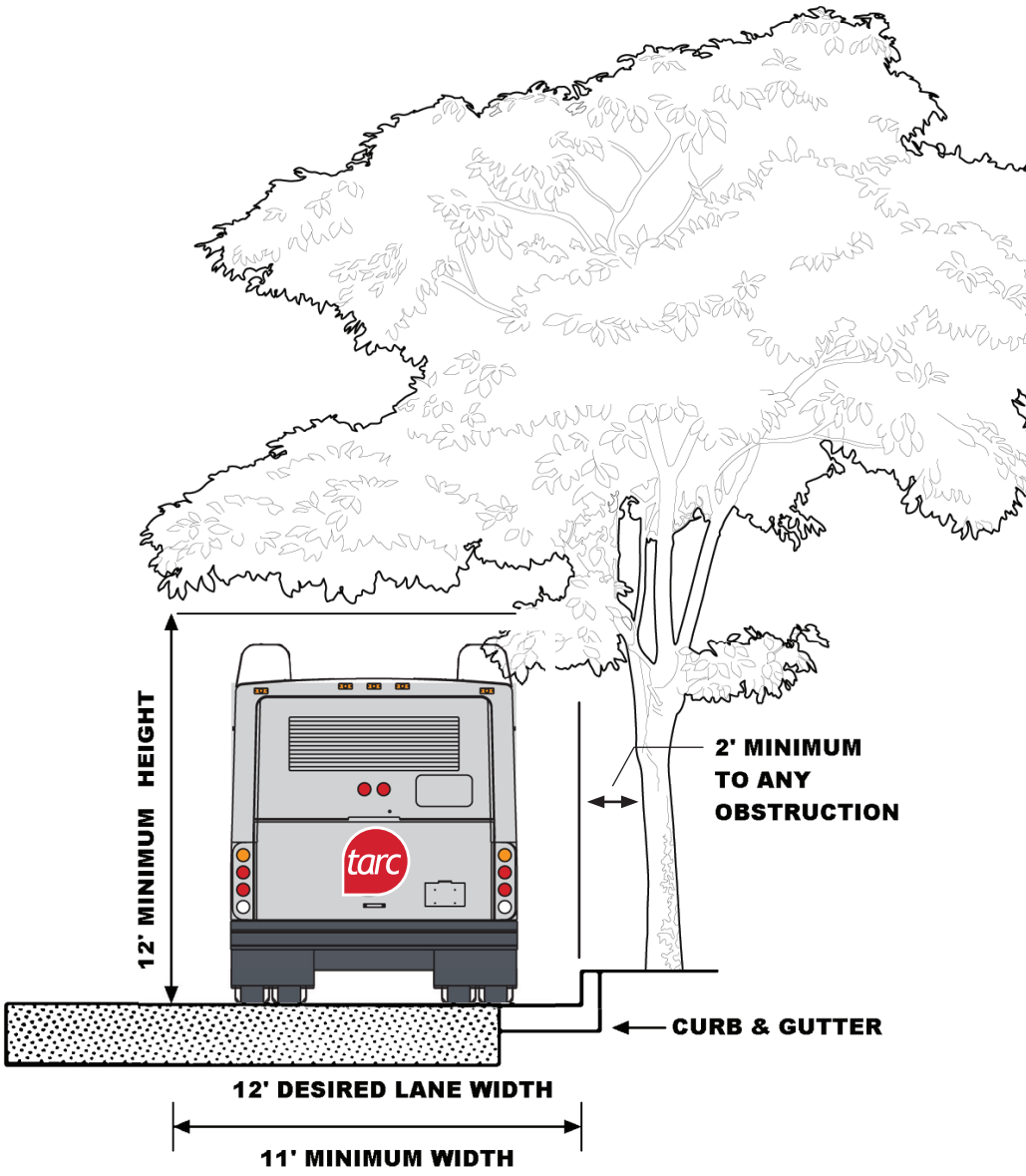


Figure 3: Minimum lane width and clearance for typical 40-ft bus
Source: Modified from Palm Tran Transit Design Manual

FLEET CHARACTERISTICS

TARC operates hundreds of vehicles each day. A variety of vehicle types make up the fleet including diesel, hybrid and full-electric technology. Currently, the standard 40-ft bus has the largest capacity and is the most common. In addition, TARC operates a number of 29-ft buses, electric buses, and TARC3 paratransit vehicles. Typically, transit vehicles are designed to accommodate 1.5 times their seating capacity. For example, a 40-seat bus has a standing capacity for an additional 20 riders for a maximum load of 60 passengers.

Table 1 outlines the current primary specifications for vehicles within the TARC fleet. To accommodate transit vehicles, these specifications should be considered when (re)designing street-side infrastructure.

The measurements within the table do not include:

- Bicycle racks in the upright or extended position
- Radio antenna attached to the roof of the bus
- Outside mirrors set to individual operator preferences

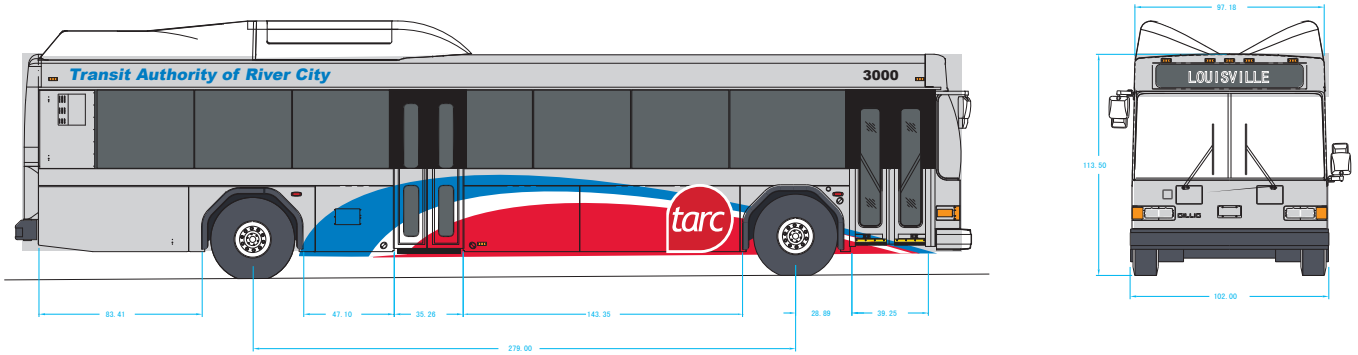


Figure 4: Typical 40-ft TARC bus dimensions

Fleet Characteristics	29-ft Low Floor Gillig	40-ft Low Floor Gillig**	40-ft Hybrid Gillig	MV-1	TARC 3	35-ft EcoRide Proterra
Current Number in Fleet *	21	135	32	31	60	10
Seating Capacity	28	40	40	3 + 1 WCs	7 + 3 WCs	35
Overall Length	29’-0”	40’-0”	40’-0”	17’-1”	20’-0”	35’-8”
Overall Height	115”	116”	132”	75”	114”	138”
Overall Width	102”	102”	102”	79.4”	102”	102”
Front Door Opening Width	35”	35”	35”	36”	32”	34”
Turning Radius	29’-0”	43’-0”	43’-0”			38’-0”
Gross Loaded Vehicle Weight	31,000 lbs	39,600 lbs	39,600 lbs	6,600 lbs	14,050 lbs	36,500 lbs

**As of April 2021*

*** Includes 21 Commuter style coaches*

Table 1 - TARC Vehicle Fleet Characteristics

LOCATING A TRANSIT STOP

When determining where to locate a transit stop, TARC must consider the overall travel time and transit demand of the area. Providing bus stops at every block (1/8 to 1/4 mile or every 600 to 1250-ft) will create shorter walking distances, but will add more frequent stops and longer travel times. On the other hand, spacing transit stops farther apart will allow for higher speeds, infrequent stops, and shorter trips, while increasing walking distances. To balance spacing and making trips as efficient as possible, transit planners must take into consideration land uses, development types and densities (i.e. residential, commercial areas, downtown, etc.). Table 2 shows typical spacing of bus stops based on environmental context. Table 3 shows spacing for differing densities or land uses. Major trip generators such as shopping centers, medical campuses, or large business parks can also determine where bus stops are located.

The future demand for transit amenities should also be considered by locating stops where benches, shelters, and trash receptacles can be accommodated. Safety and operation factors are also critical, and obstacles that impede bus, car, or pedestrian travel should be avoided.

Safety concerns to consider:

- Passenger protection from passing traffic
- Access for people with disabilities
- Proximity to passenger crosswalks and curb ramps
- Proximity of stop in the opposite direction
- Proximity to major trip generators
- Convenience of passenger transfers to nearby routes

Operating concerns to consider:

- Adequate curb space
- Impact of stop on adjacent properties
- On-street parking and truck delivery zones
- Volume and turning movements of other traffic
- One-way direction restrictions and widths of intersecting streets
- Bus routing patterns
- Width of sidewalk
- Pedestrian activity

Context	Spacing Range	Typical Spacing
Central Business District	300 to 1000-ft	600-ft
Urban Areas	500 to 1200-ft	750-ft
Suburban Areas	600 to 2500-ft	1000-ft
Rural Areas	650 to 2640-ft	1250-ft

Source: TCRP Report 19

Table 2 - Bus Stop Spacing (Context)

Bus Stop Placement in Relation to the Street

Placement of a bus stop along a transit route involves choosing where to properly locate the stop in relation to the roadway. There are three typical locations where a bus stop is placed along a street: far-side, near-side, and mid-block.

At a far-side bus stop, a transit vehicle stops immediately after passing through an intersection. The transit vehicle stops immediately prior to an intersection at a near-side bus stop. A mid-block stop is typically found at long blocks and adjacent to high activity generators. See Figure 6 for far-side, near-side, and mid-block bus stop depictions and placement recommendations.

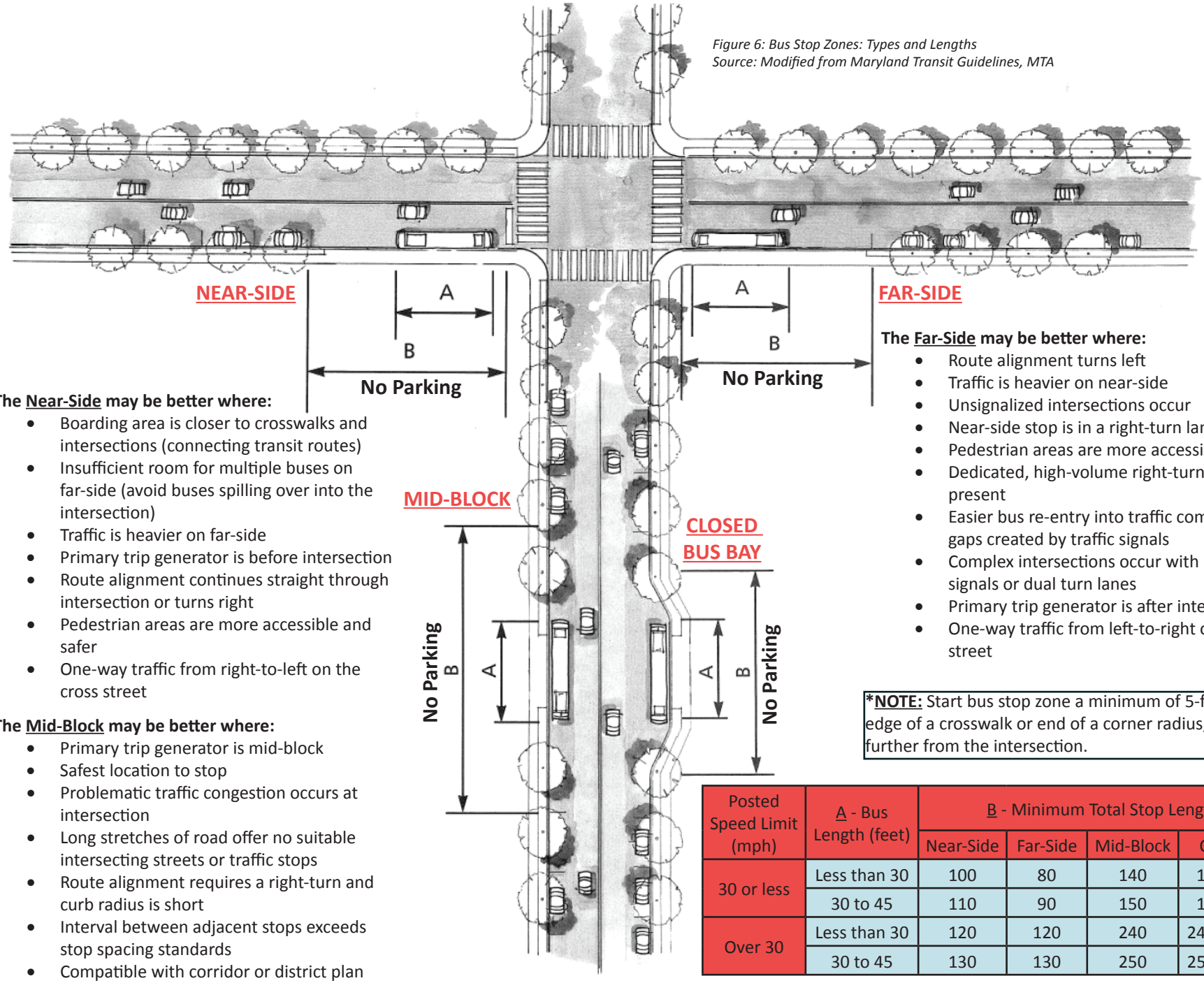
The following factors should be considered when selecting where to appropriately locate a bus stop:

- Adjacent land uses
- Bus route direction
- Impact on intersection operations
- Connecting transit routes
- Intersection geometry
- Parking restrictions and requirements
- Passenger origins and destinations
- Pedestrian access, including ADA accessibility
- Physical roadside constraints (trees, poles, driveways)
- Potential patronage
- Presence of bus bypass lane
- Traffic control devices

STOP TYPE	ADVANTAGES	DISADVANTAGES
NEAR SIDE	• Minimizes interference when traffic is heavy on the far side of the intersection • Allows riders to access buses closest to the crosswalk • Allows operator to use the width of the intersection as an acceleration lane • Eliminates potential double stopping through intersection • Allows riders to board and alight at a traffic signal • Allows operators the opportunity to observe oncoming traffic and make transfer connections	• Increases conflicts with right-turning vehicles • May obscure motorist's view of traffic control devices and crossing pedestrians • May obscure line of sight for crossing pedestrian • May block travel lane with queuing buses • May require more than one traffic signal cycle to cross an intersection
FAR SIDE	• Minimizes conflicts between right-turning vehicles and buses • Provides additional right-turn capacity by making curb lane available for traffic • Minimizes sight distance problems on approaches to intersection • Encourages pedestrians to cross behind the bus • Allows operators to use the width of the intersection as a deceleration lane • Allows operators to use gaps in traffic created by the traffic signal	• May block intersection during peak period traffic • May obscure line of sight for crossing pedestrians and vehicles • May require double stopping (before and after intersection) to serve bus stop • May increase risk of rear-end collisions • May restrict or choke travel lanes on far side of intersection
MID BLOCK	• Minimizes sight distance problems for pedestrians and motorists • May result in passenger waiting areas experiencing less pedestrian congestion	• Requires additional distance for no-parking restrictions • Encourages street crossing at mid-block (or jaywalking) • Increases walking distance to intersections

Table 4 - Bus Stop Placement *Source: TCRP Report 19*

Figure 6: Bus Stop Zones: Types and Lengths
Source: Modified from Maryland Transit Guidelines, MTA



The Near-Side may be better where:

- Boarding area is closer to crosswalks and intersections (connecting transit routes)
- Insufficient room for multiple buses on far-side (avoid buses spilling over into the intersection)
- Traffic is heavier on far-side
- Primary trip generator is before intersection
- Route alignment continues straight through intersection or turns right
- Pedestrian areas are more accessible and safer
- One-way traffic from right-to-left on the cross street

The Mid-Block may be better where:

- Primary trip generator is mid-block
- Safest location to stop
- Problematic traffic congestion occurs at intersection
- Long stretches of road offer no suitable intersecting streets or traffic stops
- Route alignment requires a right-turn and curb radius is short
- Interval between adjacent stops exceeds stop spacing standards
- Compatible with corridor or district plan

The Far-Side may be better where:

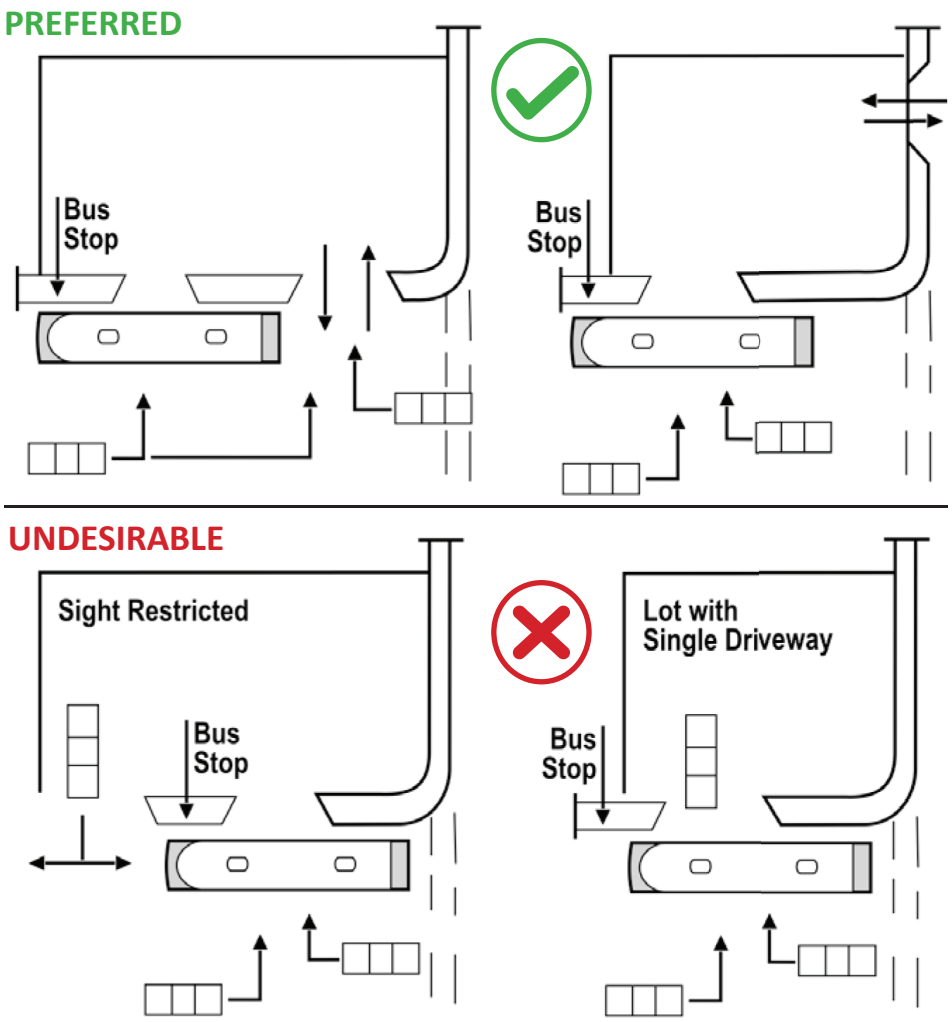
- Route alignment turns left
- Traffic is heavier on near-side
- Unsignalized intersections occur
- Near-side stop is in a right-turn lane
- Pedestrian areas are more accessible and safer
- Dedicated, high-volume right-turn lanes are present
- Easier bus re-entry into traffic compensates for gaps created by traffic signals
- Complex intersections occur with multi-phased signals or dual turn lanes
- Primary trip generator is after intersection
- One-way traffic from left-to-right on the cross street

***NOTE:** Start bus stop zone a minimum of 5-ft from the edge of a crosswalk or end of a corner radius, whichever is further from the intersection.

Posted Speed Limit (mph)	A - Bus Length (feet)	B - Minimum Total Stop Length (feet)			
		Near-Side	Far-Side	Mid-Block	Closed Bus Bay
30 or less	Less than 30	100	80	140	140 (50+40+40)
	30 to 45	110	90	150	150 (50+50+50)
Over 30	Less than 30	120	120	240	240 (100+40+100)
	30 to 45	130	130	250	250 (100+50+100)

Driveways and Curb Cuts

Bus stops should not be located close to driveways and curb cuts where a bus can block other vehicular ingress or egress. Ideally, a transit stop should be located a minimum of 200-ft away from existing driveways and curb cuts.



If blocking an entrance or driveway is unavoidable:

- Attempt to keep at least one entrance /exit open to other vehicular access
- Locate transit stop downstream of a driveway
- Allow for other vehicular visibility to minimize conflicts (far-side placement preferred)
- Allow boarding and alighting from a curb instead of a driveway
- Avoid riders waiting for the bus in the middle of the driveway

BUS STOP ZONES

A bus stop zone includes the area within the travel way that is associated with operations of the bus including acceleration, stopping area, deceleration, and lane treatments. Within the public right-of-way, the bus stop zone is the designated area of roadway along a bus route that is marked for bus use, allowing riders to board and alight. Dimensions required for the bus stop zone depend on travel lane design speed and the number of buses serving each stop at a given time.

There are two types of bus stop zones: off-street and on-street, each having their own variations, design considerations, and facility requirements as it relates to the travel way. Off-street facilities contain ingress and egress separate from the travel lane in designated areas located at transit centers or park-n-ride lots. On-street bus stop zones can have a variety of configurations either on-line or off-line and are arranged in a variety of configurations along a travel way. Configurations include curb-side, bus bay, open bus bay, queue jumper bus bay, or curb extension.

Figure 5: Locating a bus stop near driveways
Source:TCRP Report 19

On-Street Bus Stop Zone Design

On-street bus stops can be located within the travel way, parking lane, or shoulder and can be categorized as either on-line or off-line. On-street bus stops are the most frequently used because they provide operating efficiency, are easily accessible for bus drivers, and have minimal delays in service. Bus stop zone lengths can vary based on the on-street arrangement and their placement along the route. For far or near-side bus stop placement, curb-side bus stop zones should start a minimum of 5-ft from the edge of a pedestrian crosswalk or end of the corner radius, whichever is further from the intersection. Depending on the design configuration, on-street bus stop zones can include unobstructed space for deceleration, stopping area, and acceleration. See Table 5 for advantages and disadvantages of the various on-street bus stop configurations.

Within a bus stop zone, a minimum distance of 50-ft of stopping area should be provided for a typical 40-ft bus. The bus stop sign indicates, for the driver and customer, the location where the transit vehicle will make a stop. This bus stop sign provides a "control point" around which amenities are installed, access for the disabled is maintained, and where connections to adjacent land uses converge. Generally, the bus stop environment should be consistent and predictable from stop to stop.

At a far-side bus stop, the bus route identification sign should be located a minimum of 50-ft from a pedestrian crossing to allow for stopping area.

At a near-side facility with a signalized intersection, the designated stopping area should start a minimum of 15-ft (25-ft preferably) from a pedestrian crossing, indicated by the placement of the bus stop sign. If an intersection is unsignalized, the stopping area and placement of a bus stop sign should be a minimum of 5-ft from a pedestrian crossing.

ON-LINE BUS STOPS

An on-line bus stop allows a transit vehicle to remain along the travel way within the curb-side lane while riders board and alight. On-line bus stop types include curb-side and curb extension stops.

Curb-Side Bus Stop

On-line, curb-side stops are the most common on-street bus stops and are the most easily recognized. An on-line bus stop has no impacts on the existing streetscape, but prohibits parking within the allotted bus stop zone.

Curbside bus stop on University of Louisville's campus.

Added length to minimum standards will result in greater ease and maneuverability for the bus driver to position the bus. In addition, on-line, curb-side stops are easily established, relocated, and eliminated when needed. See Figure 6 for typical dimensions for on-street, curb-side bus stop zones.

Curb Extension

A curb extension, also known as a bus bulb, bulb-out, or nub, is an extension of the sidewalk into an existing parking lane, creating additional space for pedestrian activity. Installing curb extensions along transit routes can help to make a route more efficient by reducing the amount of time a bus is stopped at a bus stop. Delays caused by buses re-entering the flow of traffic can be eliminated by allowing the bus to remain within the travel lane when stopped for passengers to broad and alight.

A curb extension can be installed at near or far-side bus stops, and even at mid-block, but should only be located along streets with a curb-side parking lane. Additionally, curb extensions shorten the distance pedestrians must cover when crossing the street and aid in traffic calming. Ultimately, bus bulbs are designed to maximize pedestrian space while enhancing pedestrian safety and transit operations.

Additional benefits from installing a curb extension include:

- Increased pedestrian visibility and safety at intersections through improved sight lines
- Decreased pedestrian exposure to vehicles by shortening the street crossing distance
- Reduced vehicle turn speeds by physically and visually narrowing the roadway
- Increased pedestrian waiting space
- Additional space for street furniture, planting and other amenities, including those used for transit
- Reduced illegal parking at corner crosswalks and bus stops
- Can provide two curb ramps per corner

Curb extension should be considered on all streets with on-street transit routes and a parking lane, **EXCEPT**:

- Where there is a peak period tow-away parking lane
- Where there is a desire to have a queue jump lane for buses
- At near-side stops with heavy right turn movements

Although more expensive to construct, the installation of a curb extension can overcome limitations to on-street parking and sidewalk space needed for transit amenities by providing additional space for boarding or waiting areas, shelters, benches, and trash receptacles. A curb extension reduces the length of the bus stop zone and eliminates the need for deceleration and acceleration space, allowing for more on-street parking and prevents parking within the bus stop zone. Curb extensions should be avoided on high-volume or high-speed roadways greater than 45-mph where vehicle stacking can become problematic.

Priority areas for curb extension installation:

- New streets
- Streets with high pedestrian activity and/ or high traffic volumes
- Streets with a history of pedestrian safety concerns
- Limited sidewalk space where shelters and/ or benches are desirable
- On-line bus stop zones with restricted on-street parking
- Wide streets with lengthy pedestrian crossing distances and times
- Locations where neighborhood streets intersect with busier throughways
- Transit priority streets where shortening crossing cycles would improve transit flow
- Where the existing sidewalk is too narrow to accommodate transit amenities or pedestrian through traffic is constrained
- Where transit performance is slowed due to lengthy wait times or delays caused by re-entering traffic flow

Traditionally, bus bulbs have been placed on streets with two or more lanes per direction of travel so that vehicles may pass a stopped bus on the left. A curb extension should extend to the full width of the parking lane (typically 8-ft), leaving a minimum of 12-ft in the nearest auto lane for transit vehicles. Where bike lanes are present, a curb extension should be set back so that the curb gutter doesn't extend into the bike lane (5-ft minimum width). Also, a curb extension should be long enough to accommodate all doors of the transit vehicle that will load and unload passengers plus an additional 5-ft of maneuvering space. At far-side bus bulbs, 10-ft should be added to the back of the bus stop zone to prevent following cars from blocking the intersection.

See Figure SD-8B for typical curb extension layout and dimensions.

A curb extension should follow the corner radius and return to the prevailing curb-line as sharply as possible to maximize usable space and minimize parking loss.

Transit stop at a curb extension with the addition of bus shelter
Location: 4th Street and Montana Avenue, Louisville, KY
Source: TARC Planning Department

STANDARD

Standard curb extensions should be designed with a 20-ft inner radius and 10-ft outer radius and allow for on-street parallel parking.

NON-STANDARD

A sharper curb return can increase pedestrian space and minimize parking loss.

- 90° return - may be used with parallel or perpendicular parking
- 45° return - may be used with parallel or angled parking

Figure 7: Curb extension design variations
Source: TARC Planning Dept

Transit stop at a curb extension with the addition of bus shelter
Location: 4th Street and Industry Road, Louisville, KY
Source: TARC Planning Department

OFF-LINE BUS STOPS

Off-line bus stops, commonly known as bus bays, are separated from the normal travel way and are designed to allow through traffic to flow freely without the obstruction of stopped buses. Also known as turnouts or pullouts, bus bays are typically provided in high-volume or high-speed roadways. Heavily congested arterial roads or shopping centers where there are large numbers of people who board and alight may benefit from the installation of an off-line bus stop.

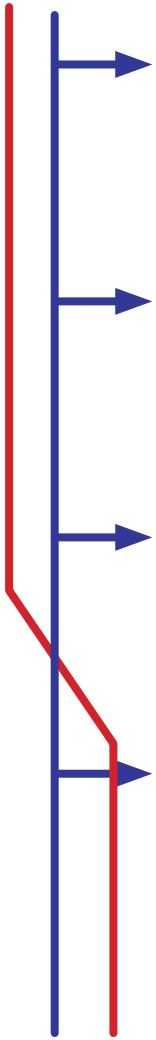
A bus bay's preferable width is 12-ft, but 10-ft is acceptable. The total length of a bus bay should allow room for an entrance taper, a deceleration lane, a stopping area, an acceleration lane, and an exit taper. The common practice is to include only the tapers and stopping area within the bus bay, allowing deceleration and acceleration within the travel lane. See Table 5 for typical bus bay dimensions.

Criteria to consider for installing a bus bay:

- Traffic in the curb lane exceeds 250 vehicles during the peak hour
- Traffic speed is greater than 40 mph
- Bus volumes are 10 or more per peak hour on the roadway
- Passenger volumes exceed 20 to 40 boardings per hour
- Average peak-period dwell time exceeds 30 seconds per bus
- Buses are expected to layover at the end of a trip
- Potential for auto/ bus conflicts warrants separation of transit and passenger vehicles
- History of repeated traffic and/ or pedestrian accidents
- Right-of-way width is adequate to construct the bay without adversely affecting sidewalk pedestrians
- A right turn lane is used by buses as a queue jumper lane
- Bus parking in the curb lane is prohibited
- Imporvements, such as widening, are planned for a major roadway

An off-line bus bay with a transit stop and amenities.
Location: 2nd Street & Eastern Parkway, UofL Campus

BUS BAY DESIGNS



Closed Bus Bay

A closed bus bay is specially constructed and separated from the normal section of the travel way. A closed bus bay is typically installed at mid-block, but can also be located at near-side and far-side stops, and includes an entrance and exit taper, as well as space for deceleration, stopping, and acceleration.

Open Bus Bay

An open bus bay is always located on the far-side and is designed so that the bay is open to the upstream intersection. The intersection width is used as a deceleration area for the bus as it moves from the travel lane into the bus bay resulting in a short overall length of the bus bay.

Combination Bus Bay/ Right Turn Lane

As a variation of the open bus bay, a combination bus bay/ right turn lane can accommodate both transit and right-turning vehicles. Located on the near-side, the design allows a bus bay and right turn lane to share space. For optimal design, a bus bay should be located as far upstream as feasibly possible from the right turn lane.

Queue Jumper Bus Bay

A queue jumper bus bay gives priority treatment for buses at intersections by allowing them to bypass traffic congestion. The queue jumper bus bay design includes a near-side right-turn only lane followed by a far-side open bus bay. Buses are allowed to proceed through the turn lane to enter the open bus bay.

See Table 5 for advantages and disadvantages of the various bus bay designs.

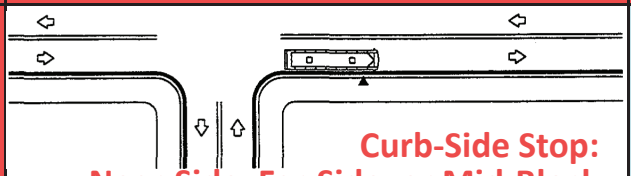
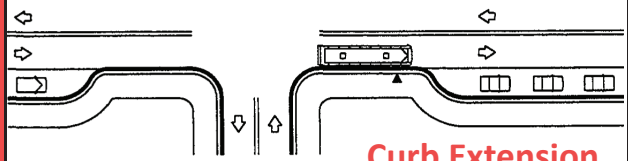
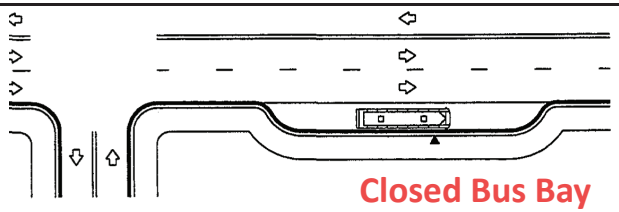
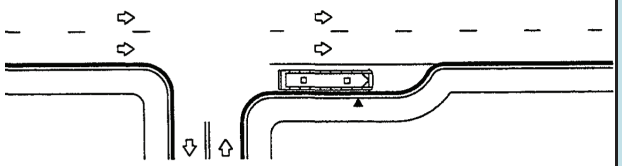
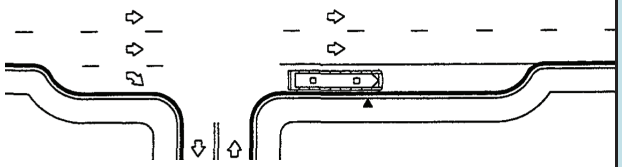
	TYPE OF ON-STREET STOP	ADVANTAGES	DISADVANTAGES	RECOMMENDED USE
ON-LINE	 **Curb-Side Stop: Near-Side, Far-Side, or Mid-Block**	• Provides easy access for operators and results in minimal delays • Simple design, easy and inexpensive to install and relocate	• May result in traffic congestion due to queuing behind stopped buses • May cause motorists to make unsafe maneuvers when changing lanes to avoid stopped buses	• Are acceptable in most instances
	 **Curb Extension or Bulb Out**	• Removes fewer parking spaces • Decreases walking distance (and time) for pedestrians crossing the street • Provides additional sidewalk area for riders to wait •Results in minimal delays	• Costs more to install compared to curb-side stops • May result in traffic congestion due to queuing behind stopped buses • May cause motorists to make unsafe maneuvers when changing lanes to avoid stopped buses	• Along streets with lower traffic speeds and/ or low traffic volumes • Collector streets in designated pedestrian districts • Wide streets • Streets with at least 2 lanes per travel direction
OFF-LINE	 **Closed Bus Bay**	• Allows boarding and alighting out of the travel lane • Provides a protected area away from moving vehicles for riders and buses • Minimizes delays to through traffic	• May cause problems for operators attempting to re-enter traffic • Expensive to install compared to curb-side stops • Difficult and expensive to relocate	• Layover needed at end of route • No on-street parking available • Along streets with higher traffic speeds and/ or higher traffic volumes
	 **Open Bus Bay**	• Allows bus deceleration through the intersection • Allows boarding and alighting out of the travel lane • Provides a protected area away from moving vehicles for riders and buses • Minimizes delays to through traffic	• Increased pedestrian crossing distance at the intersection • May cause problems for operators attempting to re-enter traffic • Expensive to install compared to curb-side stops • Difficult and expensive to relocate	• No dedicated right-turn lane • No on-street parking available • Along streets with higher traffic speeds and/ or higher traffic volumes
	 **Queue Jumper Bus**	• Buses bypass queues at signaled intersections (priority treatment) • Allows bus deceleration through the intersection • Allows boarding and alighting out of the travel lane • Provides a protected area away from moving vehicles for riders and buses • Minimizes delays to through traffic	• May cause delays to right-turning vehicles • Increased pedestrian crossing distance at the intersection • May cause problems for operators attempting to re-enter traffic • Expensive to install compared to curb-side stops • Difficult and expensive to relocate	• High-frequency bus routes with average headway of 15-min or less • Traffic volumes exceed 250 vehicles/ hour in the curb lane during peak • Land acquisitions are feasible and affordable • No on-street parking available

Table 5: On-street Bus Stop Design Types

Source: TCRP Report 19

BUS STOP DESIGN

Bus Stop Design impacts the transit user's experience at a transit stop. This section will provide information on bus stop infrastructure and amenities, as well as accessibility to and from transit facilities.

PEDESTRIAN CIRCULATION

All transit riders start and end their trips as pedestrians, therefore, both the origin and destination must be walkable by providing for pedestrian circulation through the use of connections and pathways. A well connected network of streets and pathways improves mobility by providing multiple travel routes, providing pedestrians with a choice of how to reach a destination. Pedestrian circulation paths can include walkways, sidewalks, shared streets, shoulders, street crossings or crosswalks, over or underpasses, courtyards, ramps, and landings within the public right-of-way. Pedestrian circulation paths can also be used to connect buildings within a development or adjacent land uses to the public right-of-way.

Pathways

Pedestrians may arrive at a transit facility (usually a bus stop) by foot, in a private vehicle, by car drop-off, in a van, feeder bus, paratransit service, or by bicycle. Convenient and safe access for persons with disabilities should be provided on the pathway to the transit stop. To increase access and the viability of transit, coordinate pathway and sidewalk placement with bus stops and land uses. Avoid circuitous or curvilinear (winding) pathways to minimize walking distances and travel times; these types of paths restrict access, resulting in "short-cutting" across grass and other landscaping features. When accessible pathways leading to transit facilities are carefully designated, there is minimal disruption of normal traffic patterns and movement of people. Locating pathways between and within developments can make alternative modes of travel more attractive.

On-Site Circulation

Incorporating transit stops into a comprehensive circulation plan for site-specific and multi-use master plans will improve mobility and access of all residents, employees, and/ or customers of the development. Transit patrons are (or will be) residents of the new development. In non-residential settings, they are (or will be) employees or customers of the new development. Improvements to pathways and direct connections between the main entrance and the transit stops, among other transit infrastructure discussed in this manual, will make transit more attractive and convenient for users of the site.

Pedestrians or bus riders approach a transit stop from adjacent land uses and developments usually along sidewalks or across parking lots. To incorporate convenient pedestrian pathways into a new or existing development, the route should be short, continuous, and direct. A short pathway should be within a ¼-mile from the main entrance of a development or land use to the transit facility. The preferred distance a pedestrian is willing to walk to reach a transit facility is between 5 and 10 minutes, ideally, covering ¼-mile. To maximize safety and convenience, streets within ¼-mile of a transit stop should have continuous sidewalks on both sides of the street and highly visible crosswalk markings.

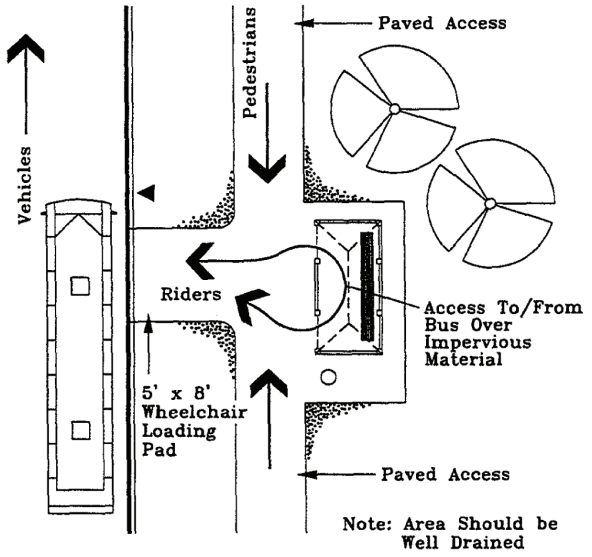
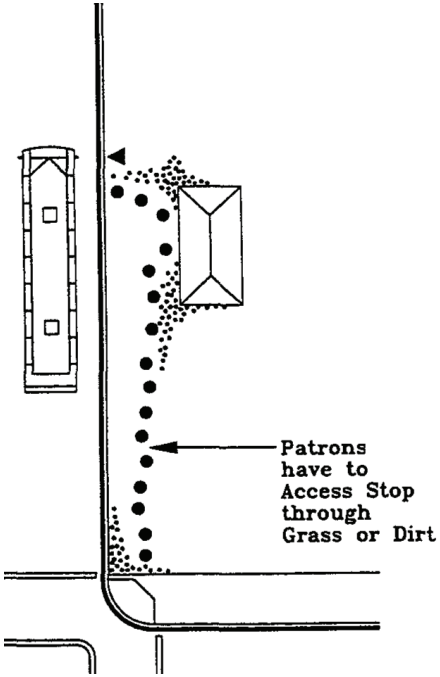
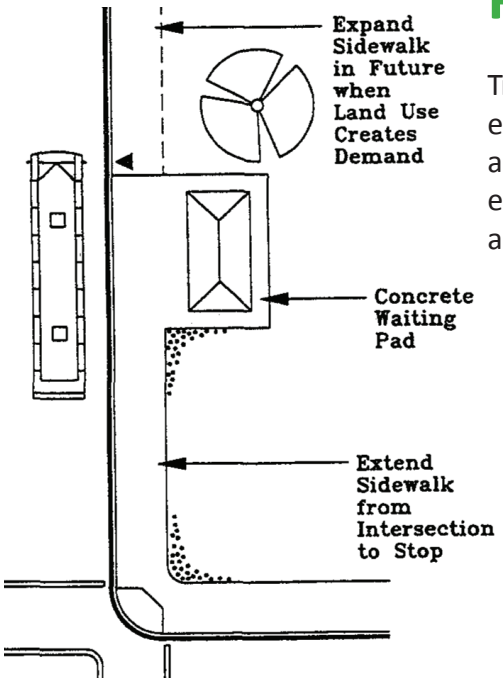


Figure 7: Bus stop circulation
Source: TCRP Report 19



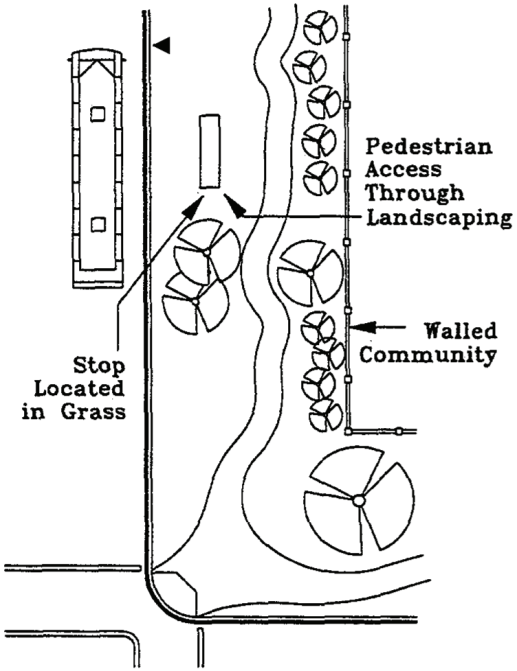
UNDESIRABLE

Transit stop is located in an undeveloped public right-of-way with no connection to the existing sidewalk.



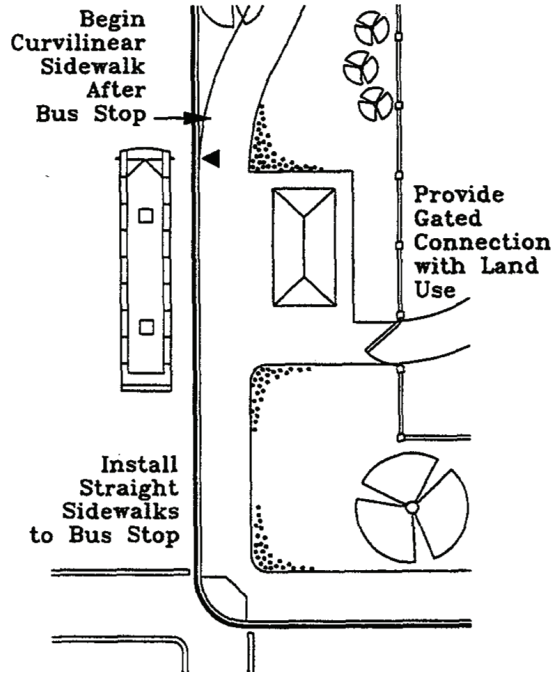
PREFERRED

Transit stop is connected to an existing sidewalk by a pedestrian access route, which can later be expanded beyond the boarding area and shelter.



UNDESIRABLE

Transit stop is inaccessible to the adjacent development by the addition of a wall and curvilinear path. The development did not include a connection to transit in its design.



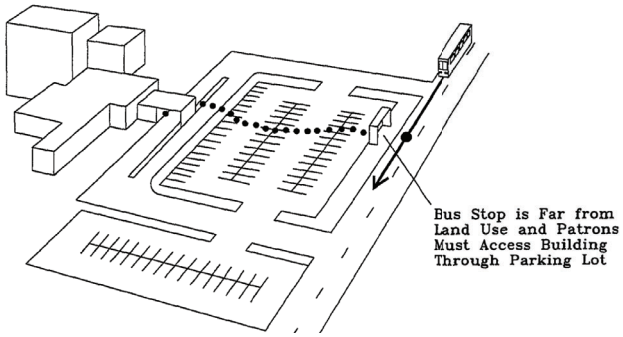
PREFERRED

Transit stop is accessible to the surrounding neighborhood by a pedestrian access route and gate. An accessible boarding area and shelter are incorporated into the design for the adjacent development.

Figure 8: Making bus stops accessible
Source: TCRP Report 19

UNDESIRABLE

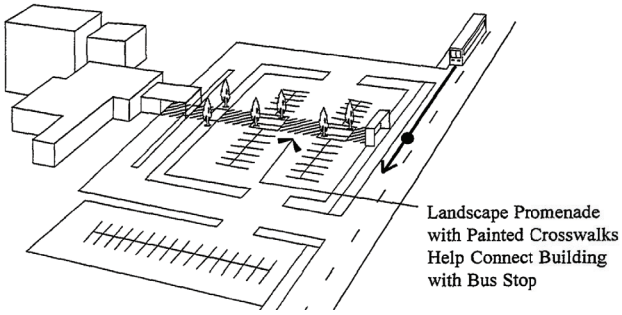
No coordinated access to transit



- Bus remains on main thoroughfare minimizing travel time along route
- Potential vehicle/ pedestrian safety conflicts
- Increased walking distance from land use entrance to transit stop

ACCEPTABLE

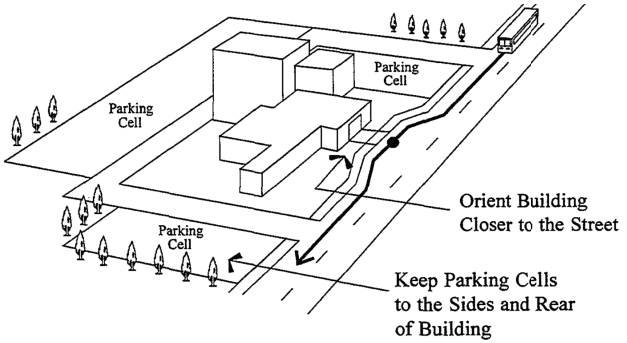
Pedestrian promenade through parking lot



- Bus remains on main thoroughfare, minimizing travel time along route
- Reduced vehicle/ pedestrian conflicts
- Increased walking distance from land use entrance to transit stop
- Provides a safe, continuous, and direct route to transit stop

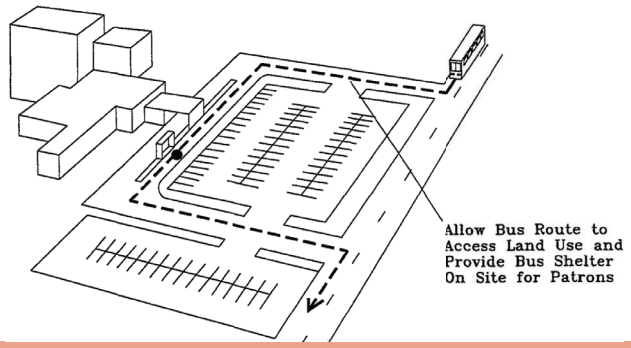
PREFERRED

Building oriented closer to street, rear parking



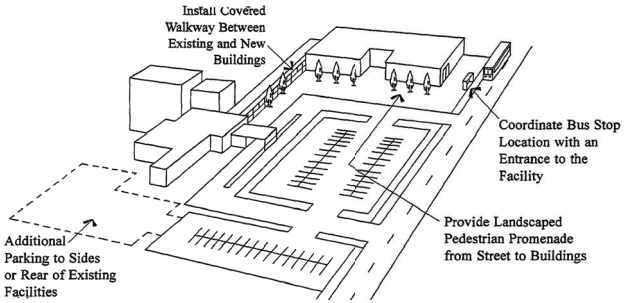
- Bus remains on main thoroughfare, minimizing travel time along route
- Reduced vehicle/ pedestrian conflicts
- Reduced walking distance from land use entrance to transit stop
- Provides a safe, direct, and secure route to transit stop
- Building architecture can provide extra protection from inclement weather

Transit deviates from route



- Bus can access land use more directly, increasing route travel time and distance
- Reduced vehicle/ pedestrian conflicts
- Reduced walking distance
- Provides a safe, direct, and secure route to transit stop
- Building architecture can provide extra protection from inclement weather

Expanding facility



- Bus remains on main thoroughfare, minimizing travel time along route
- Reduced vehicle/ pedestrian conflicts
- Reduced walking distance from land use entrance to transit stop
- Provides a safe, direct, and secure route to transit stop

Figure 9: Coordinating transit into site design
Source: TCRP Report 19

UNIVERSAL DESIGN & ADA ACCESSIBILITY

The Public Right-Of-Way Accessibility Guidelines (PROWAG) provides accessibility standards for facilities within the public right-of-way. The accessibility guidelines and standards that affect the design of new transit facilities have been included in this manual to serve as a reference for required placement and dimensions of facility elements.

Pedestrian Access Route

To ensure the independent mobility and circulation of all types of pedestrians, the ADA requires that all pedestrian circulation paths provide for the equal access of persons with disabilities, especially those with limited mobility or vision impairments.

A pedestrian access route is a continuous and unobstructed path of travel provided for pedestrians with disabilities within or coinciding with a pedestrian circulation path in the public right-of-way. A pedestrian access route used by persons with disabilities must coincide as much as possible with the route taken by all pedestrians, but also minimize the distance that those with disabilities will travel, especially to access a transit stop.

A pedestrian access route must be provided within:

- Sidewalks and other pedestrian circulation paths located in the public right-of-way (including along a street or highway and within a shoulder)
- Pedstrian street crossings (crosswalks) and at-grade rail crossings, including curb ramps, medians and pedestrian redfuge islands
- Overpasses, underpasses, bridges, and similar structures that contain pedestrian circulation paths

A pedestrian access route connects facilities, elements, and spaces in the public right-of-way, including pedestrian signals and pushbuttons, street fruniture, transit stops and shelters, on-street parking and passenger

On-site circulation through the parking lot allows pedestrians a direct route to the transit stop.
Location: Mid City Mall, Louisville, KY

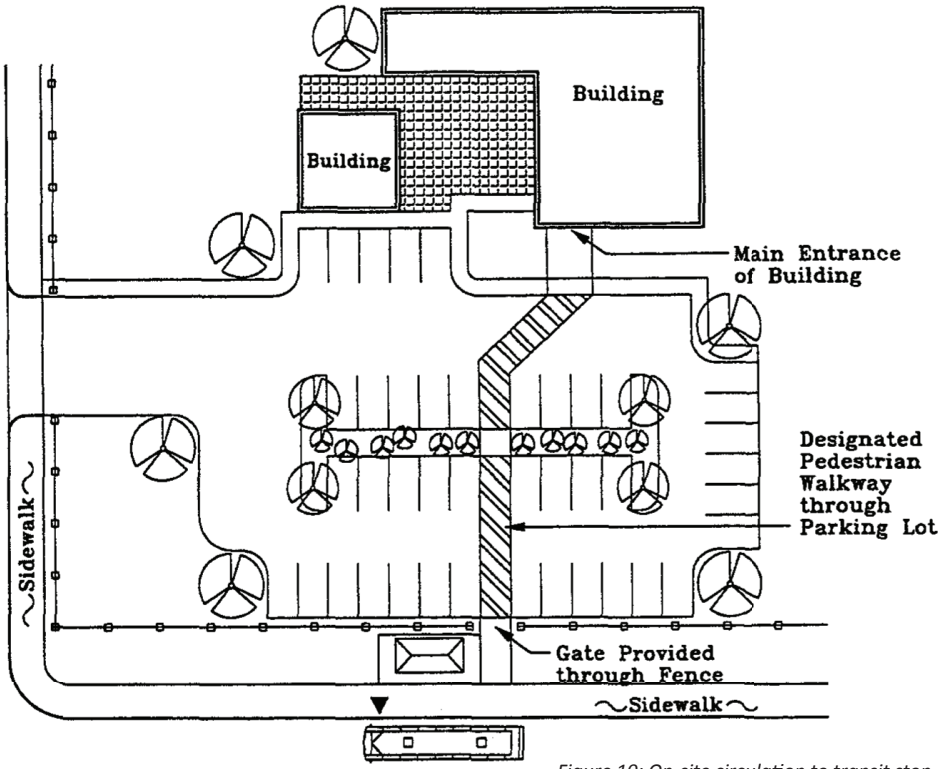


Figure 10: On-site circulation to transit stop
Source: TCRP Report 19

loading zones. Pedestrian access routes in the public right-of-way are also required to connect to accessible routes at building and facility site arrival points.

Components

The components of a pedestrian access route are similar to those of a pedestrian circulation pathway, but are required to follow specific technical guidelines found within the PROWAG.

Components include:

- Sidewalks
- Pedstrian street crossings (crosswalks) and at-grade rail crossings
- Overpasses, underpasses and similar structures
- Ramps, curb ramps and blended transitions
- Elevators and platform lifts
- Doors, doorway, and gates

Stairways and escalators are not included within a pedestrian access route.

Continuous Width

A pedestrian access route shall have a continuous, unobstructed clear width of 4-ft (preferably 5-ft), exclusive of the width of the curb. A 4-ft path is wide enough for a person in a wheelchair and a person on foot to travel side by side, and also allows a person on foot to pass a person in a wheelchair. A 5-ft path allows two-way traffic and lets wheelchairs pass each other easily. If an accessible route is less than 5-ft wide, it must include passing spaces at regular intervals, every 200-ft at 5-ft wide for a distance of 5-ft. Within medians and pedestrian refuge islands, clear width shall be 5-ft minimum.

Additional maneuvering space should be provided at turns or changes in direction, transit stops, recesses or alcoves, building entrances, and along curved or angled routes. Street furniture or transit amenities are not permited within the minimum clear width of a pedestrian access route.

Grade & Cross Slope

The grade of a pedestrian access route shall not exceed the general grade established for an adjacent street or highway right-of-way. Grade shall not exceed 5% for pedestrian access routes contained within pedestrian street crossings or those outside the public right-of-way. Grade is measured parallel to the direction of travel.

The cross slope of a pedestrian access route shall not exceed 2% maxium, but should allow for proper water drainage to avoid pooling. Where a pedestrian street crossing exists without yield or stop control, a cross slope shall not exceed 5% maximum. At midblock pedestrian street crossings, the cross slope of a pedestrian access route shall be permitted to equal the street or highway grade. Cross slope is measured perpendicular to the direction of pedestrian travel.

*NOTE: Grade and cross slope requirements for curb ramps may vary.

Surface

The surface of a pedestrian access route shall be stable, firm, and slip-resistant, applying to all components. Facilities, elements, and spaces that connect to a pedestrian access route must also follow these surface requirements including clear space at street furniture and pedestrian signals and push buttons, boarding and alighting areas at transit stops, and access isles at accessible parking spaces and passenger loading zones. Surfaces should be chosen for easy rollability.

Paving and materials to AVOID on accessible routes:

- Gravel, stone, or sand
- Jointed materials
- Brick or concrete blocks with irregularities exceeding ¼-in
- Grates

Paving materials such as bricks or concrete blocks with irregularities exceeding ¼-in should be avoided within a pedestian access route. The bumping caused by rolling on jointed materials can be uncomfortable because it increases rolling resistance and vibration.

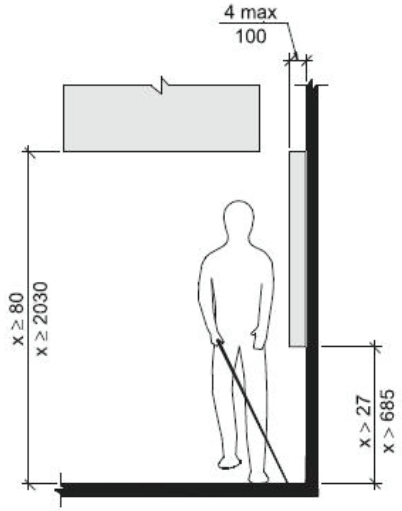
Vertical Alignment & Surface Discontinuities

Vertical alignment shall be generally planar, or flat, and smooth within a pedestrian access route and grade breaks shall be flush. Small vertical changes in level can stop a wheelchair unexpectedly or cause a person to trip. The surface of a pedestrian access route should be free of bumps, but have a texture that provides traction (slip-resistant). Surfaces should remain slip-resistant in both wet and dry conditions and should not require more than normal maintenance to retain traction.

Vertical surface discontinuities shall not exceed ½-in maximum. Discontinuities between ¼-in and ½-in shall be beveled with a slope not steeper than 50% (1:2) and be applied across the entire level change. Changes in level greater that ½-in require a ramp.

Horizontal Openings

Gratings and wide walkway joints should be avoided within pedestrian access routes because they increase bumping, rolling resistance, and vibration for persons pushing strollers or using wheelchairs and scooters. If not avoidable, walkway joints and grate openings shall not permit the passage of a sphere no more than ½-in in diameter. Elongated openings shall be placed so that the long dimension is perpendicular to the dominant flow of traffic.

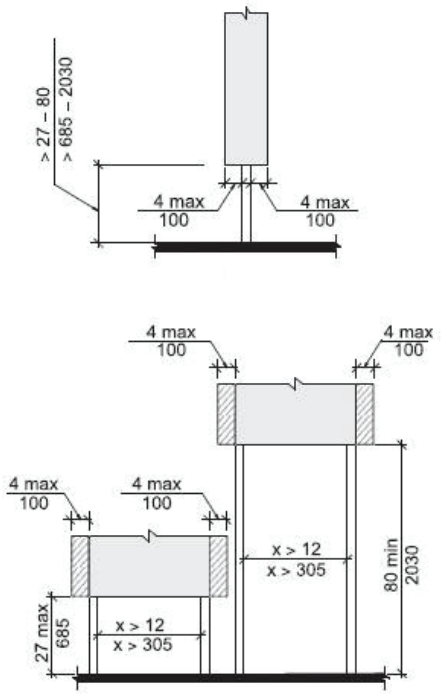


Protruding Objects

Protruding object guidelines apply across the entire width of a pedestrian circulation path and shall not reduce the clear width required for a pedestrian accress route.

Objects with leading edges with more than 27-in (2.25-ft) and not more than 80-in (6.7-ft) above the finished surface or ground shall have a maximum protrusion of 4-in horizontally into the pedestrian circulation path. This 4-in maximum protrusion applies to free-standing, post-mounted objects such as signs and is measured from the base of the post. A post base must have a minimum thickness of 2.5-in. Where objects are mounted between posts with a clear distance of more than 12-in (1-ft), objects, such as signs, shall have a maximum height of 27-in or a minimum height of 80-in.

TARC aims to mount its signage a minimum of 7-ft above the finished surface or ground wherever possible.

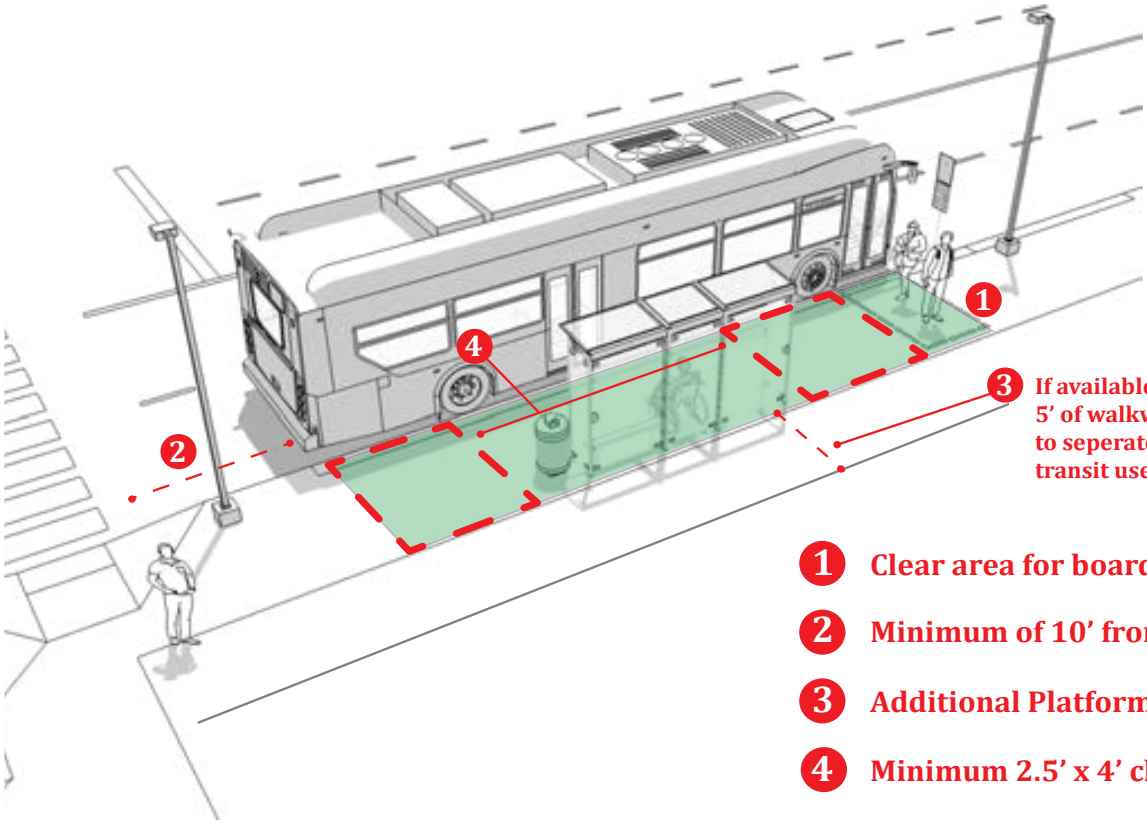


CLEAR SPACE

Clear space is required at accessible pedestrian signals and pushbuttons and in combination with curb ramps, benches, and transit shelters. One full, unobstructed side of a clear space must adjoin an adjacent pedestrian access route or another clear space. Clear space shall be a minimum of 30-in (2.5-ft) by 48-in (4-ft) in size, which can include knee and toe clearance. The running slope of a clear space can be consistent with the grade of the adjacent pedestrian access route but must maintain a 2% cross slope, and follow the ADA's PROWAG surface requirements.

The positioning of clear space shall allow for either a forward or parallel wheelchair approach. Maneuvering or turning space may be required if a clear space is located within a confined space or alcove. Turning space can overlap a clear space or a portion is permitted to be outside of a transit shelter.

Where benches are located, 50% of benches, but no less than 1 bench must provide a clear space for a wheelchair adjacent to the bench. Clear space must also be provided entirely within transit shelters. Where seating is provided within a shelter, the clear space must be located at the end of a seat, or not overlap the area within 1.5-ft from the front edge of the seat.



3 If available, consider providing 5' of walkway behind the shelter to seperate pedestrians from transit users.

1 Clear area for boarding and alighting

2 Minimum of 10' from crosswalk

3 Additional Platform length

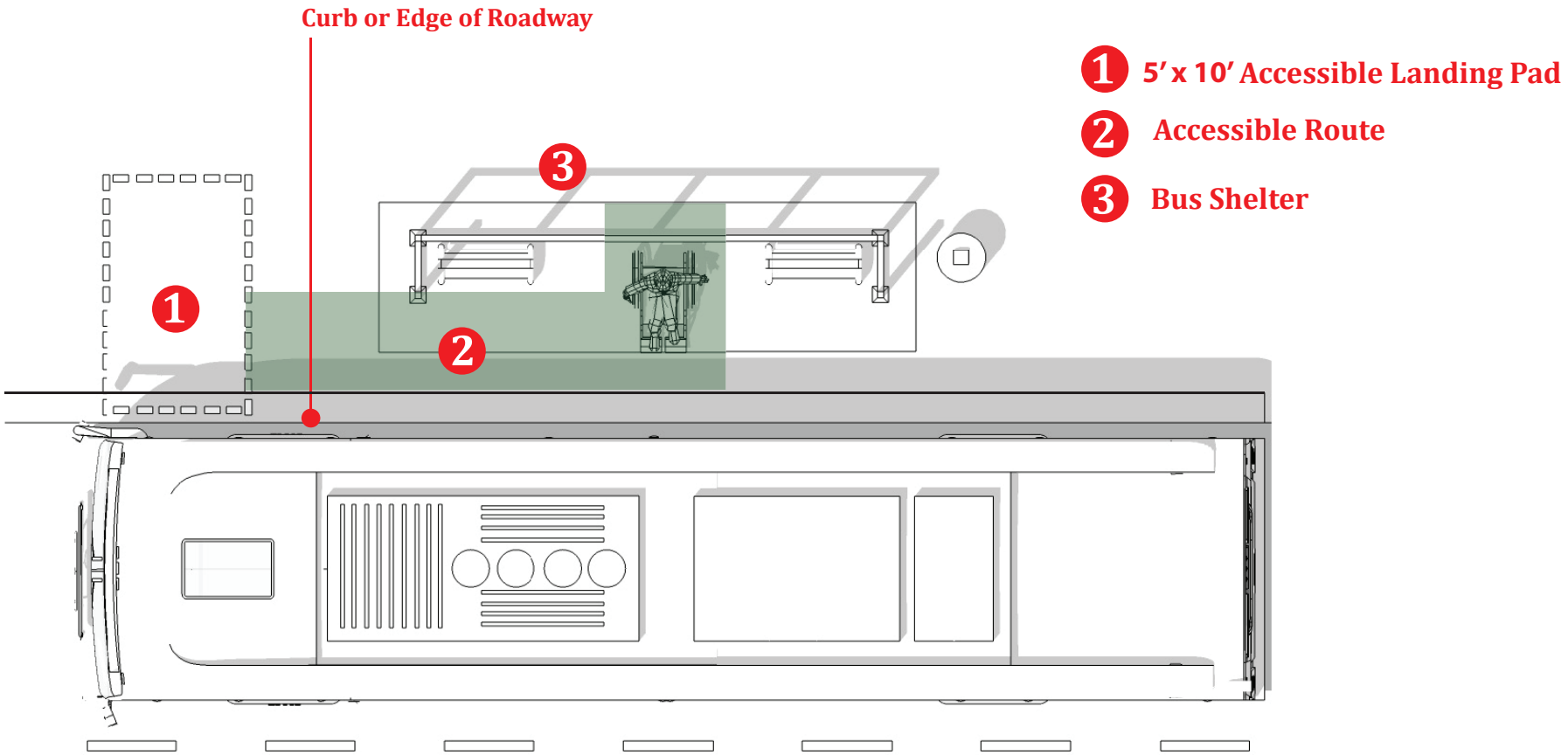
4 Minimum 2.5' x 4' clear space

PEDESTRIAN ACCESS ROUTE: ALTERNATE ELEMENTS

Curb ramps and pedestrian street crossings are elements within a pedestrian access route that allow persons with disabilities to access the public right-of-way.

Pedestrian Street Crossings

Pedestrian circulation can overlap with automobile traffic at street intersections and create a conflict with the varying modes of travel. The use of marked crosswalks at intersections (and sometimes at mid-block), guide pedestrians to walk across a roadway at the safest location and also alerts motorists to the potential presence of pedestrians. Street crossings are essential to transit riders, who are arriving at transit stops from all directions within walking distance.



Crosswalks should be provided in the following locations:

- Intersections where passengers are required to cross streets between routes
- Signalized intersections in urban areas with marked crosswalks on all four corners unless there is a specific reason to direct pedestrians to an alternative crossing location
- Where a marked crosswalk can channel pedestrians to a single location
- When there is a need to delineate an ideal crossing location due to confusing street geometries
- Unsignalized intersections where there are no signalized crossings within 600-ft

Well-defined pedestrian crosswalk and curb ramps along a main transit corridor.
Location: Brown-Forman, 18th Street, Louisville, KY

Conditions for <u>NOT</u> providing crosswalks at unsignalized intersections:

- Posted speed is greater than 40 mph
- Roadway with four or more lanes without a raised median or crossing island that has (or will soon have) average traffic of 12,000 vehicles per day or greater

The design of street crossings must comply with the ADA and PROWAG Guidelines:

- Minimum width of 6-ft (10-ft preferred)
- Maximum running slope of 5%
- Maximum cross slope of 2% (with stop control)
- Maximum cross slope of 5% (without stop control)
- Pavement markings increase visibility of crosswalk
- Provide ADA-compliant curb ramps (2 per corner preferred) at all crosswalks

Curb Ramps

Curb ramps are installed at intersections to facilitate street crossings for people with disabilities. Typically, curb ramps are located at street corners or in conjunction with crosswalks and function as a connection to pedestrian access routes. There are two types of curb ramps: perpendicular and parallel. Sidewalk width determines the appropriate ramp type to be installed. The location of a curb ramp must be carefully coordinated with pedestrian crosswalk lines and the locations of future and existing bus stops.

Placement criteria:

- Avoid obstruction by parked vehicles
- Avoid interference with normal bus stop functions
- Must be downstream of the stop bar and aligned with pedestrian crosswalk and ramp at opposing corner

The design of curb ramps must comply with the Americans with Disabilities Act of 1990 (ADA) and the Public Right-of-Way Accessibility Guidelines:

- Minimum 4-ft clear width (excluding flared sides)
- Maximum 8.33% running slope (5% minimum)
- Maximum 2% cross slope (equal to street or highway grade at street crossings without yeild or stop control or at midblock)
- Maximum 15-ft ramp length
- Minimum 4-ft by 4-ft turning space (2% running slope) at top or bottom of ramp (may overlap other turning or clear space)
- Maximum 10% slope for flared sides (where pedestrian circulation crosses ramp, not included in pedestrian access route)
- Grade breaks at top or bottom of ramp shall run perpendicular to direction of travel and be flush with surface slopes
- Provide a detectable warning surface (truncated domes)
    - Minimum 2-ft length in direction of travel by full width of ramp (excludes flared sides)

See R305 within PROWAG, 2011 for dome size, spacing, contrast, and placement of detectable warning surfaces.

The Nia Center serves as an off-street transit facility, connecting TARC routes and providing easy transfers.

TRANSIT FACILITES

There are two types of transit facilities: off-street and on-street, each having their own variations, design considerations, and facility requirements as it relates to the travel way. Off-street facilities contain ingress and egress separate from the travel way in designated areas located at transit centers or park-n-ride lots. On-street facilities include both on-line (curbside and curb extensions) and off-line (bus bays) transit stops that run adjacent to the travel way.

OFF-STREET FACILITIES

Off-street facilities such as transit centers and park-and-ride lots can accommodate a large number of riders at a centralized location which shifts parking away from the Central Business District, further lessening congestion and lowering parking requirements for the downtown area. Transit centers or park-and-ride facilities should be considered for larger commercial or industrial developments or at locations with major activity generators where transfers occur or multiple routes connect.

Transit Centers

Transit centers are appropriate for large scale developments such as shopping centers, planned communities, and major office or commercial sites. Although transit needs vary from location to location, it is recommended that transit centers be located as close as possible to the core of the activity center. Depending on the level of service and demand, transit centers can be enclosed buildings or open air, and can incorporate a variety of transit amenities such as shelters, benches, bus bays, trash receptacles, and bicycle parking. Transit centers may be combined with park-and-ride facilities as well as retail and food services.

Factors to Consider

A transit center is an area designed to be served by multiple routes. Transit centers are sheltered waiting areas located where several bus routes converge. They serve as efficient “hubs” to allow bus riders from various locations to assemble at a central point to take advantage of express trips or other route-to-route transfers. Transit centers provide the community with a permanent presence of transit service. Center locations are established to facilitate passenger connections and safe vehicle movement.

PARK & RIDES

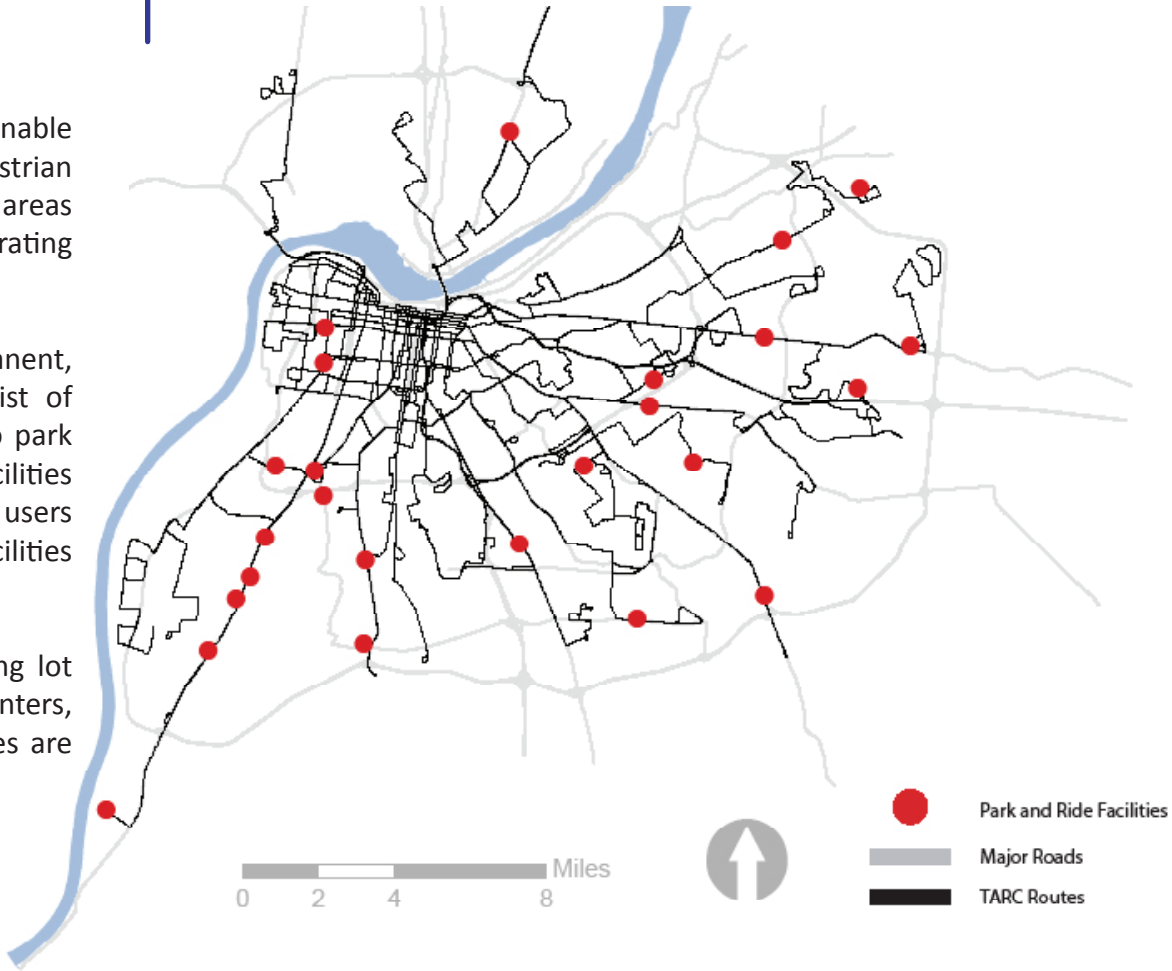
Park-and-rides lots are off-street intermodal facilities which enable users to change from automobile travel to public transit or pedestrian modes. Providing park-and-ride facilities within lower density areas allows transit ridership to become more feasible by concentrating demand to a specific site.

Typical park-and-ride facilities include shared-use lots or permanent, single use lots or garages. Park-and-Ride facilities can consist of parking garages and/ or paved areas used for transit riders to park their automobile while commuting by bus. Park-and-Ride facilities serve as collector sites for bus service or as transit centers. Since users likely arrive by automobile, the service area for park-and-ride facilities is much larger than a typical pedestrian bus stop.

A shared-use lot is a designated portion of an existing parking lot for use by commuters. Large parking lots at major shopping centers, commercial or industrial developments, and religious campuses are typical participants in a shared-use park-and-ride facility.

Design of park-and-ride facilities should be done on a case-by-case basis. Factors to consider:

- Capacity or site size
- Visibility
- Available transit service
- Access for vehicles, bicycles, and pedestrians
- Multiple street connections
- Pedestrian access routes



TARC Park-and-Ride Facilitites
Source: TARC Planning Department

Placement criteria:

- Accessible to freeways and major arterials
- Close proximity to major traffic generators and activity centers
- Near other transportation facilities such as transportation centers or nodes
- Current or future roadway levels of service
- Evidence of informal park-and-ride activity
- Distance between residences and employment centers
- Intensity of employment centers
- Density of residential areas

ON-STREET FACILITIES

On-street facilities, also known as bus or transit stops, are typically located within the public right-of-way, either on-line (along the travel way) or off-line (along a separate pull-off adjacent to the travel way). Newly established on-street facilities include basic elements which are necessary to make a stop functional and accessible. Bus stops can also be designed to provide comfort and improve convenience with the addition of transit amenities such as street furniture and landscaping.

New transit stops and their amenities, typically located in the public right-of-way, are required to comply with ADA physical dimensions, although modifying existing stops is not required, it is highly recommended.

Basic elements include:

- Transit signs
- Boarding and alighting area (wheelchair landing pad, ADA required)
- Lighting

Transit Signs

Transit signs identify the location of the bus stop. Signs should be placed on separate stanchions, but are often found on existing utility poles. Proper placement of bus stop signs ensure that bus drivers know exactly where to stop and passengers know where to board the transit vehicle. TARC will determine the location of new transit signs. Currently, TARC uses transit signs that are 12-in by 18-in and made of a retroreflective material that glows brightly at night when in direct headlights but appears nonreflective when viewed from other directions.

The location of transit signs must comply with the Americans with Disabilities Act of 1990 (ADA) and the Public Right-of-Way Accessibility Guidelines:

- Locate outside of the pedestrian access route leading from the waiting area to the boarding and alighting area
- Locate at the far end of the bus stopping area within the bus stop zone (downstream)
- Locate outside of minimum 3-ft clear circulation zone away from transit amenities and street furniture
- Locate outside the 8-ft x 10-ft wheelchair landing pad
- Locate outside the 4-ft minimum pedestrian access route
- Visual character's finish and contrast, case, style, character proportions and height, height from finish surface, stroke thickness, and character and line spacing must comply with R410 within PROWAG
- Provide a minimum of 7-ft vertical clearance from the bottom of the sign to the ground or floor surface (avoid classification as a protruding object)
- Install a maximum of 10-ft from the top of the sign to the ground or floor surface
- When possible, signs should include the international symbol of accessibility

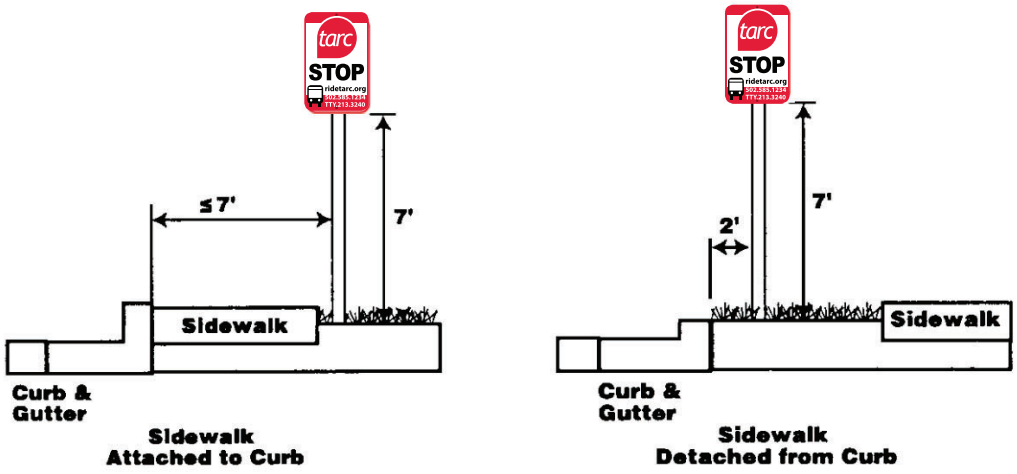
Objects mounted on stanchions, free-standing posts, pylons, or on a base between 27 and 80 inches above the finish floor or ground shall overhang a maximum of 4-in beyond the post, pylon, or base.

Additional standards for installing new bus stop signs:

- Mount securely at an angle perpendicular to the street
- Avoid obstructed visibility from adjacent signs, trees, or buildings
- Locate for easy visibility to approaching bus driver
- Locate a minimum of 2-ft from the curb-face to ensure the clearance of bus mirrors
- At a far-side stop, locate a minimum of 50-ft from a pedestrian crosswalk
- At a signalized near-side stop, locate a minimum of 15-ft (25-ft preferably) from a pedestrian crosswalk
- At an unsignalized near-side stop, locate a minimum of 5-ft from a pedestrian crosswalk
- Do not locate where visibility of shelter and transit stops are obstructed
- Do not locate where visibility of driveways and adjacent land uses are obstructed

In rural areas, bus route identification signs should be located 6-ft from the edge of a paved shoulder, or 12-ft away from the travel way if no shoulder exists.

Figure 11: TARC Bus stop identification sign



*Note: Bus schedules, timetables, and maps at shelters are not required to comply with the ADA's PROWAG guidelines.

Figure 12: Bus stop identification sign placement
Source: Modified from Palm Tran Transit Design Manual

BOARDING/ALIGHTING AREA (WHEELCHAIR LANDING PAD)

Required by the PROWAG for all newly constructed transit facilities, a boarding and alighting area, also known as a wheelchair landing pad or bus pad, is the designated clear zone at a transit facility or bus stop where riders, especially persons in wheelchairs, board or alight the transit vehicle. The wheelchair landing pad must accommodate a 5-ft wide (parallel from the curb) by 10-ft deep (perpendicular, measured from the curb-face) clear zone, free of any obstacles, transit amenities, or street furniture. The surface of the wheelchair landing area must be level, stable, and constructed of slip-resistant concrete following the same parallel slope as the adjacent roadway. A maximum cross slope of 2% (1:50) perpendicular to the roadway is allowed for drainage.

The wheelchair landing pad must be located adjacent to the transit vehicle's front entrance to aid in the use of a deployable wheelchair lift or ramp and located along the public right-of-way, flush with the curb-face. It can also be incorporated into the design of the accessory pad or waiting area if both are located between the curb and pedestrian access route (sidewalk). The wheelchair landing pad may be within the pedestrian pathway, but requires greater clearance than a standard sidewalk to allow for deployment of a wheelchair lift or ramp.

The location of the boarding/ alighting area (wheelchair landing pad) must comply with the Americans with Disabilities Act (ADA) and the Public Right-of-Way Accessibility Guidelines:

- Provide a minimum clearance of 5-ft by 10-ft adjacent to vehicle's front entrance (wheelchair loading pad)
- Provide a minimum clearance of 10-ft by 8-ft for rear door, if required (Confirm vehicle dimensions to determine distance from primary boarding area)
- Surface material is stable, firm, and slip-resistant
- Slope follows street grade but does not exceed (5%)
- Cross slope does not exceed (2%) for proper drainage
- Vertical clearance of 7-ft maintained in boarding/alighting area
- Easements should extend 2-ft beyond the border of the boarding/alighting area (wheelchair landing pad), if required

There are special considerations for wheelchair landing pads in rural and suburban areas. On an uncurbed road, the wheelchair landing pad should be raised 4 to 5 inches above the level of the adjacent roadway or shoulder pavement. If a raised pad is not provided, the slope will be too steep for a wheelchair to climb the transit vehicle's deployed ramp. Also, use a ramp to connect the wheelchair landing pad to an existing sidewalk. If no sidewalk exists, a slope should be provided to facilitate wheelchair access.

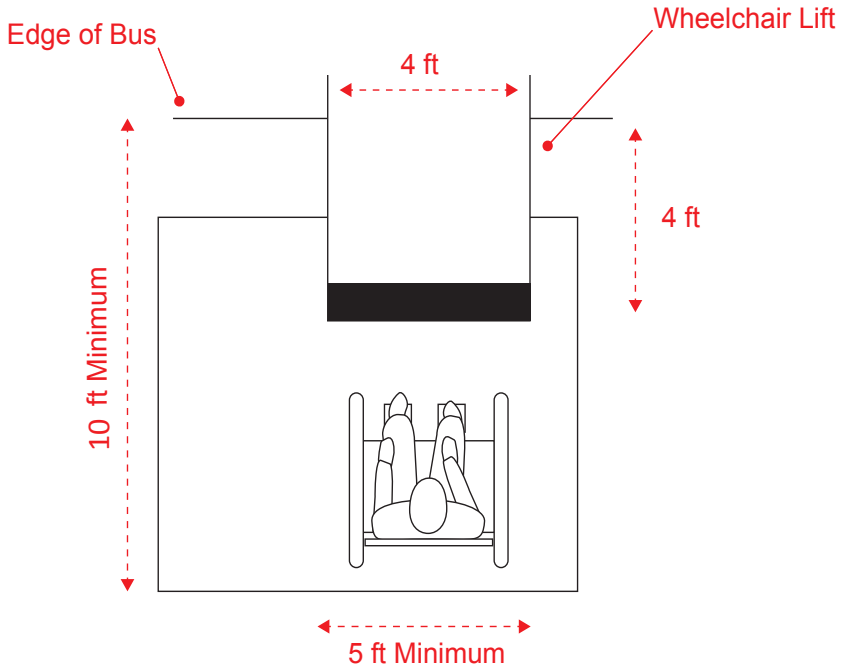


Figure 13: Wheelchair landing pad dimensions
Source: TARC Planning Department

Lighting

The rider's perception of safety and security at a bus stop is affected by the amount of visibility or lighting that is incorporated into the bus stop's location and layout. Good lighting can enhance one's sense of comfort, while bad lighting can encourage the misuse of a facility. Lighting along an accessible route must be relatively uniform and arranged to minimize shadows. Typical lighting should provide between 2 and 5 foot-candles. If new lighting is installed, fixtures should be vandal-resistant and durable but easily maintained by avoiding exposed bulbs or elements that can be tampered with or destroyed.

To avoid lighting costs, locate bus stops near existing street lights. Placement must comply with ADA pedestrian circulation clearances. See pages 44 through 47 for ADA guidelines and placement of benches and/ or shelter. Bus stops should be located within 30-ft of an existing lighting source to achieve adequate visibility.

- Flashing lights are prohibited
- Provide junction boxes and conduits for utilities
- Locate utility pole a minimum of 7-ft (15-ft preferred) away from transit amenities and other street furniture

TRANSIT AMENITIES & STREET FURNITURE

Transit amenities and street furniture are installed within the curbside bus stop zone as an added benefit for transit riders. A transit amenity is any physical improvement made to a transit facility that contributes to a rider's convenience, comfort, safety, and security while boarding, alighting, or waiting for a transit vehicle. Amenities can include street furniture, lighting, and landscaping. Street furniture contributes to the convenience and comfort of a TARC patron and includes benches, shelters, trash receptacles, bicycle racks, and any additional objects that are placed in the right-of-way for public use. Before installing transit amenities or street furniture please refer to the guidelines and standards within this manual.

The placement of transit amenities and street furniture in a pedestrian circulation path within the public right-of-way must coordinate with the dimensions of the required pedestrian access route to avoid blocked or compromised pedestrian routes as major barriers to independent travel.

Criteria used to identify the need for transit amenities at a transit stop:

- Number of daily boardings and transfers at stop
- Mobility needs
- Stop potential
- Long wait times in between a scheduled stop (headway is 30 minutes or more)
- Isolated development or unfavorable landscape/ environmental conditions
- TARC bus operator or passenger recommendations

Trash Receptacles

Trash receptacles provide a place for trash disposal and improve the appearance of a transit stop. Trash receptacles may not be needed at every transit stop, especially those with low rider patronage, but are the easiest and least costly amenity to be installed at a bus stop. Transit stops adjacent to large developments or near activities that generate a higher amount of transit patronage will (likely) warrant a trash receptacle. Trash receptacles often accompany the installation of benches and shelters. Louisville Metro Solid Waste Services empties trash receptacles within the Urban Service District. When outside the Urban Service District, including within small cities, an agreement with landowners or developers defining maintenance responsibilities may be required.

The location of trash receptacles must comply with the Americans with Disabilities Act of 1990 (ADA) and the Public Right-of-Way Accessibility Guidelines:

- Locate outside of the pedestrian access route leading from the waiting area to the boarding and alighting area
- Locate outside of minimum 3-ft clear circulation zone away from other amenities and street furniture
- Locate on a surface that is firm, stable, and slip-resistant (planar/flat and paved)
- Locate on a slip-resistant, properly drained concrete accessory pad with a maximum 2% slope perpendicular to the roadway
- Locate outside of the 8-ft x 5-ft wheelchair landing pad
- Locate outside of the 4-ft minimum pedestrian access route

Additional trash receptacle placement and installation guidelines:

- Anchor securely to the ground to reduce unauthorized movement
- Locate a minimum of 2-ft from the back-face of the curb to ensure clearance of the bus mirrors
- Avoid locating in direct sunlight (odors)
- Avoid design features (e.g. ledges) that permit liquids to pool or remain nearby (insects)
- Do not locate where visibility of shelter and transit stops are obstructed
- Do not locate where visibility of driveways and adjacent land uses are obstructed
- In accordance with Ordinance #67, Series 2012 (Street Furniture), obtain licensing agreement and follow criteria for a long term permit for encroachment on the public right-of-way through Louisville Metro Department of Public Works

See Appendix C for trash receptacle specifications.

Trash receptacle and shelter at a BRT stop

Waiting Area or Accessory Pad

A waiting area provides riders with a designated place to assemble while waiting for a bus to arrive. Waiting areas may be defined by bricks or pavers, but a paved, concrete accessory pad is preferred. An accessory pad, different from a loading/ boarding pad or wheelchair landing area, can contain a bench, shelter, or leaning rail. The accessory pad can also include a trash receptacle or additional non-standard transit amenities. The size of a waiting area or accessory pad can vary depending on what types of street furniture or transit amenities are to be accommodated.

The size of an accessory pad depends on:

- Available space in right-of-way
- Length and width of bench or shelter
- Clearance requirements of street furniture or amenities
- Location of wheelchair loading pad
- Setback requirements

TARC recommends two variations of accessory pads at transit stops; one for benches and one for shelters. An accessory pad that will contain a bench and trash receptacle is typically 5-ft by 15-ft, while the typical size for a shelter and trash receptacle is 10-ft by 20-ft. The waiting area or accessory pad must not encroach into a pedestrian access route, usually a sidewalk. An accessory pad can be located on either side of a pedestrian access route depending on the availability of right-of-way space. If a loading/ boarding area or wheelchair landing pad is combined with an accessory pad, the wheelchair landing area (5-ft by 8-ft) must be maintained as a clear zone.

A larger accessory pad may be needed if street furniture or additional transit amenities are located within the waiting area, ADA accessibility guidelines should be followed.

Benches

Benches offer a place for transit riders to rest comfortably for the next available bus in the bus stop zone. Benches encourage social activities and provide places to rest along neighborhood corridors with transit service; benches enhance the appearance of the neighborhood around the bus stop. Benches may not be needed at every transit stop, but do greatly improve the comfort of riders, particularly the elderly, disabled, or those with limited mobility. Transit stops adjacent to large developments or near activities that generate a higher amount of transit patronage will require a bench. Uncomfortable conditions such as wind, sun or rain can discourage the use of a bench. The proper placement, installation, and use of materials can encourage more frequent use of benches by transit riders. A bench installed at a bus stop provides comfort and convenience for its riders.

An accessory pad with bench and trash receptacle

Factors determining bench installation:

- Width of bus stop
- Long wait times in between scheduled stops (headway is 30 minutes or more)
- Available protection from the weather (e.g. shade trees, building canopies/ awnings, etc.)
- Landowner had denied permission to install a shelter
- Frequent use by the elderly or disabled
- Evidence of riders sitting or standing on nearby land uses or structures
- Neighborhood requests for improvements

The location and design of benches must comply with the Americans with Disabilities Act of 1990 (ADA) accessibility standards and Public Right-of-Way Accessibility Guidelines:

- Connect bench to boarding/alighting area using a pedestrian access route
- Locate outside of minimum 3-ft clear circulation zone away from other amenities and street furniture
- Locate on a surface that is firm, stable, and slip-resistant (planar/ flat and paved)
- Locate on a slip-resistant, properly drained concrete accessory pad with a maximum 2% slope perpendicular to the roadway
- Locate outside the 8-ft x 10-ft wheelchair landing pad
- Do not locate where visibility of shelter and transit stops are obstructed
- Do not locate where visibility of driveways and adjacent land uses are obstructed
- Provide a clear space with a minimum size of 30-in by 48-in positioned at the end of the bench and located for shoulder-to-shoulder seating for at least 50% of benches (no fewer than 1 bench)
- Front edge of bench shall have a minimum height of 17-in and maximum of 19-in above ground or floor space

Additional bench placement guidelines and criteria:

- Coordinate with existing street lighting to increase visibility and security
- Coordinate with existing landscaping (e.g. shade trees) to provide protection from wind, sun, and rain.
- Locate away from driveways and curb cuts
- Locate a minimum of 2-ft (preferably 4-ft) from the back-face of the curb to ensure clearance of the bus mirrors
- Locate a minimum of 1-ft from the edge of the concrete accessory pad
- Locate a minimum of 10-ft from an existing fire hydrant (KRS 94.82)
- Do not locate in undeveloped areas of the right-of-way
- Provide additional waiting area near bench
- Anchor securely to concrete accessory pad
- Design to seat at least 3 adults, with use of anti-vagrant bars preferred
- Backrest no greater than 6-ft in length and 2-ft in height (18-in minimum)
- Height above ground or floor surface 3’-6” minimum, 3’-8” maximum
- Seat depth 1’-8” minimum, 2-ft maximum
- Support a minimum of 250-lbs of force
- Use materials that are durable, vandal-resistant, and low maintenance that will allow water to drain and resist the elements while remaining structurally sound with a minimum ten-year usable life expectancy
- Public facility easement of 5-ft by 15-ft for bench installation (extend a minimum of 2-ft beyond accessory pad), if required
- In accordance with Ordinance #67, Series 2012 (Street Furniture), obtain licensing agreement and follow criteria for a long term permit for encroachment on the public right-of-way through Louisville Metro Department of Public Works.

See Appendix C for bench specifications.

Shelters

A bus shelter provides protection from sun, wind, and rain, while seating gives a level of comfort to riders waiting for a bus to arrive. Shelters are installed at transfer points and bus stops with a high number of boardings. Additional shelters will improve the convenience of transit. Most shelters are owned and maintained by TARC. TARC shares the responsibility of cleaning the interior and surroundings of the shelter with the adjacent property owner(s).

Factors determining shelter installation:

- Number of daily boardings and transfers at a stop
- Frequent use by the elderly or disabled
- Availability of space/ right-of-way
- Proximity to major activity centers/ trip generators
- Frequency of service
- Adjacent land use compatibility
- Width of bus stop
- Long wait times in between scheduled stops (headway is 30 minutes or more)
- Exposure to the sun, rain, and wind
- Evidence of riders sitting or standing on nearby land uses or structures
- Neighborhood requests for improvements
- High density of residents within 1/4-mile of stop

System equity or funding availability may cause installation of new bus shelters to be done on a case-by-case basis when installed by TARC. Shelters may be required at newly developed and redeveloped sites.

The location and design of shelters must comply with the Federal Americans with Disabilities Act of 1990 (ADA) accessibility standards and Public Right-of-Way Accessibility Guidelines:

- Connect shelter to boarding/ alighting area using a pedestrian access route
- Locate outside of minimum 3-ft clear circulation zone away from other amenities and street furniture
- Locate on a surface that is firm, stable, and slip-resistant
- Locate on a properly drained concrete accessory pad with a maximum 2% cross slope perpendicular to the roadway
- Locate outside the 8-ft x 10-ft wheelchair landing pad
- Provide a minimum clear floor area 30-in wide by 48-in deep (including knee and toe clearance) entirely within the perimeter of the shelter to permit wheelchair access
- Provide for a forward or parallel wheelchair approach with open side of shelter adjoining a pedestrian access route or another clear space
- If shelter has a doorway, provide a clear minimum width of 32-in, 36-in preferred
- Provide for wheelchair maneuvering space
    - Forward approach: a minimum of 36-in wide where depth exceeds 24-in
    - Parallel approach: a minimum of 60-in wide where depth exceeds 15-in

Placement criteria:

- Coordinate with existing street lighting to increase visibility and security
- Coordinate with existing landscaping (e.g. shade trees) to provide protection from wind, sun, and rain
- Locate as close as possible to the end of the bus stopping area within the bus stop zone for high visibility to approaching buses and passing traffic
- Locate away from driveways and curb cuts, preferably 200-ft
- Locate a minimum of 2-ft (preferably 4-ft) from the back-face of curb (measurement taken at roof line) to ensure clearance of the bus mirrors
- Locate a minimum of 1-ft away from trash receptacles
- Locate a minimum of 10-ft away from an existing fire hydrant (KRS 94.82)
- Locate a minimum of 7-ft (15-ft preferred) away from a utility pole
- Locate a minimum of 12-ft from an intersection (near-side stop)
- Provide a minimum of 12-in clear space between adjacent buildings and shelter to permit trash removal and cleaning
- Provide a minimum of 12-in between roof canopy and edge of accessory pad to prevent soil erosion
- Avoid locating in front of store windows (interference with advertisements and displays)
- Do not locate where visibility of benches and transit stops are obstructed
- Do not locate where visibility of driveways and adjacent land uses are obstructed
- Do not locate in undeveloped areas of the right-of-way
- Do not locate in medians or limited access roads
- Walking distance from the shelter to the bus should be minimized

Design criteria:

- Anchor shelter securely to concrete accessory pad
- Anchor seating securely to concrete accessory pad or shelter
- Provide seating for a minimum of 3 adults and space for 1 wheelchair
- Provide additional waiting area near shelter, if required
- Use materials that are durable, vandal-resistant, and low maintenance that will allow water to drain and resist the elements while remaining structurally sound with a minimum ten-year usable life expectancy
- Recommended interior dimensions: 4-ft deep, 12-ft long, 7-ft high
- Maximum roof height of 10-ft
- Public facility easement of 10-ft by 20-ft for shelter installation (extend a minimum of 2-ft beyond accessory pad), if required
- In accordance with Ordinance #67, Series 2012 (Street Furniture), obtain licensing agreement and follow criteria for a long term permit for encroachment on the public right-of-way through Louisville Metro Department of Public Works

Near-side bus stop with shelter, trash receptacle and wheelchair landing pad

Shelter Advertising

Shelters are often used for advertising purposes and take advantage of the visibility received by passing traffic. Private vendors may fund the purchase and installation of bus shelters through a contract with TARC in return for advertising space. The shelter is generally placed on a public facility easement negotiated by TARC or Louisville Metro and the vendor installs, operates, and maintains the shelter while providing advertising on the shelter and collecting revenues. To prevent restricted visibility, advertisements should only be placed on shelter panels that are downstream of the traffic flow. Advertisements on bus shelters must not exceed the established requirements as defined in the LDC. TARC and Louisville Metro will be responsible for determining or approving a proposed shelter location and appearance.

Non-Standard Amenities

Additional amenities and street furniture may be located within the bus stop zone, and complement adjacent land uses, density, and frequency of ridership.

Additional amenities can include:

- Newspaper or magazine rack, stand, or vending machine
- Public art or clock
- Intelligent Transportation Systems (ITS)
- Route map or information kiosk
    - Recommended at major transfer points and high passenger pick-up locations
- Bicycle storage rack or facility
    - To complement the role of and expand access to transit
    - To discourage the securing of bicycles to street furniture and transit amenities
    - Specific bicycle parking standards can be found in the Land Development Code, Chapter 9 Part 2. Refer to Appendix 9A for the Bicycle Parking Design Manual.

The location of additional amenities or street furniture must comply with the Americans with Disabilities Act of 1990 (ADA) and Public Right-of-Way Accessibility Guidelines:

- Locate outside of the pedestrian access route leading from the waiting area to the boarding and alighting area
- Locate outside of minimum 3-ft clear circulation zone away from other amenities and street furniture
- Locate on a surface that is firm, stable, and slip-resistant
- Locate on a properly drained concrete accessory pad with a maximum 2% cross slope perpendicular to the roadway
- Locate outside the 8-ft x 5-ft wheelchair landing pad
- Locate outside the minimum 4-ft pedestrian access route
- Do not locate where visibility of shelter and transit stops will be obstructed
- Do not locate where visibility of driveways and adjacent land uses are obstructed

Other placement criteria:

- Locate a minimum of 10-ft away from an existing fire hydrant (KRS 94.82)
- Locate a minimum of 7-ft (15-ft preferred) away from a utility pole
- Locate a minimum of 2-ft from the back-face of curb to ensure clearance of the bus mirrors
- Locate a minimum of 1-ft away from trash receptacles
- Provide a minimum of 12-in clear space between adjacent buildings and amenity to permit trash removal and cleaning
- In accordance with Ordinance #67, Series 2012 (Street Furniture), obtain licensing agreement and follow criteria for a long term permit for encroachment on the public right-of-way through Louisville Metro Department of Public Works

Landscaping

Shade trees and landscaping, such as grass and shrubs, can enhance the environmental comfort and aesthetics of a transit stop. Street trees can act as a safe buffer between automobile and pedestrian traffic. Trees shade transit riders from the sun, and protect riders from light rain. Trees should be pruned to allow for 12-ft minimum vertical clearance from the surface of the travel way to permit transit vehicles to pass without obstructions. Boarding and alighting areas should also maintain a minimum vertical clearance of 10-ft for trees and landscaping.

Additional shrubs and landscaping will further shelter riders from inclement weather. Avoid using landscaping that would reduce visibility around a bus stop (e.g. evergreen trees act a visual barrier). Low growing shrubs, ground cover, shade trees and drought tolerant plants are preferred. Ground cover between the curb and the back of the waiting area should not exceed 2-ft in height, while shrubs should not exceed 3-ft at maturity.

Maintenance

To ensure that TARC is an attractive transportation option, providing regular maintenance to transit facilities is crucial. The comfort and security of riders is greatly increased when a transit stop is clean and well maintained. To enforce regular maintenance of transit facilities, working agreements should be established between property owners, developers, and TARC. Binding elements can also be included into proposed development plans to ensure proper maintenance.

Recommendations for transit stop maintenance:

- Repair or remove amenities that are unsafe as soon as possible
- Incorporate regular mowing with adjacent property
    - Remove weeds and prune foliage
- Empty trash receptacle and pick up litter: once a week
- Full wash down of shelter or street furniture: once a month
    - Remove dirt, debris, graffiti, and pasted materials
    - Wipe down glass or Plexiglas surfaces
    - Touch up cracked or chipped paint

Establish agreements with commercial strip centers to remove shopping carts from adjacent bus stops regularly. Abandoned shopping carts are unattractive and restrict rider and pedestrian access to the bus stop.

Bus stop with landscaping.

Bus stop with maintenance needs.

APPENDIX **A**

TRANSIT GLOSSARY

ACCESSIBILITY – The extent to which facilities are barrier free and usable by persons with disabilities, 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 concrete slab or paved area that is provided for bus patrons and may contain a bench, shelter, and/ or other transit amenities.

ACTIVITY CENTER – A small geographic area with a high concentration of employment and retail activity 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.

ALIGHT(ING) – exiting a bus

AMERICANS with DISABILITIES ACT (ADA) – An act passed by the United States Senate in 1990 to provide a clear and comprehensive national mandate for the elimination of discrimination against individuals with disabilities. Provides consistent, enforceable standards.

ATTACHED SIDEWALK – a sidewalk which is directly attached to the back of the curb.

BENCH – a transit amenity that can accommodate three or more persons and is placed at a bus stop for use by waiting passenger.

BOARD(ING) – entering the bus

BOARDING AREA – see Wheelchair Landing Pad

BUS PAD – a concrete pad constructed in the street, adjacent to the bus stop zone that accommodates the weight of a bus.

BUS STOP – A point along a transit route that is specially designated for bus passenger boarding and alighting. It is defined by a bus stop sign and can be located near-side, far-side, or mid-block.

BUS STOP ZONE – a length of roadway designated for the deceleration, stopping area, and acceleration of the bus that is marked for use as a bus stop and where parking is prohibited.

BUS BAY (pull-out) – a dedicated stopping area for buses that is recessed outside of the travel lane that is used for passengers to board and alight. Also known as a bus turnout.

CURB LANE – a travel, parking, or bike lane adjacent to the curb.

CURB RAMP – a combined ramp and landing constructed to allow persons with disabilities and wheelchairs to travel from the sidewalk to street level.

DETACHED SIDEWALK – a sidewalk separated from the back of the curb by a planting strip or verge.

DOWNSTREAM - in the direction of travel.

ELEMENT - an architectural or mechanical component of a building, facility, space, site, or public right-of-way.

FACILITY - all or any portion of buildings, structures, improvements, elements, and pedestrian or vehicular routes located in the public right-of-way.

FAR-SIDE BUS STOP – a bus stop that is located immediately following an intersection as indicated by the direction of travel.

FOOT CANDLES – a standard measurement of lighting intensity.

HEADWAY – a measurement of the distance or time between vehicles in a transit system. The time interval between transit revenue vehicles passing a specified location.

HORIZONTAL CLEARANCE – the distance between the grade level and any obstacle such as a sign, tree branch, over crossing, etc.

LAYOVER – Time built into a schedule between arrivals and departures, used for the recovery of delays and preparation for the return trip.

MID-BLOCK BUS STOP – a bus stop that is located between intersections.

NEAR-SIDE BUS STOP – a bus stop that is located immediately before an intersection as indicated by the direction of travel.

OFF-LINE BUS STOP – a bus stop that is not located directly within the travel way, but instead is adjacent to the travel way within a separate pull-off area.

OFF-STREET FACILITY – a transit stop that is located outside of the public right-of-way, typically within a parking lot or other designated area.

ON-LINE BUS STOP – a stop that is located directly within the travel way.

ON-STREET FACILITY – a transit stop that is located directly within or adjacent to the travel way.

PARK-and-RIDE – a designated parking area for automobile drivers who then board transit vehicles from these locations.

PEDESTRIAN ACCESS ROUTE – a continuous and unobstructed walkway within a pedestrian circulation path that provides accessibility.

PEDESTRIAN CIRCULATION PATH – a prepared exterior or interior way of passage provided for pedestrian travel.

PUBLIC RIGHT-OF-WAY (ROW) – public land or property, usually in interconnected corridors, that is acquired for or devoted to transportation purposes.

SHELTER – a transit amenity that includes a covered passenger waiting area, often semi-enclosed with benches, that provides protection from the elements (weather).

STREET FURNITURE – sidewalk equipment or furnishings that may consist of a transit shelter, bench, trash receptacle or other component provided at a bus stop for the comfort and convenience of waiting passengers.

TRANSFER – a passenger's change from one transit vehicle to another.

TRANSIT AMENITY – a feature of a transit stop that enhances a riders transit experience which can include a shelter, bench, trash receptacle, or bike rack, etc.

TRANSIT CENTER – a major transit hub where several transit routes converge and can also include the interchange between varying modes of transportation (walking, biking, and motor vehicles).

TRANSIT FACILITY – a designated location along a transit route where a transit vehicle stops for passengers to board and alight and includes a bus route identifications sign, wheelchair landing pad, lighting and other transit amenities.

TRAVEL LANE – a lane devoted exclusively for vehicular travel.

VERTICAL CLEARANCE – see Horizontal Clearance

WHEELCHAIR LANDING PAD – a paved area or sidewalk that allows for the extension of a wheelchair lift and safe boarding and alighting or a person in a wheelchair. A 5-ft by 8-ft concrete pad required at all new or renovation bus/ transit stops.

APPENDIX **B**

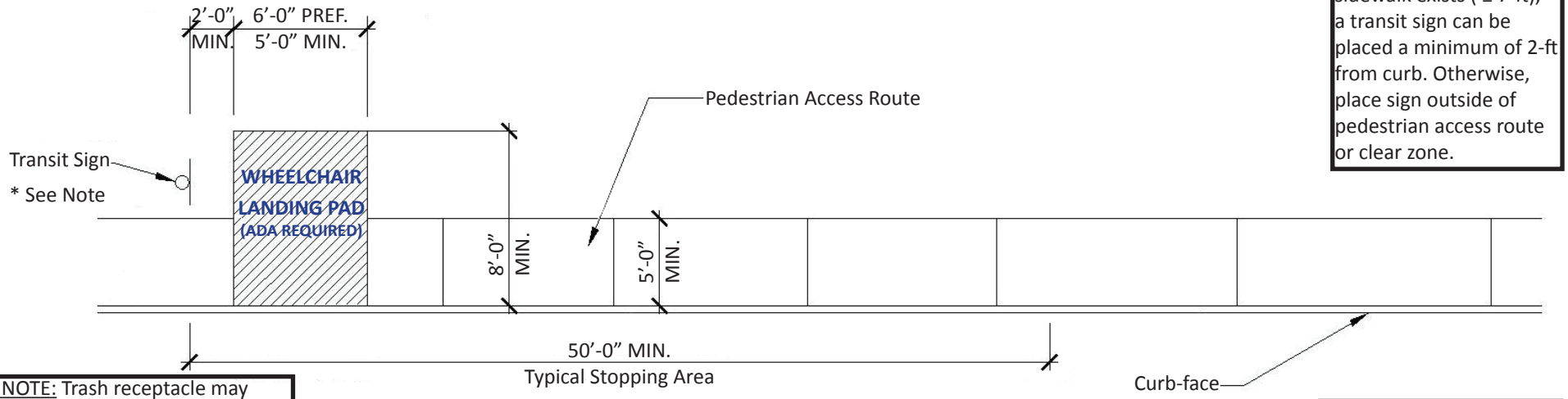
DIMENSIONAL GRAPHIC STANDARDS

Disclaimer:

These design guidelines are intended to provide accurate, authoritative direction for general situations. They are not intended to provide site-specific, detailed public transit, engineering, architectural, construction, legal or other information. The reader will need to adjust the information contained in the guidelines to site-specific needs, constraints, and to all applicable laws, regulations, and codes. Further, if the reader desires expert advice concerning any of the technical references contained in these guidelines, the reader is encouraged to retain the services of appropriate expert(s). These guidelines are provided with the understanding that TARC is not engaged in the rendering of any professional service.

Acknowledgement:
The TARC Planning Department acknowledges the efforts of the local architectural firm, Kersey & Kersey Architects, to develop the initial versions of standard drawings for use in this Manual. TARC staff has modified those drawings to reflect the policies on boarding areas and amenities adopted within this, the most current, version of the Manual.

Other drawings may have been adapted from or influenced by examples found in the publications listed in Appendix D: References. The purpose of the standard drawings is to illustrate typical boarding areas that are comfortable, attractive, and dimensionally compliant with the PROWAG and other requirements for improvements within Louisville area rights-of-way.

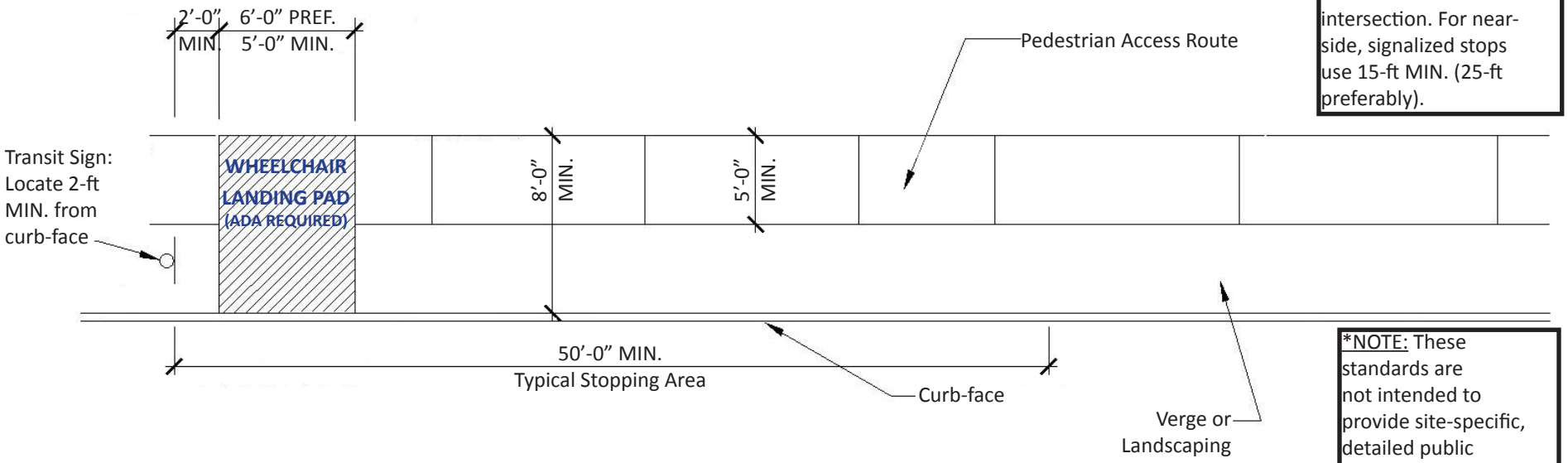


*NOTE: If a wide sidewalk exists (≥ 7-ft), a transit sign can be placed a minimum of 2-ft from curb. Otherwise, place sign outside of pedestrian access route or clear zone.

*NOTE: Trash receptacle may be provided if space and need allows. Do not locate trash receptacle on ADA wheelchair landing pad or within the 5-ft pedestrian access route.

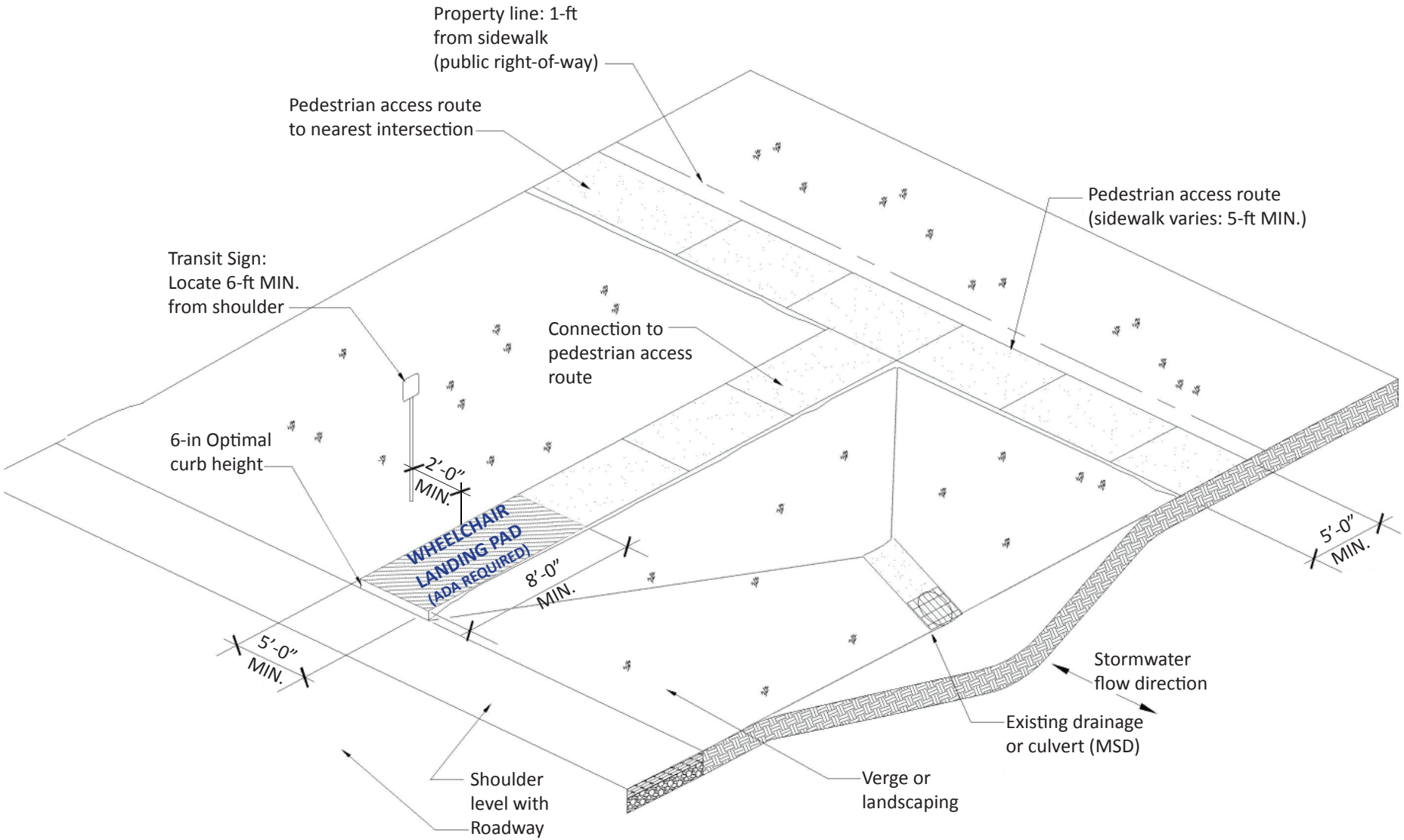
SD-1A: Minimum Required Boarding Area: Attached Sidewalk

*NOTE: Start bus stop zone a minimum of 5-ft MIN. from the edge of a crosswalk or end of a corner radius, whichever is further from the intersection. For near-side, signalized stops use 15-ft MIN. (25-ft preferably).



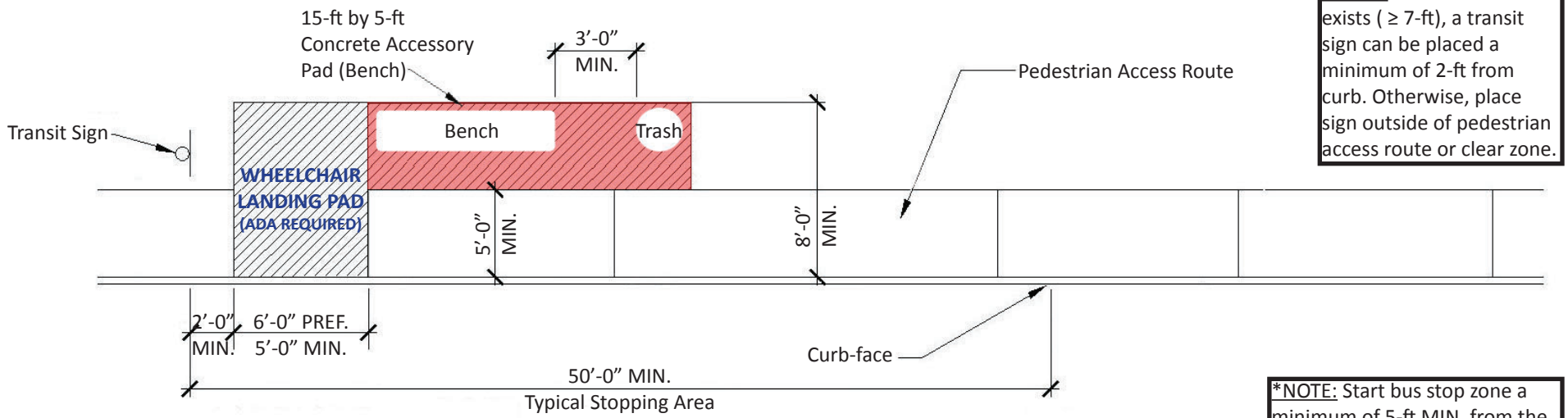
SD-1B: Minimum Required Boarding Area: Detached Sidewalk

*NOTE: These standards are not intended to provide site-specific, detailed public transit, engineering, architectural, construction, legal or other information.



SD-2: Boarding Area with Shoulder and Drainage Swale

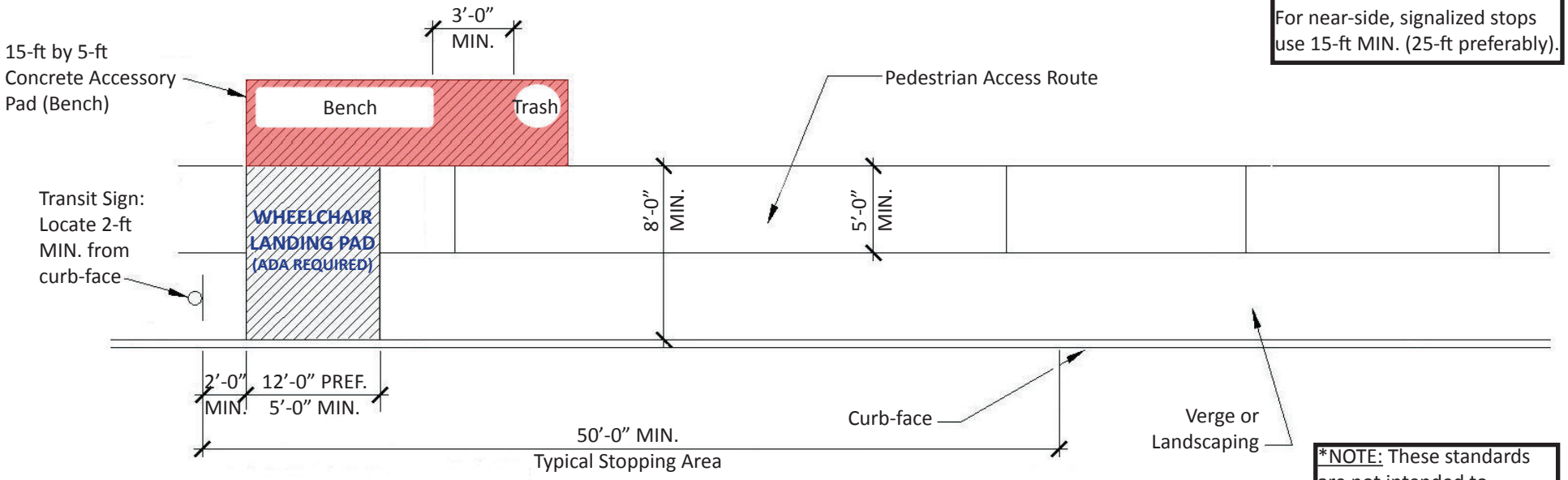
*NOTE: These standards are not intended to provide site-specific, detailed public transit, engineering, architectural, construction, legal or other information.



*NOTE: If a wide sidewalk exists (≥ 7-ft), a transit sign can be placed a minimum of 2-ft from curb. Otherwise, place sign outside of pedestrian access route or clear zone.

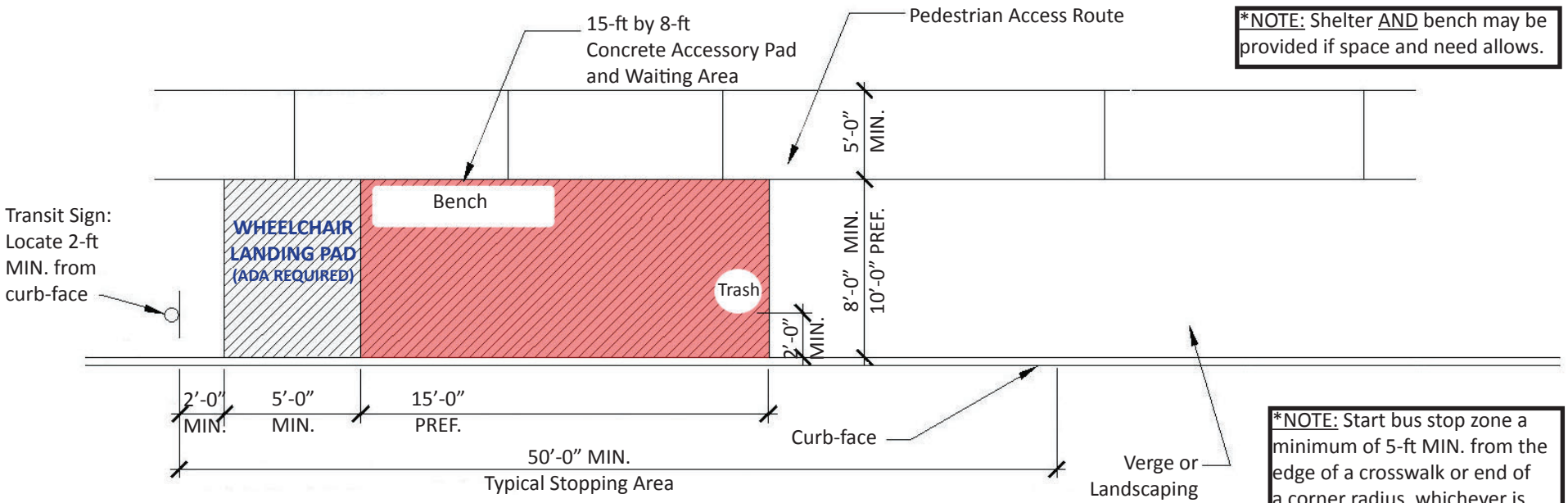
SD-3A: Boarding Area with Bench: Attached Sidewalk

*NOTE: Start bus stop zone a minimum of 5-ft MIN. from the edge of a crosswalk or end of a corner radius, whichever is further from the intersection. For near-side, signalized stops use 15-ft MIN. (25-ft preferably).



SD-3B: Boarding Area with Bench: Detached Sidewalk

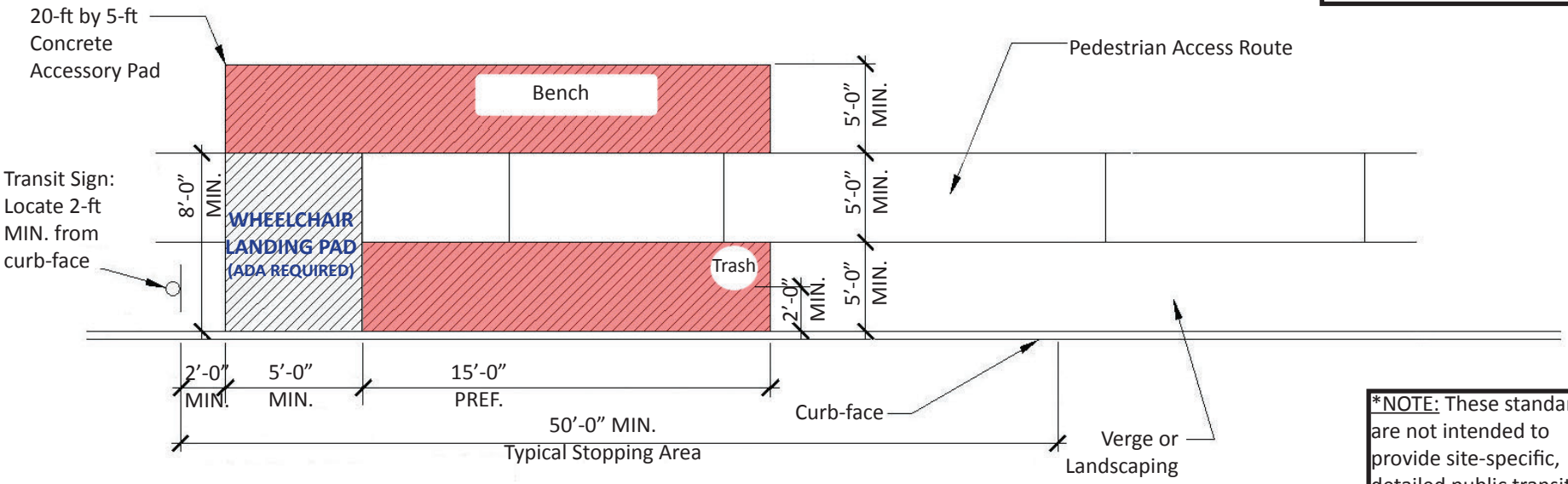
*NOTE: These standards are not intended to provide site-specific, detailed public transit, engineering, architectural, construction, legal or other information.



*NOTE: Shelter AND bench may be provided if space and need allows.

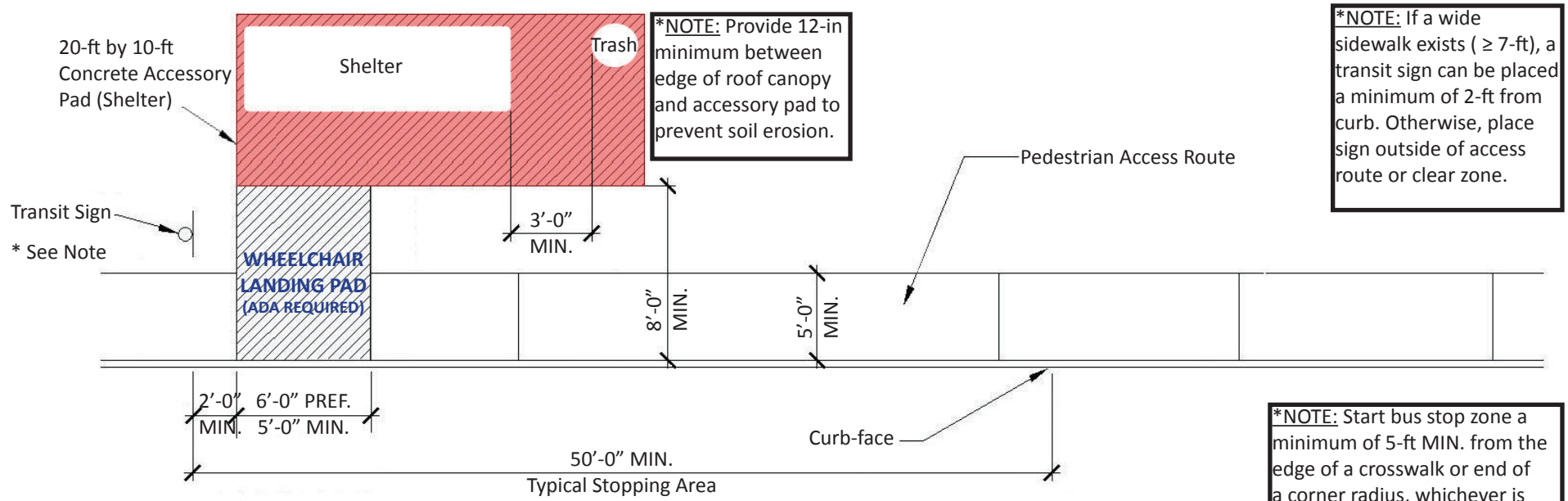
*NOTE: Start bus stop zone a minimum of 5-ft MIN. from the edge of a crosswalk or end of a corner radius, whichever is further from the intersection. For near-side, signalized stops use 15-ft MIN. (25-ft preferably).

SD-4A: Urban Boarding Area: Attached Sidewalk (Verge >10-ft)

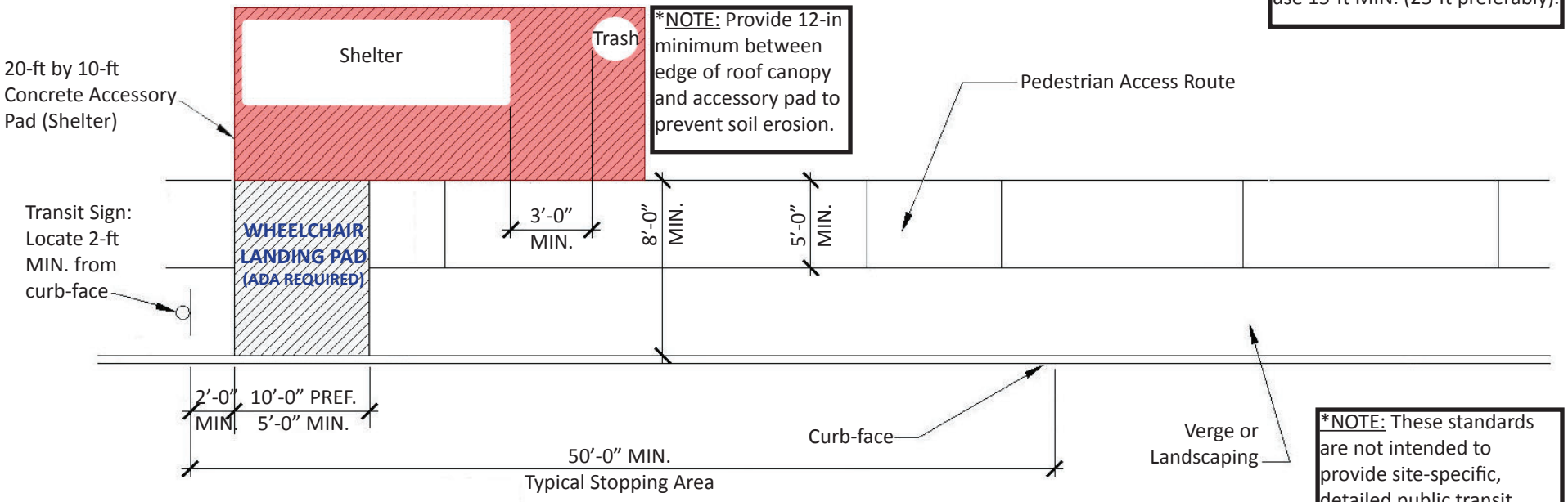


*NOTE: These standards are not intended to provide site-specific, detailed public transit, engineering, architectural, construction, legal or other information.

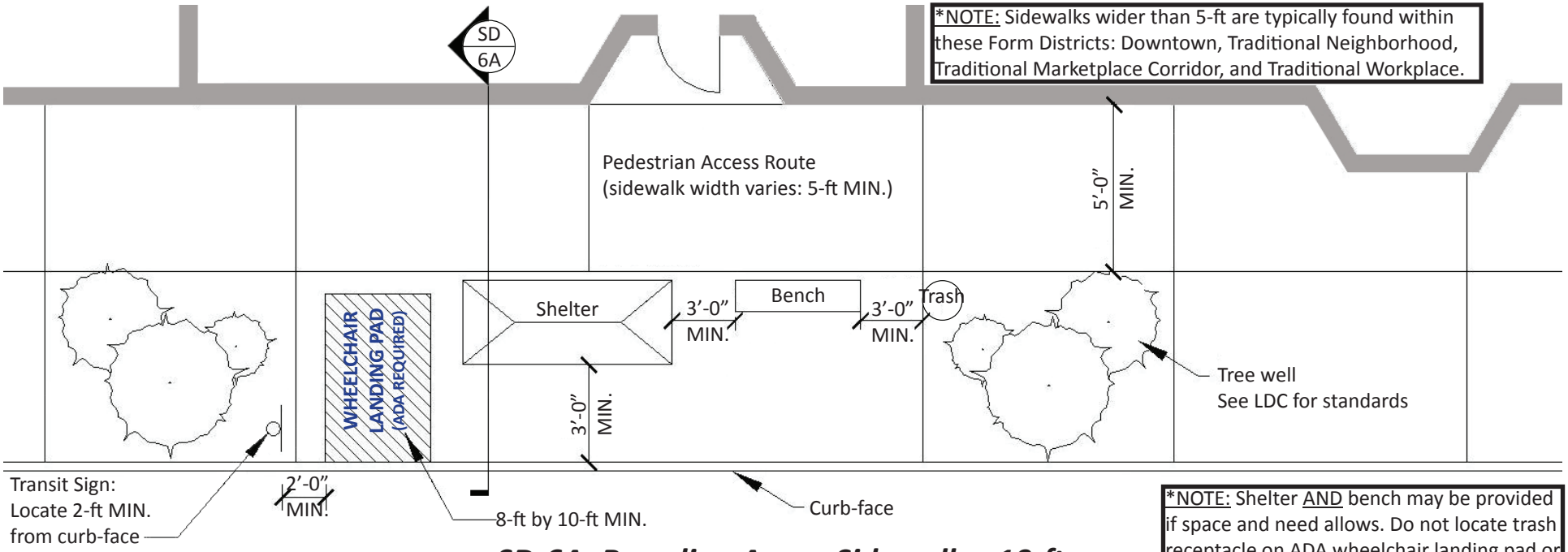
SD-4B: Urban Boarding Area: Detached Sidewalk (Verge <10-ft)



SD-5A: Boarding Area with Shelter: Attached Sidewalk



SD-5B: Boarding Area with Shelter: Detached Sidewalk

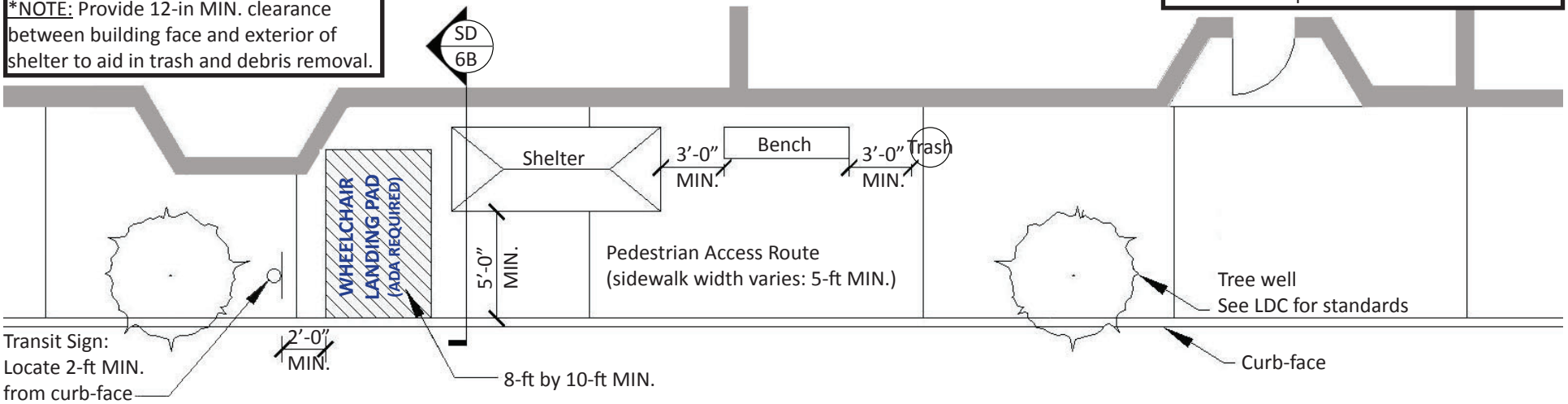


*NOTE: Sidewalks wider than 5-ft are typically found within these Form Districts: Downtown, Traditional Neighborhood, Traditional Marketplace Corridor, and Traditional Workplace.

*NOTE: Shelter AND bench may be provided if space and need allows. Do not locate trash receptacle on ADA wheelchair landing pad or within the 5-ft pedestrian access route.

SD-6A: Boarding Area - Sidewalk > 10-ft

*NOTE: Provide 12-in MIN. clearance between building face and exterior of shelter to aid in trash and debris removal.



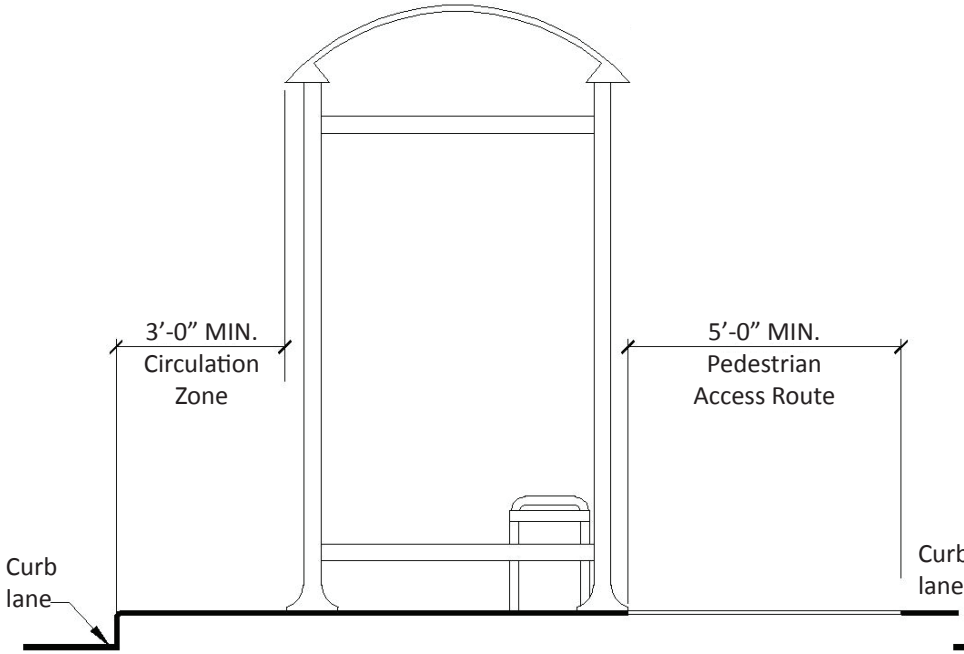
SD-5B: Boarding Area - Sidewalk ≤ 10-ft

*NOTE: Start bus stop zone a minimum of 5-ft MIN. from the edge of a crosswalk or end of a corner radius, whichever is further from the intersection. For near-side, signalized stops use 15-ft MIN. (25-ft preferably).

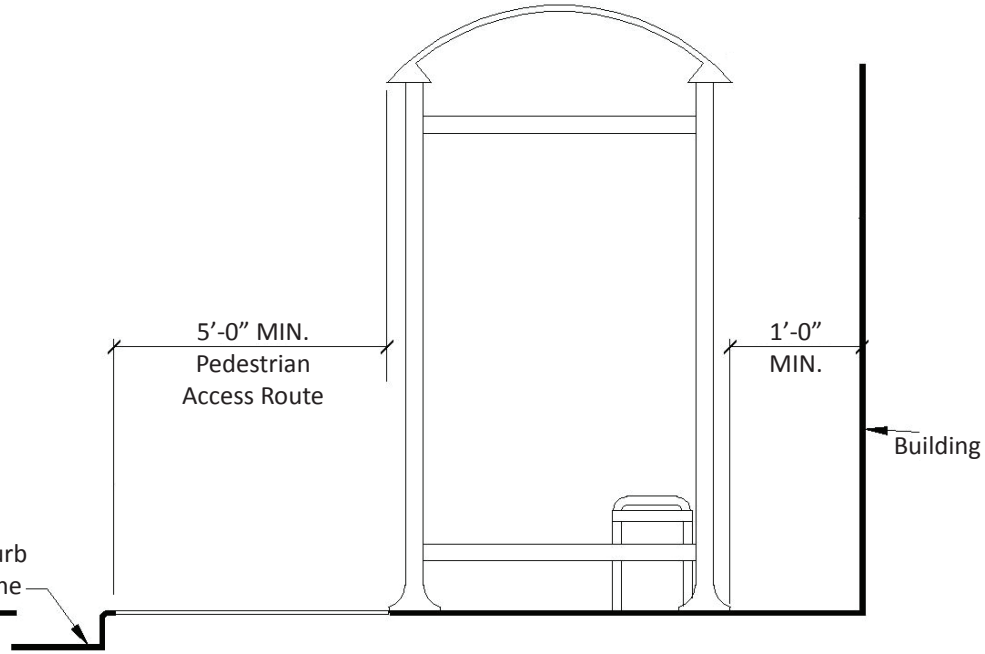
*NOTE: These standards are not intended to provide site-specific, detailed public transit, engineering, architectural, construction, legal or other information.

*NOTE: See SD-5A/ 5B for referenced plans.

*NOTE: These standards are not intended to provide site-specific, detailed public transit, engineering, architectural, construction, legal or other information.

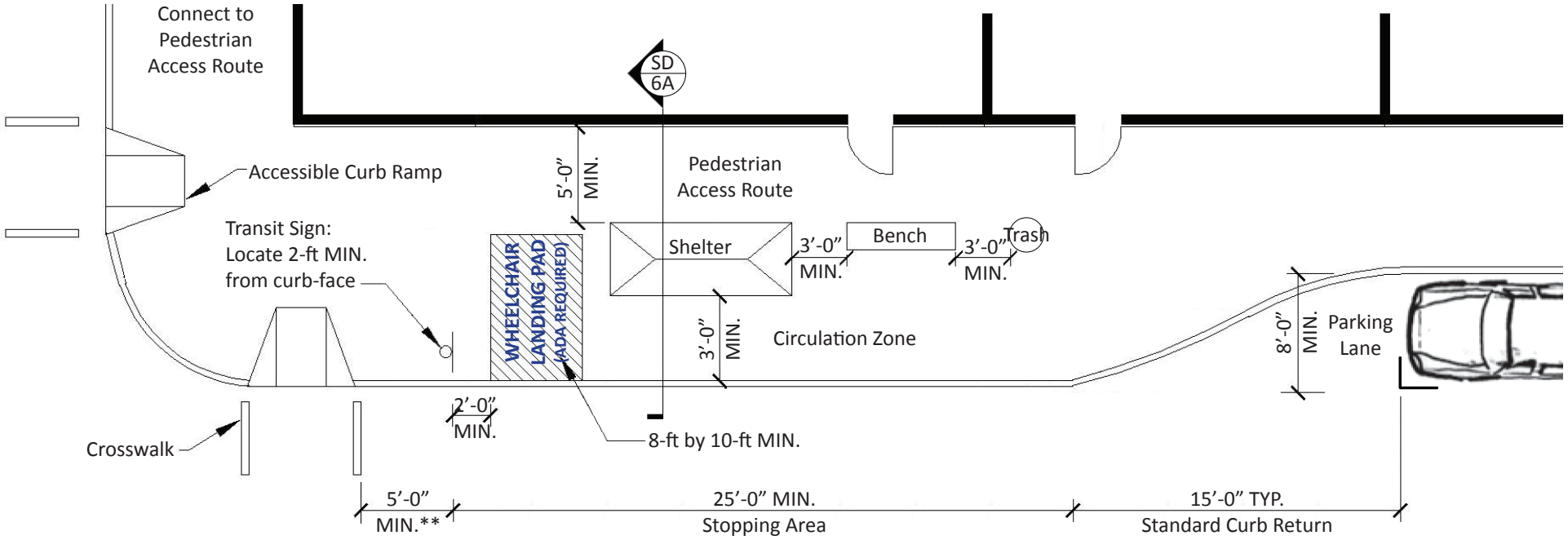


SD-6A: Boarding Area with Sidewalk > 10-ft Section



SD-6B: Boarding Area with Sidewalk < 10-ft Section

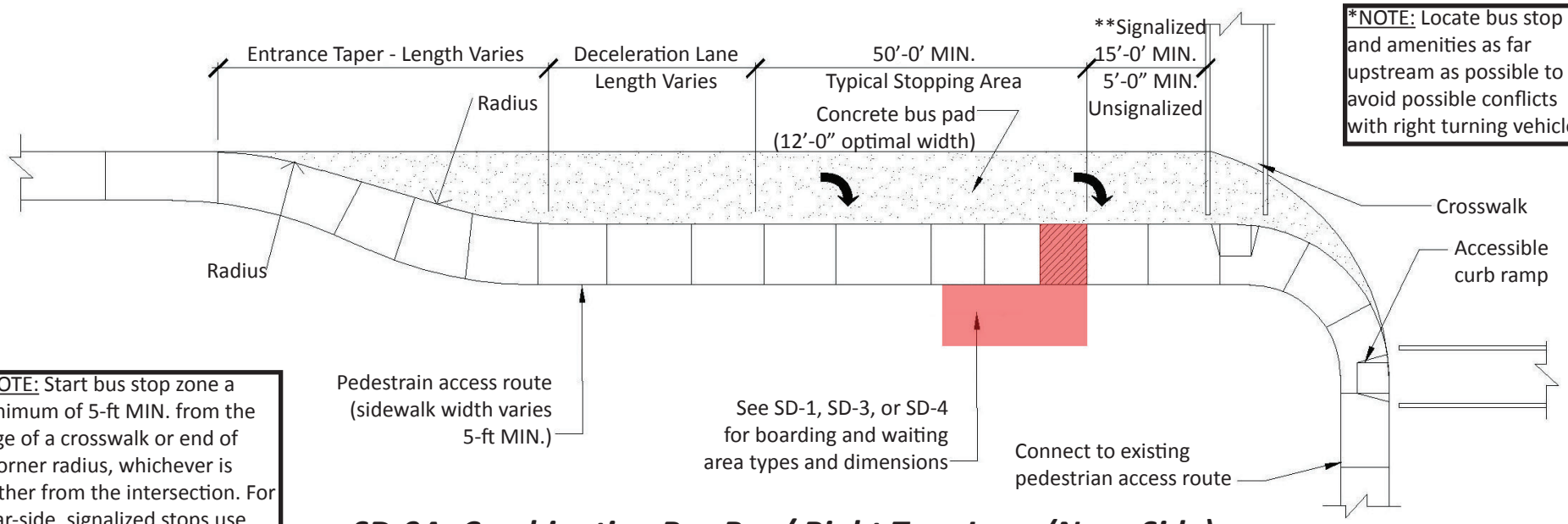
*NOTE: Shelter AND bench may be provided if space and need allows.



SD-8B: Typical Curb Extension (Bus-bulb)

*NOTE: Start bus stop zone a minimum of 5-ft MIN. from the edge of a crosswalk or end of a corner radius, whichever is further from the intersection. For near-side, signalized stops use 15-ft MIN. (25-ft preferably).

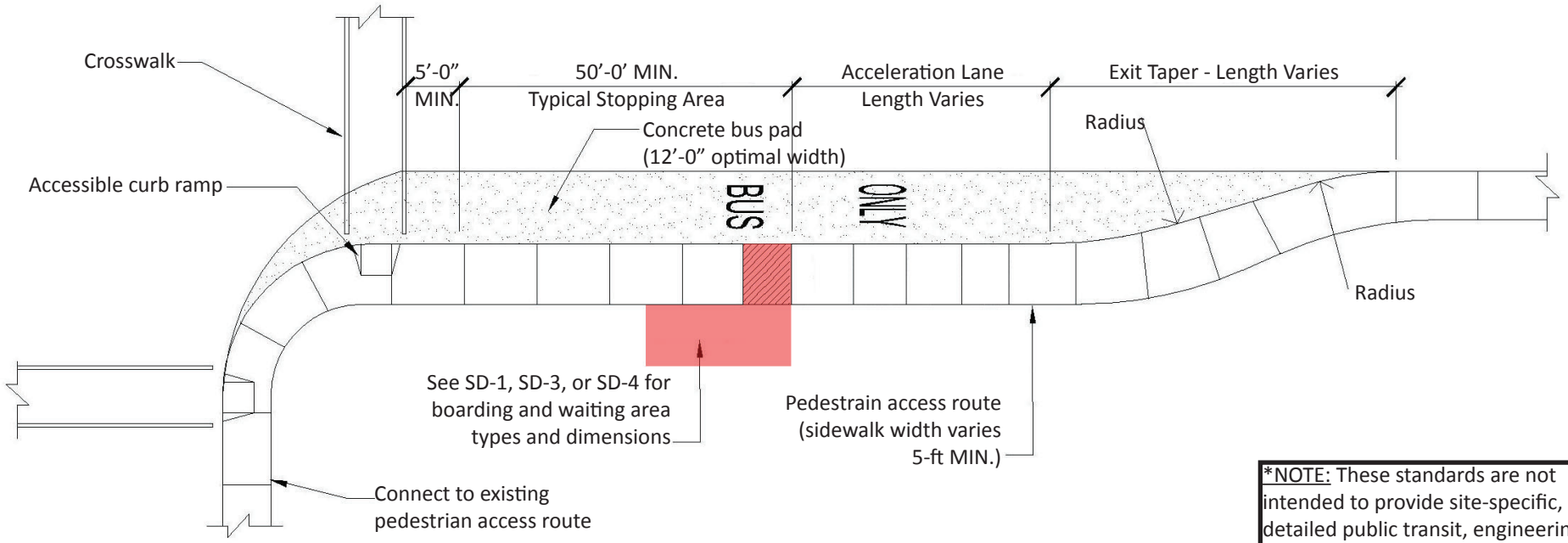
*NOTE: These standards are not intended to provide site-specific, detailed public transit, engineering, architectural, construction, legal or other information.



*NOTE: Locate bus stop and amenities as far upstream as possible to avoid possible conflicts with right turning vehicles.

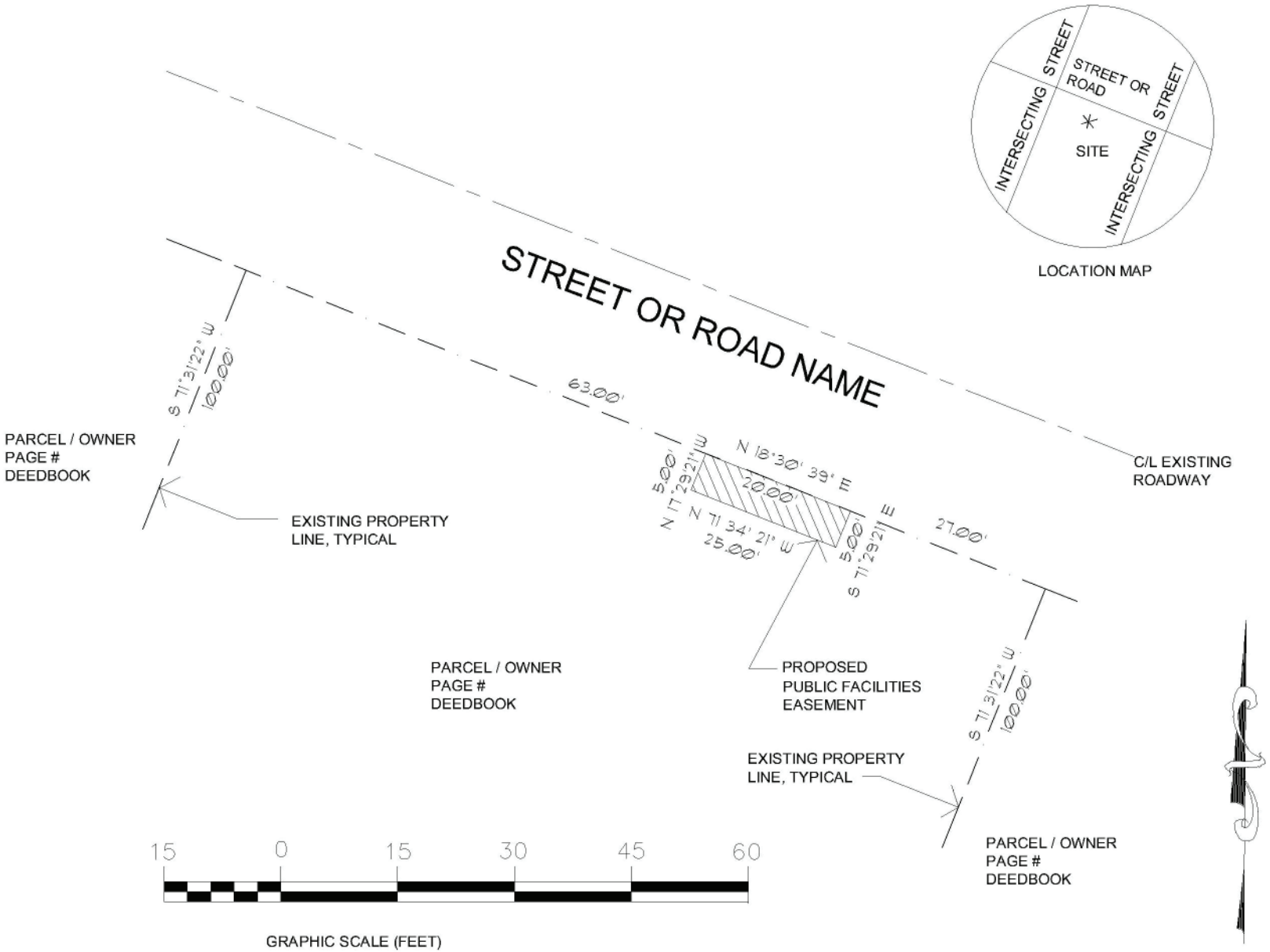
*NOTE: Start bus stop zone a minimum of 5-ft MIN. from the edge of a crosswalk or end of a corner radius, whichever is further from the intersection. For near-side, signalized stops use 15-ft MIN. (25-ft preferably).

SD-9A: Combination Bus Bay/ Right Turn Lane (Near-Side)



SD-9B: Open Bus Bay (Far-Side)

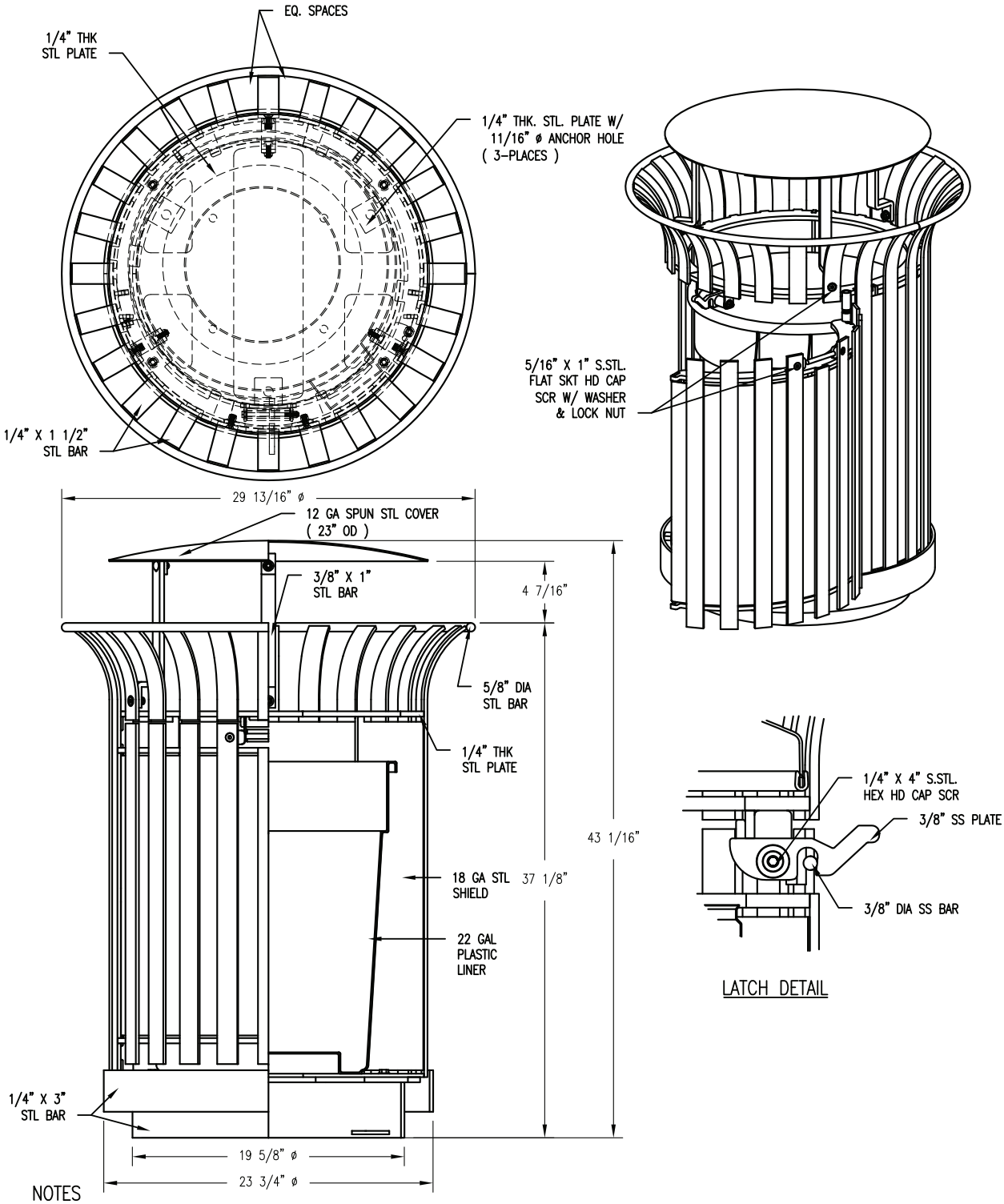
*NOTE: These standards are not intended to provide site-specific, detailed public transit, engineering, architectural, construction, legal or other information.



SD-10: Sample Public Facility Easement

*NOTE: These standards are not intended to provide site-specific, detailed public transit, engineering, architectural, construction, legal or other information.

APPENDIX **C**



LATCH DETAIL

NOTES

1.) ALL STL. MEMBERS COATED W/ ZINC RICH EPOXY THEN FINISHED W/ POLYESTER POWDER COATING.

2.) 1/2" X 3 3/4" EXPANSION ANCHOR BOLTS PROVIDED.

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SCALE : NONE	TITLE : RECEPTACLE			
DATE DRAWN : 11/14/03				
DRAWN BY : JSB	REV. E	DRAWING NUMBER 157-22-25BT	SHEET 1 OF 2	
DATE REV. : 12/17/09				
REV. BY : AWH				

Chase Park®

Product Drawing

Side Opening Litter Receptacle, With Lock

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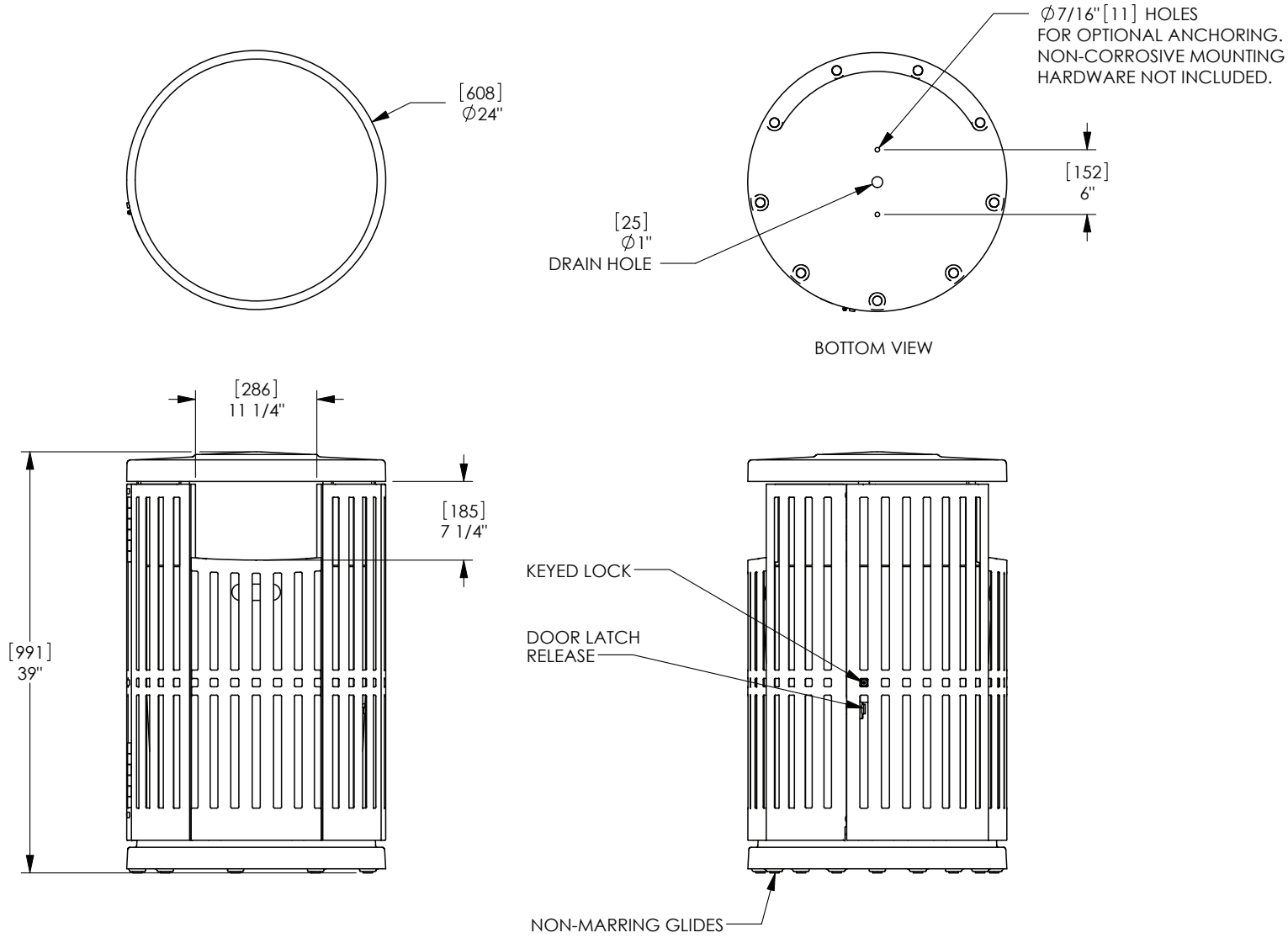
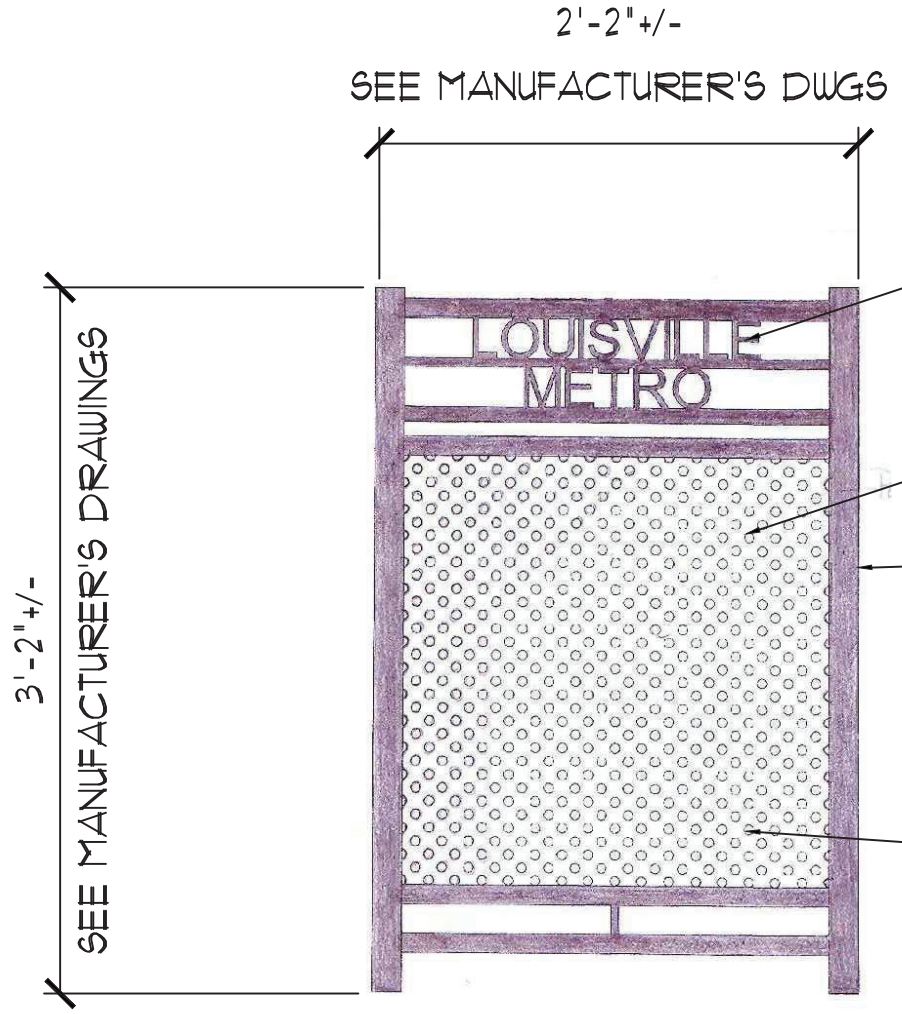


Drawing: CP362-02
Date: 8/5/2010
Dimensions are in Inches[mm]
U.S. Patent Nos.: D472,357; D481,507; D489,502



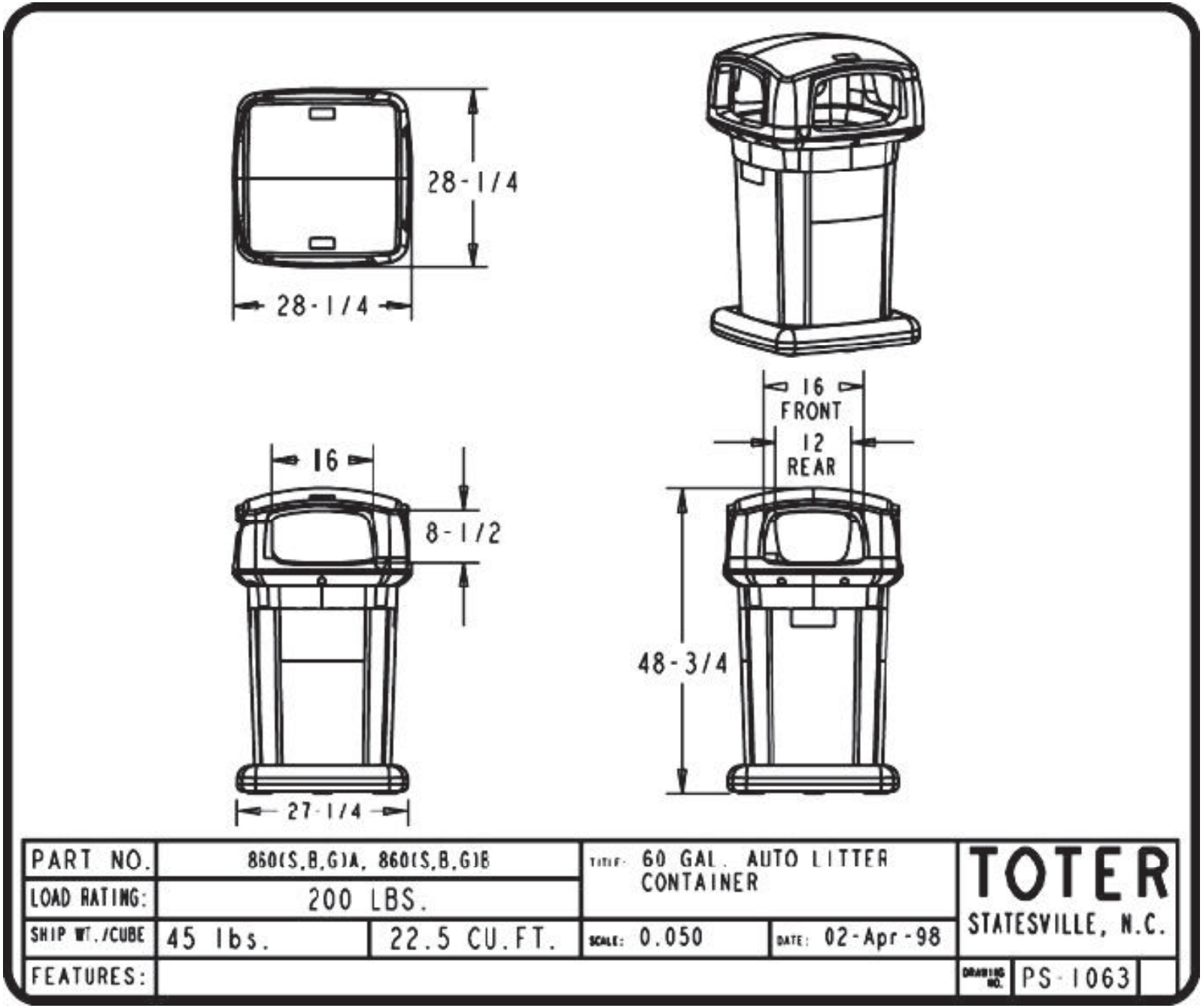
"CUSTOM DESIGNED" LETTERING, TYPICAL

PERFORATED METAL PLATE

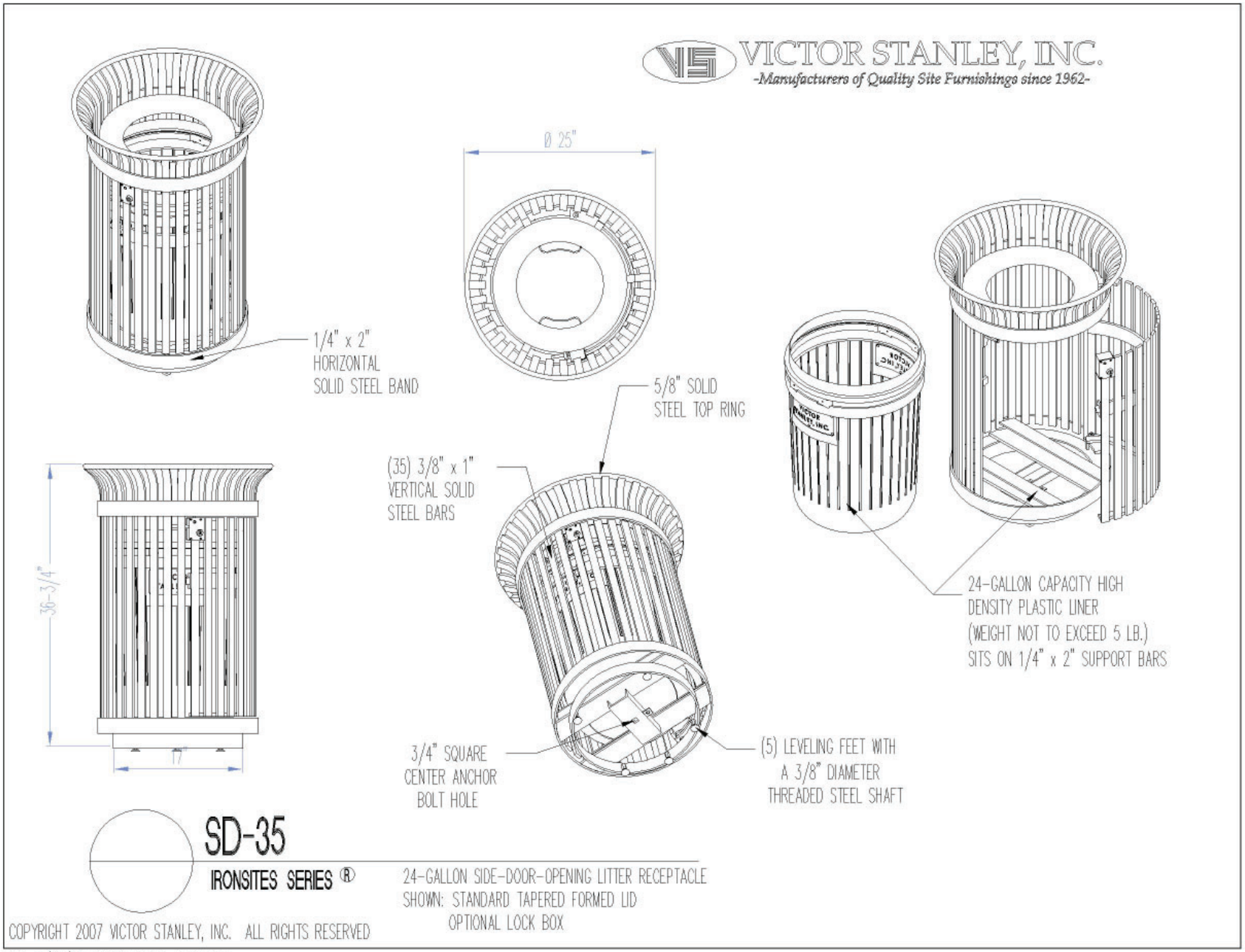
1 1/2" X 1 1/2" STEEL TUBE , PAINTED, WITH SCUFF RESISTANT COATING

PROVIDE REMOVABLE LINER, TYPICAL

OPPOSITE SIDE SIMILAR



PART NO.	860(S,B,G)A, 860(S,B,G)B		TITLE: 60 GAL. AUTO LITTER CONTAINER		TOTER STATESVILLE, N.C.
LOAD RATING:	200 LBS.				
SHIP WT./CUBE	45 lbs.	22.5 CU.FT.	SCALE: 0.050	DATE: 02-Apr-98	
FEATURES:				DRAWING NO.	PS-1063


VICTOR STANLEY, INC.
-Manufacturers of Quality Site Furnishings since 1962-
Ø 25"
1/4" x 2"
HORIZONTAL
SOLID STEEL BAND
5/8" SOLID
STEEL TOP RING
(35) 3/8" x 1"
VERTICAL SOLID
STEEL BARS
36-3/4"
17"
24-GALLON CAPACITY HIGH
DENSITY PLASTIC LINER
(WEIGHT NOT TO EXCEED 5 LB.)
SITS ON 1/4" x 2" SUPPORT BARS
3/4" SQUARE
CENTER ANCHOR
BOLT HOLE
(5) LEVELING FEET WITH
A 3/8" DIAMETER
THREADED STEEL SHAFT
SD-35
IRONSITES SERIES ®
24-GALLON SIDE-DOOR-OPENING LITTER RECEPTACLE
SHOWN: STANDARD TAPERED FORMED LID
OPTIONAL LOCK BOX
COPYRIGHT 2007 VICTOR STANLEY, INC. ALL RIGHTS RESERVED
REV. 7/16/07 DRAWN M.C.W. 2007-259

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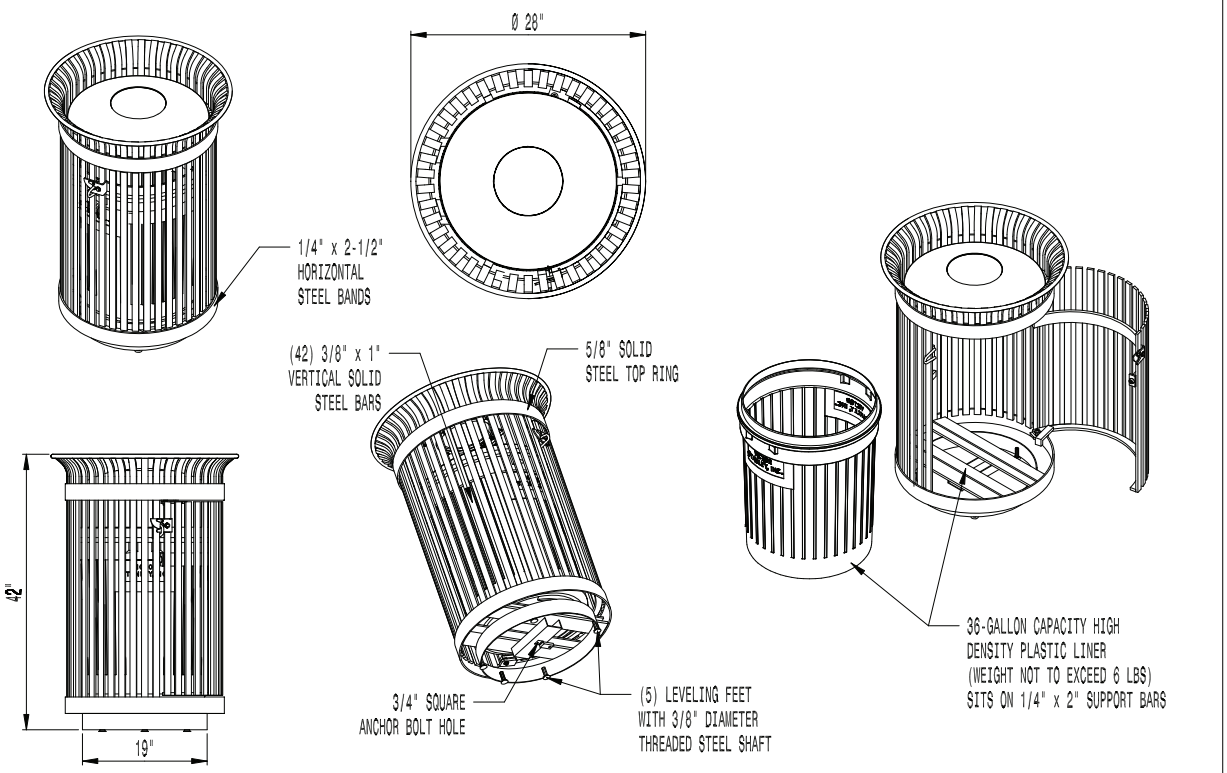


AVAILABLE OPTIONS

POWDER COATING

11 STANDARD COLORS, CUSTOM COLORS (INCLUDING THE RAL RANGE).

CUSTOM PLAQUES & DECALS

AVAILABLE WITH STEEL PLAQUES IN VARIOUS SIZES AND PRESSURE SENSITIVE VINYL OUTDOOR DECALS.

LIDS

STANDARD TAPERED FORMERED LID. AVAILABLE WITH OPTIONAL DOME LID, DOME LID WITH ASHTRAY, RAIN BONNET LID, RAIN BONNET LID WITH ASHTRAY, CONVEX LID AND CONVEX LID WITH SELF CLOSING DOOR (AS SHOWN).

SECURITY

SHOWN WITH STANDARD LOCKABLE LATCH AVAILABLE WITH OPTIONAL KEYED LOCK BOX. LID RIVETED IN PLACE. AVAILABLE WITH OPTIONAL MOUNT WITH 3 IN-LINE ANCHOR HOLES AND OPTIONAL BOTTOM PLATE COVER.

NOTES:

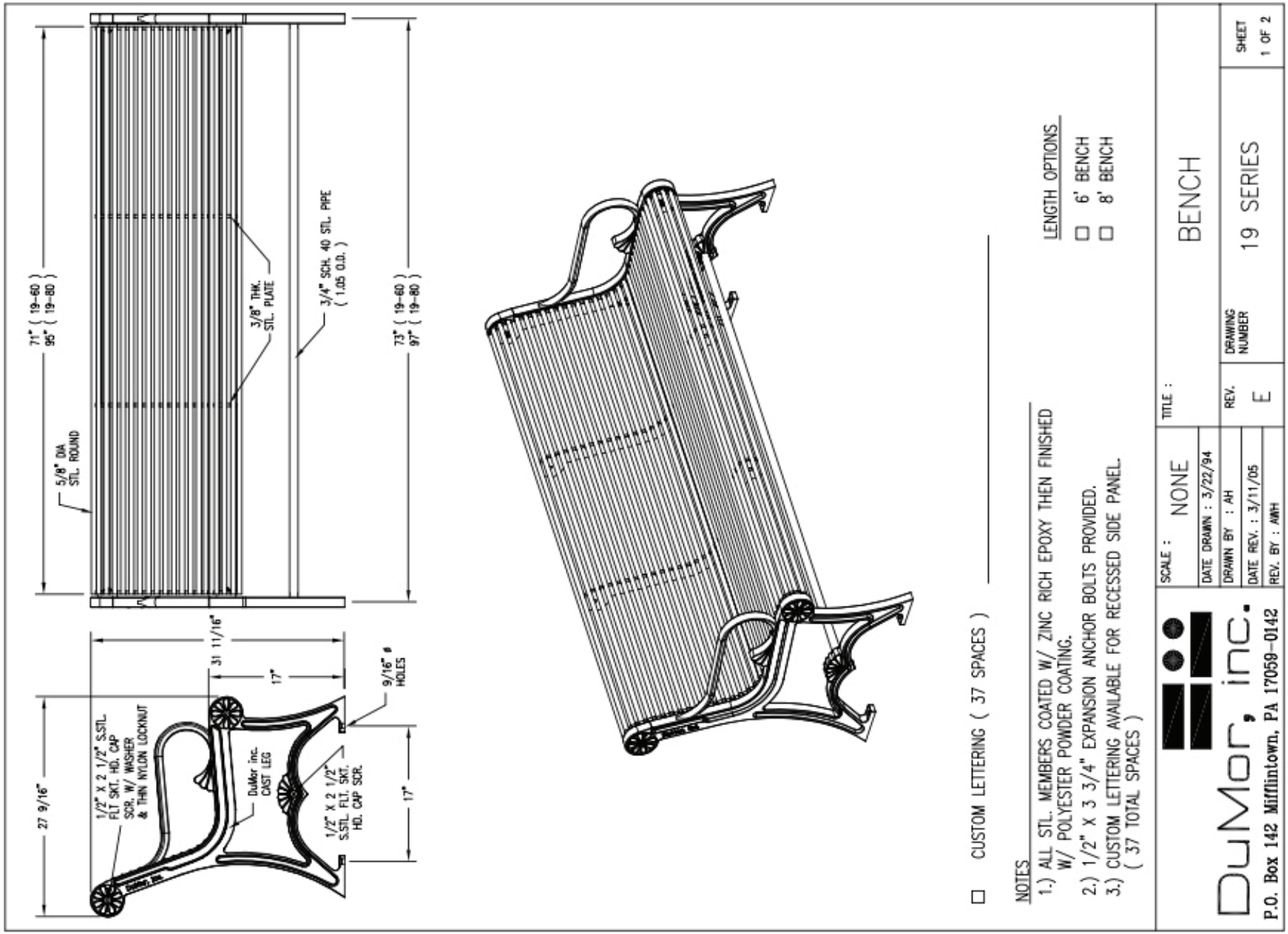
1. DRAWINGS NOT TO SCALE. DO NOT SCALE DRAWINGS.
2. ALL FABRICATED METAL COMPONENTS ARE STEEL SHOTBLASTED, ETCHED, PHOSPHATIZED, PREHEATED, AND ELECTROSTATICALLY POWDER-COATED WITH T.G.I.C. POLYESTER POWDER COATINGS. PRODUCTS ARE FULLY CLEANED AND PRETREATED, PREHEATED AND COATED WHILE HOT TO FILL CREVICES AND BUILD FILM COATING. COATED PARTS ARE THEN FULLY CURED TO COATING MANUFACTURER'S SPECIFICATIONS. THE THICKNESS OF THE RESULTING FINISH AVERAGES 8-10 MILS (200-250 MICRONS).
3. OIL IMPREGNATED BRONZE BUSHINGS AND STAINLESS STEEL PIVOT PINS FOR DOOR MOVEMENT, STANDARD 3/16" SOLID STEEL LATCH ASSEMBLY OR OPTIONAL PATENTED STAINLESS STEEL KEYED LOCK ASSEMBLY.
4. THIS VICTOR STANLEY, INC. PRODUCT MUST BE PERMANENTLY AFFIXED TO THE GROUND. CONSULT YOUR LOCAL CODES FOR REGULATIONS.
5. VICTOR STANLEY, INC., PLASTIC INNER LINERS ARE MOLDED ON TOOLING DESIGNED FOR AND OWNED BY VICTOR STANLEY, INC. THEY OFFER MAXIMUM CAPACITY AND STRENGTH WITH LIGHTWEIGHT CONSTRUCTION USING CRITICAL MOLDED RIBS, INTEGRAL HANDHOLDS, AND HIGH-STRENGTH MATERIALS. THIS MINIMIZES HANDLING DIFFICULTY AND FACILITATES EASY EMPTYING AND STORAGE WHILE AFFORDING LONG SERVICE LIFE.
6. ANCHOR BOLT NOT PROVIDED BY VICTOR STANLEY, INC.
7. FOR HIGH SALT ABUSIVE CLIMATES, HOT DIP GALVANIZING BEFORE POWDER COATING IS AVAILABLE. SEE WRITTEN SPECIFICATIONS FOR DETAILS.
8. ALL SPECIFICATIONS ARE SUBJECT TO CHANGE. CONTACT MANUFACTURER FOR DETAILS.
9. THIS PRODUCT IS SHIPPED FULLY ASSEMBLED.

SD-42

IRONSITES® SERIES

36-GALLON SIDE-DOOR-OPENING LITTER RECEPTACLE
SHOWN: CONVEX LID WITH SELF-CLOSING DOOR

REV. 7/30/09 DRAWN J.D.R. 2008-457


71" (19-60)
95" (19-80)
5/8" DIA STL. ROUND
3/8" THK. STL. PLATE
3/4" SCH. 40 STL. PIPE (1.05 O.D.)
73" (19-60)
97" (19-80)
27 9/16"
1/2" X 2 1/2" S.STL. FLT SKT. HD. CAP SCR. W/ WASHER & THIN NYLON LOCKNUT
DuMor inc. CAST LEG
31 11/16"
17"
9/16" ø HOLES
1/2" X 2 1/2" S.STL. FLT. SKT. HD. CAP SCR.
17"
☐ CUSTOM LETTERING (37 SPACES) _____
LENGTH OPTIONS
☐ 6' BENCH
☐ 8' BENCH
NOTES
1.) ALL STL. MEMBERS COATED W/ ZINC RICH EPOXY THEN FINISHED W/ POLYESTER POWDER COATING.
2.) 1/2" X 3 3/4" EXPANSION ANCHOR BOLTS PROVIDED.
3.) CUSTOM LETTERING AVAILABLE FOR RECESSED SIDE PANEL. (37 TOTAL SPACES)
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SCALE : NONE
DATE DRAWN : 3/22/94
DRAWN BY : AH
DATE REV. : 3/11/05
REV. BY : AWH
TITLE : BENCH
REV. E
DRAWING NUMBER 19 SERIES
SHEET 1 OF 2

Scarborough™

Bench, 72" Backed, with Horizontal Strap Seat

Product Drawing

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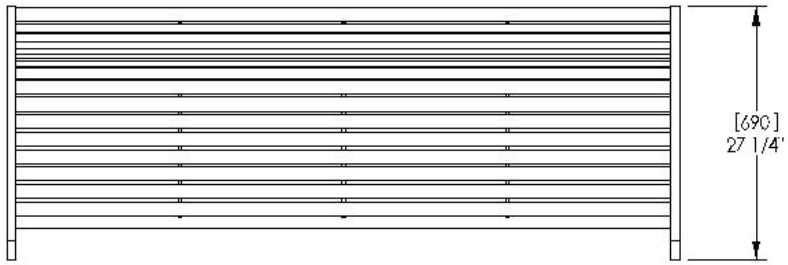

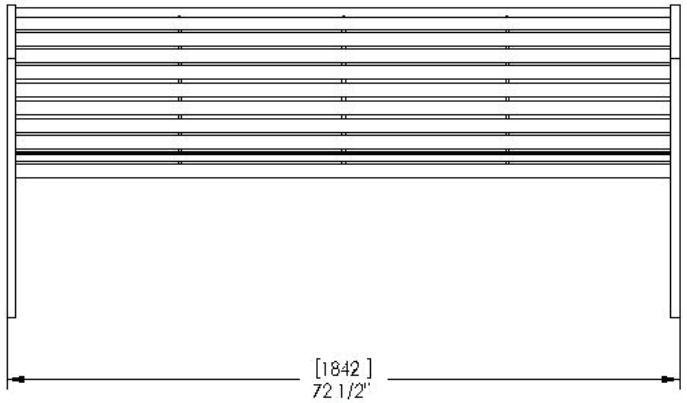

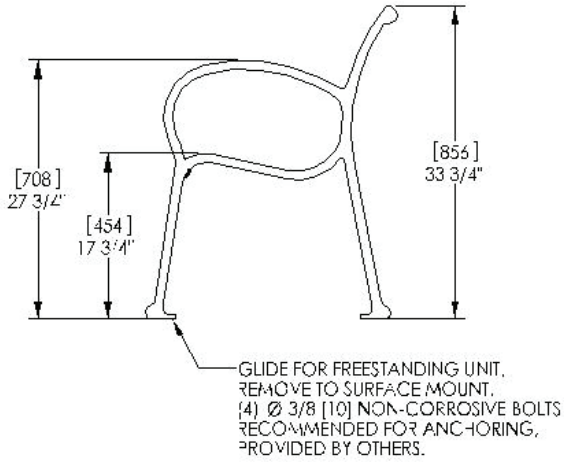

Drawing: SC175-03
Date: 5/19/2010
Dimensions are in Inches[mm]

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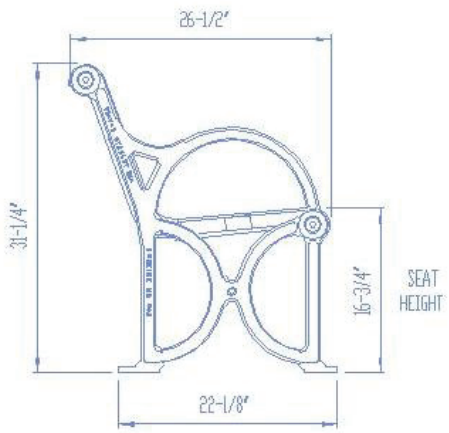

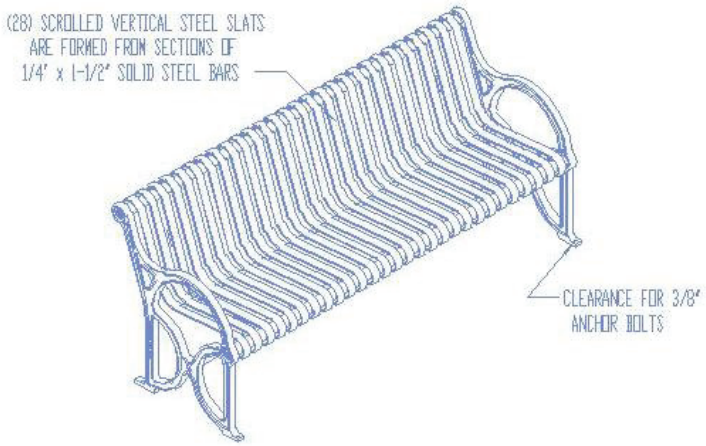

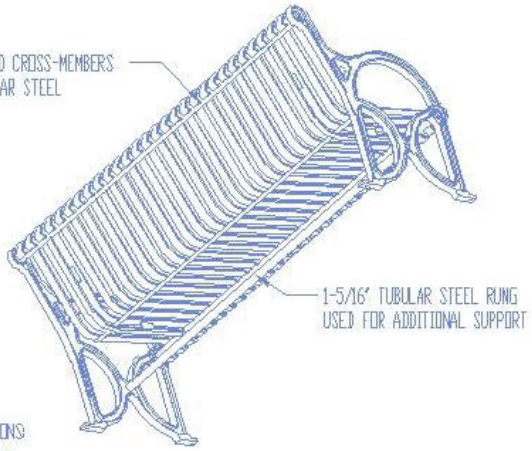

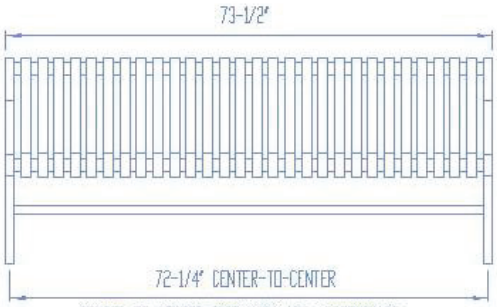

CENTER-TO-CENTER DISTANCES ARE APPROXIMATE
(VARIATIONS IN CASTINGS ARISE FROM DIFFERENT RATES OF COOLING)

AVAILABLE OPTIONS

POWDER COATING
10 STANDARD COLORS, CUSTOM COLORS (INCLUDING THE RAL RANGE)

CUSTOM PLAQUES
ENGRAVED CAST BRONZE PLAQUES

INTERMEDIATE & CENTER ARMRESTS
4', 6', & 8' AVAILABLE WITH OPTIONAL ARMRESTS

LENGTHS
STANDARD 4'
STANDARD 6' LENGTH SHOWN
STANDARD 8'

NOTES:

1. DUCTILE IRON CASTINGS COME WITH A TEN YEAR WARRANTY AGAINST BREAKAGE.
2. DRAWING NOT TO SCALE. DO NOT SCALE DRAWINGS.
3. ALL FABRICATED METAL COMPONENTS ARE STEEL SHOTBLASTED, ETCHED, PHOSPHATIZED, PREHEATED, AND ELECTROSTATICALLY POWDER-COATED WITH T.G.I.C. POLYESTER POWDER COATINGS. PRODUCTS ARE FULLY CLEANED AND PRETREATED, PREHEATED AND COATED WHILE HOT TO FILL CREVICES AND BUILD COATING FILM. COATED PARTS ARE THEN FULLY CURED TO COATING MANUFACTURER'S SPECIFICATIONS. THE THICKNESS OF THE RESULTING FINISH COAT AVERAGES 8-10 MILS (200-250 MICRONS).
4. IT IS NOT RECOMMENDED TO LOCATE ANCHOR BOLTS UNTIL BENCH IS IN PLACE. THIS VICTOR STANLEY, INC. PRODUCT MUST BE PERMANENTLY AFFIXED TO THE GROUND. CONSULT YOUR LOCAL CODES FOR REGULATIONS.
5. ANCHOR BOLTS NOT PROVIDED BY VICTOR STANLEY, INC.
6. FOR HIGH SALT ABUSIVE CLIMATES, HOT DIP GALVANIZING BEFORE POWDER COATING IS AVAILABLE. SEE WRITTEN SPECIFICATIONS FOR DETAILS.
7. ALL SPECIFICATIONS ARE SUBJECT TO CHANGE. CONTACT MANUFACTURER FOR DETAILS.
8. THIS PRODUCT IS SHIPPED FULLY ASSEMBLED.

CR-18

CITY SITES SERIES™ STANDARD BENCH WITH DUCTILE IRON END FRAMES
SHOWN: STANDARD 6-FOOT LENGTH

Victor Stanley: CR-18 Bench

VICTOR STANLEY, INC.®

-Manufacturers of Quality Site Furnishings since 1962-

P.O. DRAWER 330 - DUNKIRK, MD 20754-USA
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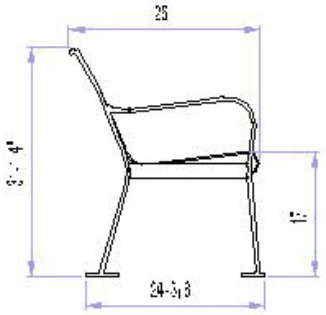
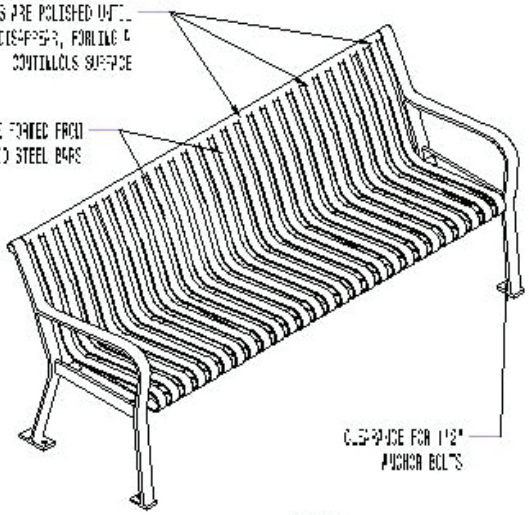
WEB SITE: HTTP://WWW.VICTORSTANLEY.COM

* ALL DIMENSIONS ARE IN INCHES *



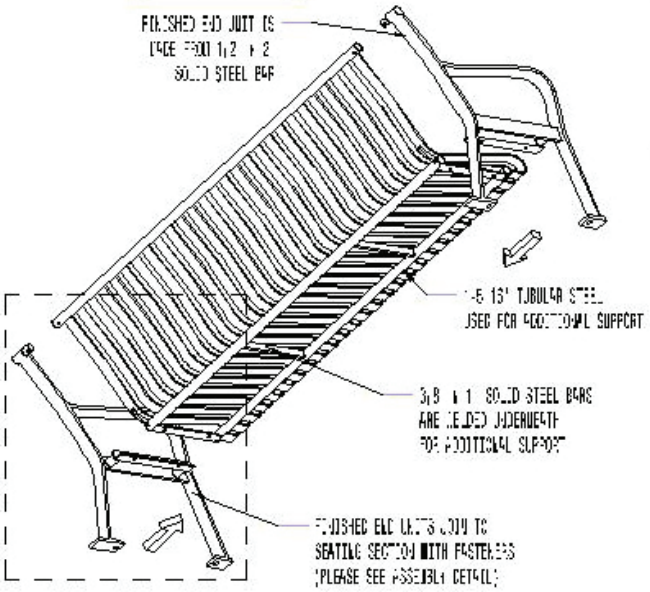
FRONT LEGS ARE POLISHED UNTIL THEY DISAPPEAR, FORMING A CONTINUOUS SURFACE

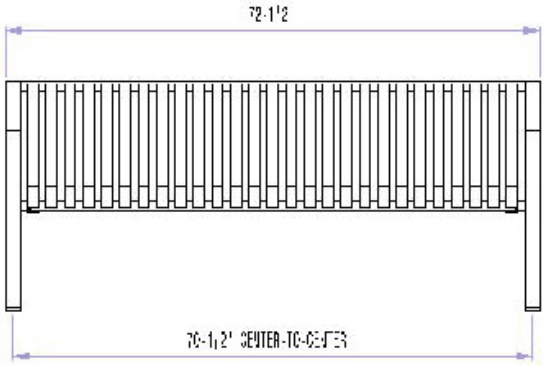
(27) STEEL SLATS ARE FORMED FROM 1/2" x 1-1/2" SOLID STEEL BARS



CLEARANCE FOR 1/2" ANCHOR BOLTS

FINISHED END JOINT IS MADE FROM 1/2" x 2" SOLID STEEL BAR





AVAILABLE OPTIONS

POWDER COATING

12 STANDARD COLORS, CUSTOM COLORS (INCLUDING THE RAL RANGE)

INTERMEDIATE & CENTER ARMRESTS

4", 6", & 8" AVAILABLE WITH OPTIONAL SOLID STEEL ARMRESTS

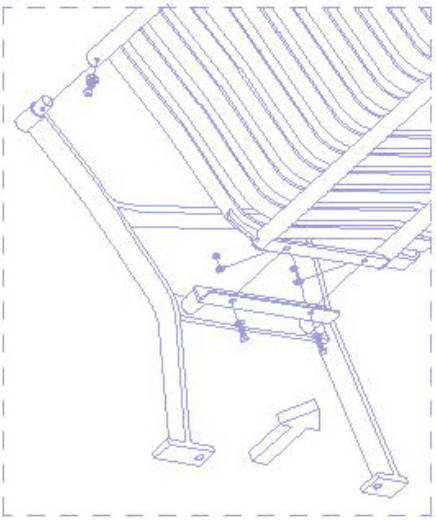
LENGTHS

STANDARD 4'

STANDARD 6' LENGTH SHOWN

STANDARD 8'

ASSEMBLY DETAIL



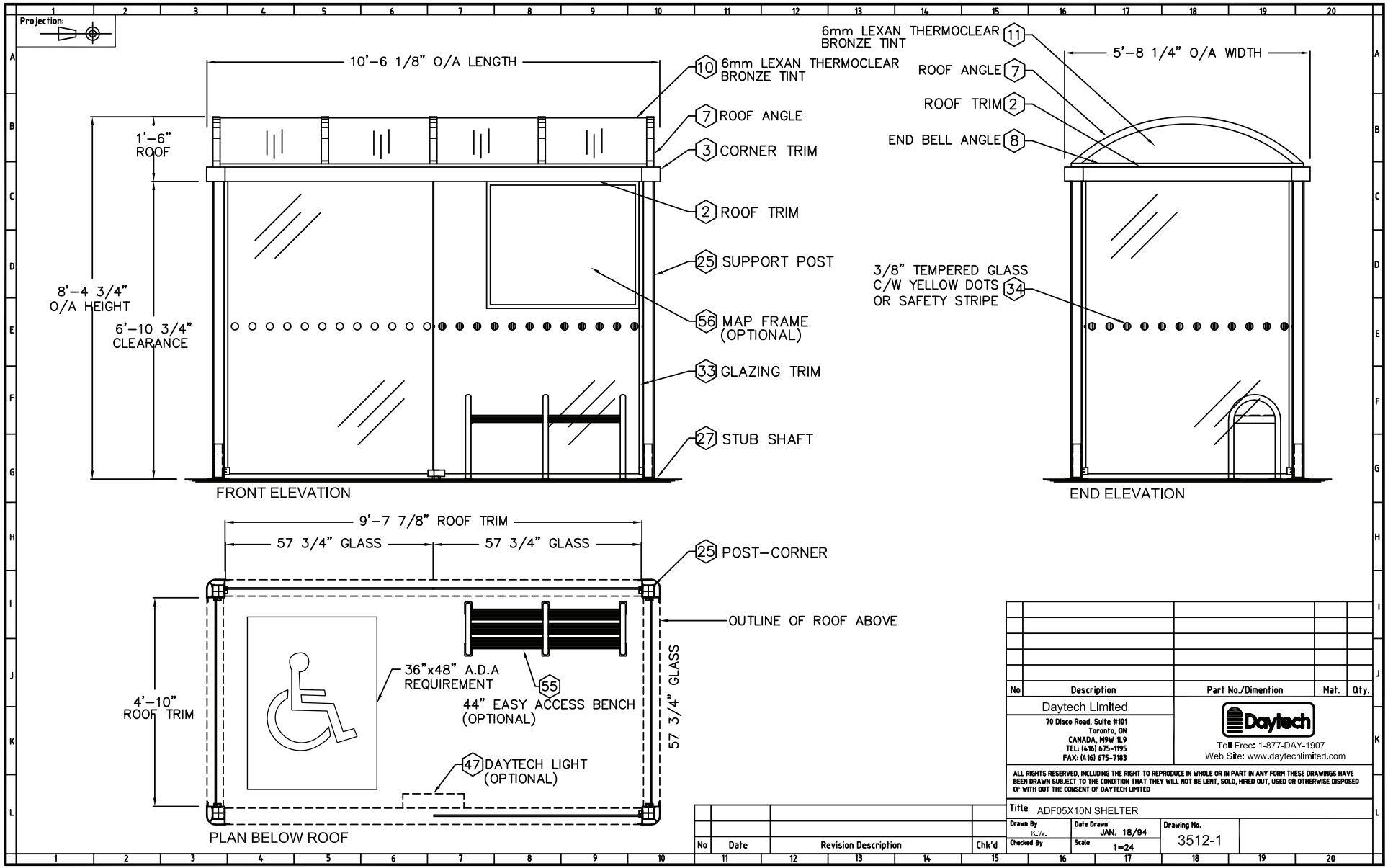
NOTES:

1. DRAWINGS NOT TO SCALE. DO NOT SCALE DRAWINGS.
2. ALL FABRICATED METAL COMPONENTS ARE STEEL SHOT-BLASTED, ETCHED, PHOSPHATIZED, PREHEATED, AND ELECTROSTATICALLY POWDER-COATED WITH T.G.I.C. POLYESTER POWDER COATINGS. PRODUCTS ARE FULLY CLEANED AND PRETREATED, PREHEATED AND COATED WHILE HOT TO FULL SPECIFICATIONS AND BOLD COATING FILM. COATED PARTS ARE THEN FULLY CURED TO COATING MANUFACTURER'S SPECIFICATIONS. THE THICKNESS OF THE RESULTING FINISH AVERAGES 3-10 MILS (200-250 MICRONS).
3. IT IS NOT RECOMMENDED TO LOCATE ANCHOR BOLTS UNTIL BENCH IS IN PLACE. THIS VICTOR STANLEY, INC. PRODUCT MUST BE PERMANENTLY AFFIXED TO THE GROUND. CONSULT YOUR LOCAL CODES FOR REGULATIONS.
4. ANCHOR BOLTS NOT PROVIDED BY VICTOR STANLEY, INC.
5. FOR HIGH SEAT ADJUSTABLE SLOPES, HOT DIP GALVANIZING BEFORE POWDER COATING IS AVAILABLE. SEE LETTER SPECIFICATIONS FOR DETAILS.
6. ALL SPECIFICATIONS ARE SUBJECT TO CHANGE. CONTACT MANUFACTURER FOR DETAILS.
7. THIS PRODUCT IS SHIPPED PARTIALLY UNASSEMBLED.

RB-28

STEELSITES™ RB SERIES

ALL STEEL CONTOURED BENCH
SHOWN: STANDARD 6-FOOT LENGTH


Projection:
10'–6 1/8" O/A LENGTH
1'–6" ROOF
8'–4 3/4" O/A HEIGHT
6'–10 3/4" CLEARANCE
10 6mm LEXAN THERMOCLEAR BRONZE TINT
7 ROOF ANGLE
3 CORNER TRIM
2 ROOF TRIM
25 SUPPORT POST
56 MAP FRAME (OPTIONAL)
33 GLAZING TRIM
27 STUB SHAFT
FRONT ELEVATION
6mm LEXAN THERMOCLEAR BRONZE TINT 11
ROOF ANGLE 7
ROOF TRIM 2
END BELL ANGLE 8
5'–8 1/4" O/A WIDTH
3/8" TEMPERED GLASS C/W YELLOW DOTS OR SAFETY STRIPE 34
END ELEVATION
9'–7 7/8" ROOF TRIM
57 3/4" GLASS
57 3/4" GLASS
25 POST–CORNER
OUTLINE OF ROOF ABOVE
4'–10" ROOF TRIM
36"x48" A.D.A REQUIREMENT
55
44" EASY ACCESS BENCH (OPTIONAL)
47 DAYTECH LIGHT (OPTIONAL)
57 3/4" GLASS
PLAN BELOW ROOF
No Description Part No./Dimention Mat. Qty.
Daytech Limited
70 Disco Road, Suite #101
Toronto, ON
CANADA, M9W 1L9
TEL: (416) 675-1195
FAX: (416) 675-7183
Daytech
Toll Free: 1-877-DAY-1907
Web Site: www.daytechlimited.com
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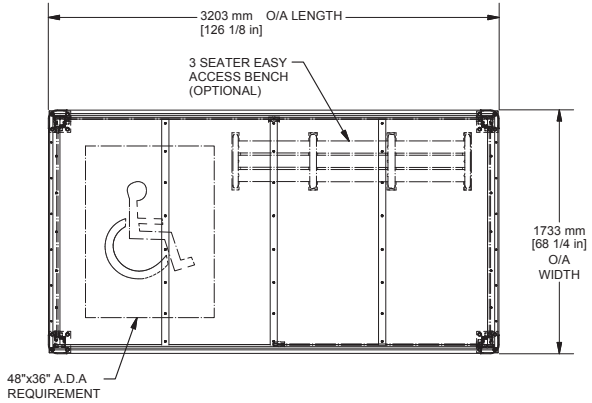
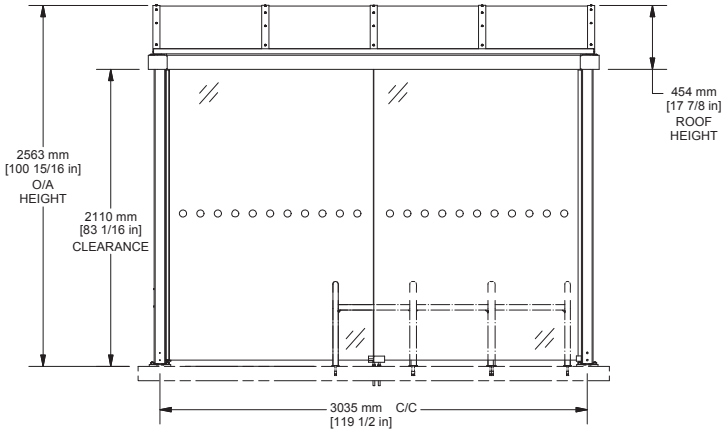
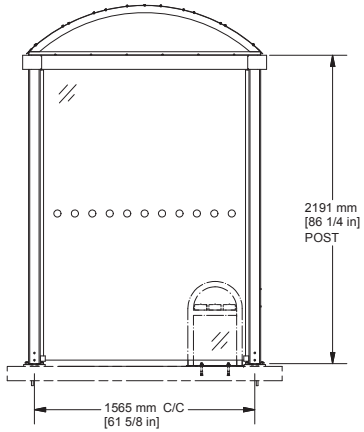
Title ADF05X10N SHELTER
Drawn By K.W.
Date Drawn JAN. 18/94
Drawing No. 3512-1
Checked By
Scale 1=24
No Date Revision Description Chk'd



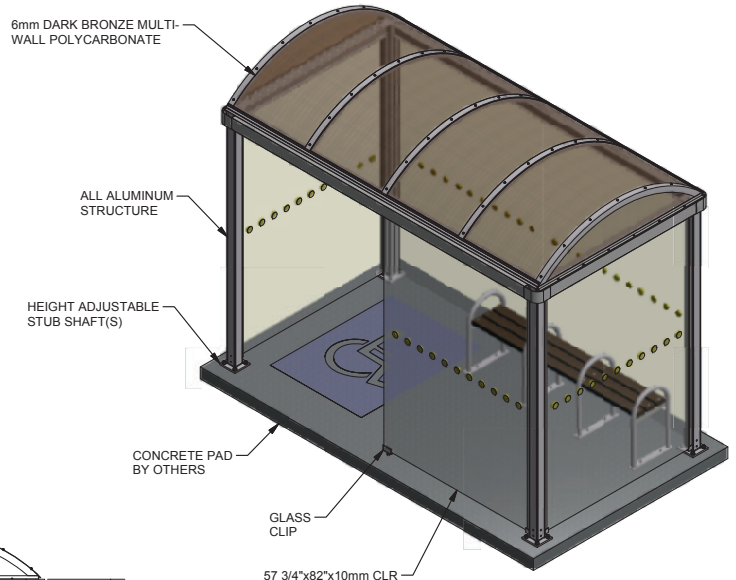
PLAN VIEW



FRONT ELEVATION



SIDE ELEVATION



NOTES:
1. COLOUR AS PER CUSTOMER SPEC
2. GLASS AS PER WORKORDER
3. ALL STAINLESS STEEL FASTENERS USED

No.	Date	Revision Description	By

Daytech
www.daytechlimited.com

Daytech Limited
70 Disco Road, Suite #101
Toronto ON M9W 1L9
CANADA
Tel: (416) 675-1195
Fax: (416) 675-7183
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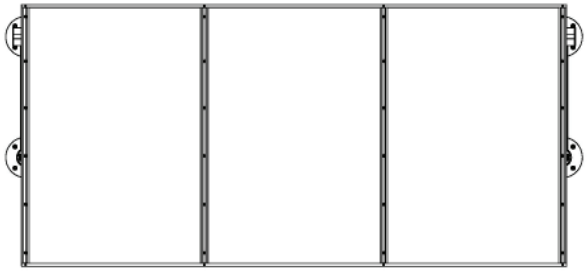
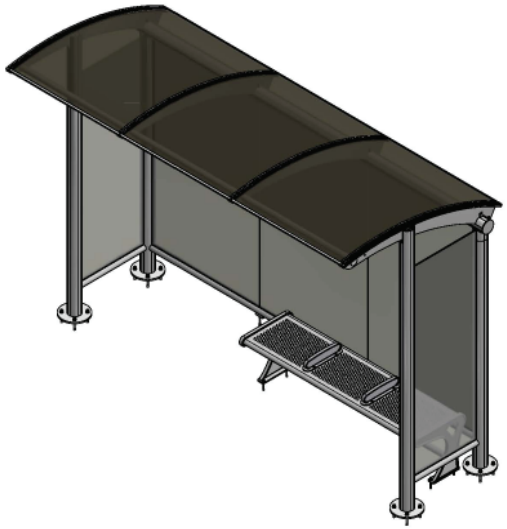
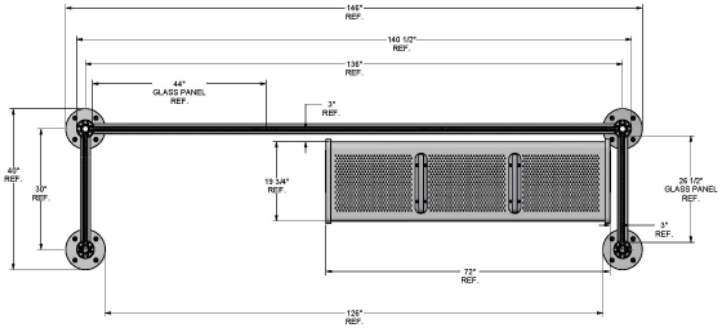
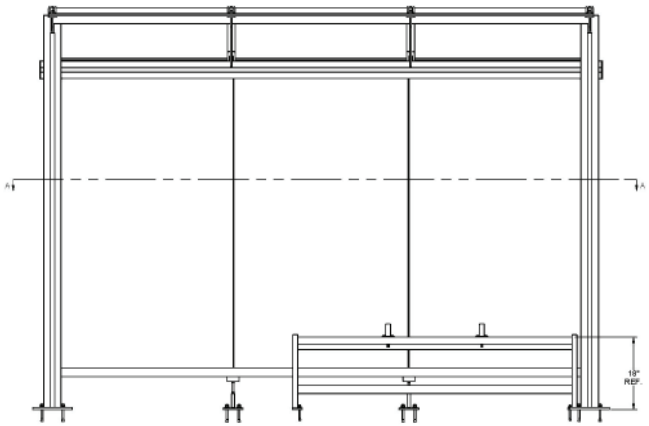
Title: ADF05X10N - 5'x10' BARREL ROOF SHELTER			
Drawn By: EP	Date Drawn: 5/22/2008	Drawing No.: 4063-1	Project No.
Checked By	Scale: NTS		

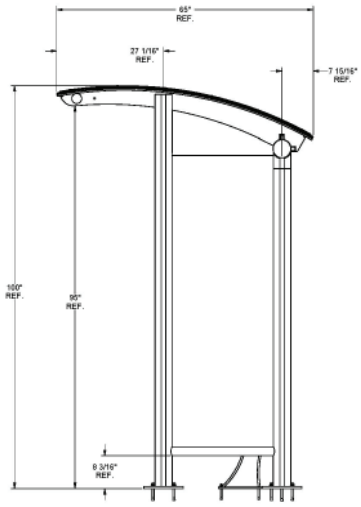






SECTION A-A





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MADISON HEIGHTS, MICHIGAN 48071
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LEAD TIME BEGINS UPON RECEIPT OF SIGNED APPROVAL.

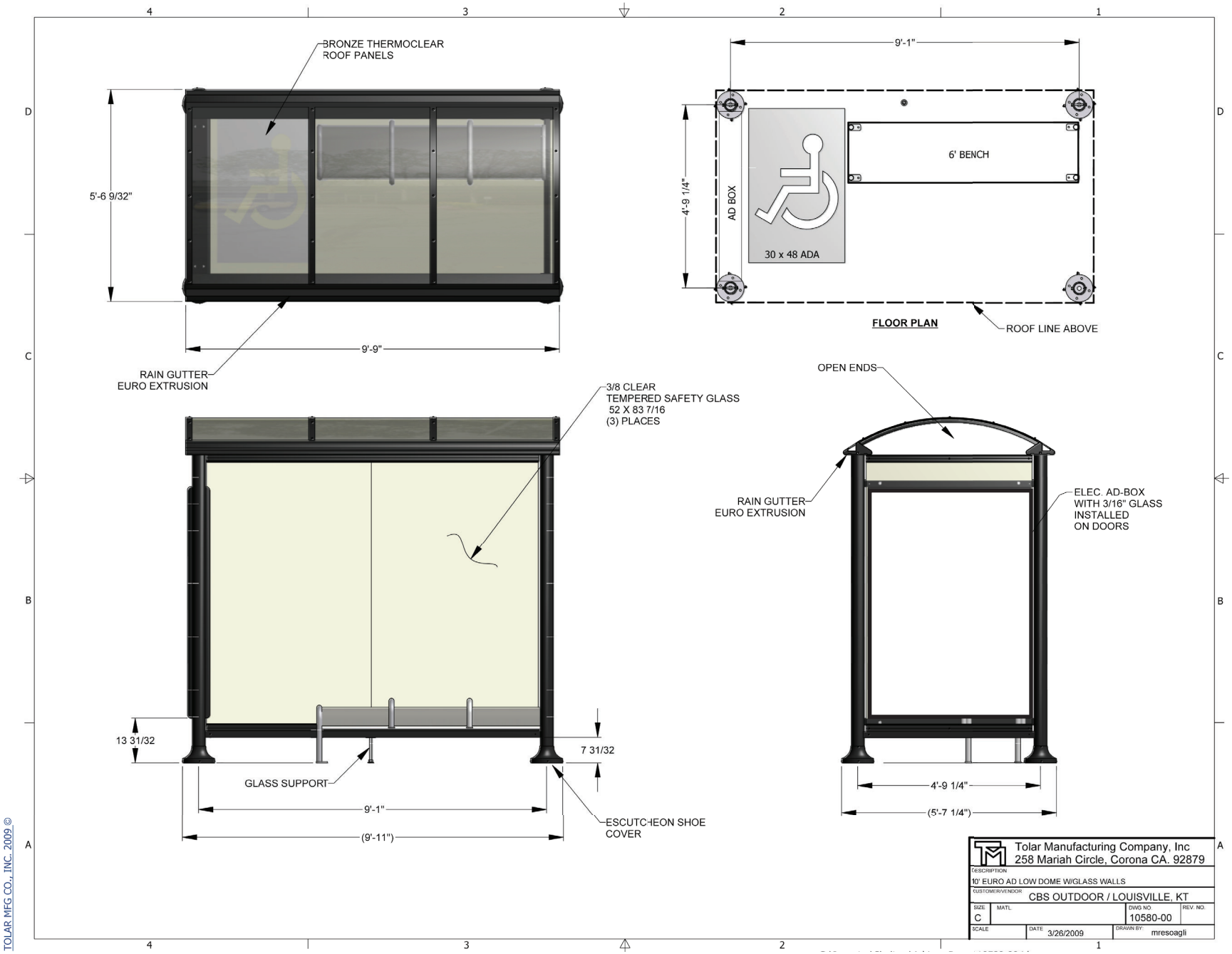
SIGNED:_____ DATE:_____

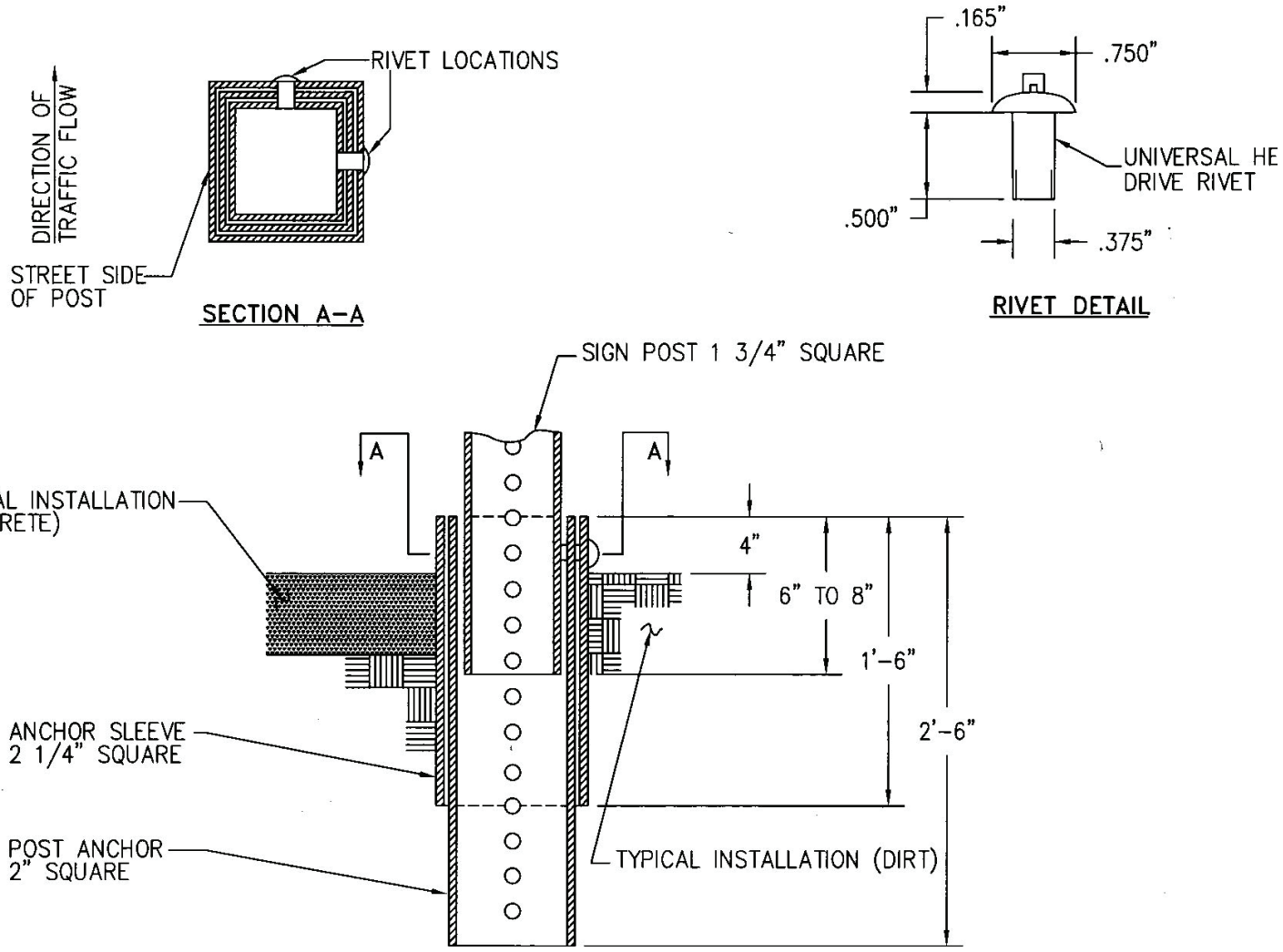
QUANTITY ( ) SHELTERS THUS:

SPECIFICATIONS:

POWDER COATED ALUMINUM STRUCTURE (RAL 9007 GREY ALUM.)
3/8" CLEAR TEMPERED SAFETY GLASS
ARCHED ROOF WITH BRONZE ACRYLIC GLAZING PANELS
6' INTERLUDE BENCH WITH PERFORATED SEAT AND SEAT DIVIDERS

BRASCO INTERNATIONAL, INC. 32400 INDUSTRIAL DR. MADISON HEIGHTS, MICHIGAN 48071 1-800-893-3665 WWW.BRASCO.COM	CUSTOMER: OUTFRONT MEDIA	DESIGN: BMB	CHECKED: NCR
THIS DRAWING IS PROPRIETARY AND IS FOR THE SOLE USE OF OUR CUSTOMERS AND MAY NOT BE REPRODUCED OR COPIED WITHOUT WRITTEN PERMISSION FROM BRASCO INTERNATIONAL.	PROJECT: ECLIPSE TRANSIT SHELTER	DATE: 9/5/17	DATE: 9/5/17
	MODEL: EC0512-C-AR-AC-25 JOB #	SHEET: A001	REVISION: A


BRONZE THERMOCLEAR
ROOF PANELS
5'-6 9/32"
9'-9"
RAIN GUTTER
EURO EXTRUSION
9'-1"
4'-9 1/4"
AD BOX
30 x 48 ADA
6' BENCH
FLOOR PLAN
ROOF LINE ABOVE
3/8 CLEAR
TEMPERED SAFETY GLASS
52 X 83 7/16
(3) PLACES
13 31/32
7 31/32
GLASS SUPPORT
9'-1"
(9'-11")
ESCUTCHEON SHOE
COVER
OPEN ENDS
RAIN GUTTER
EURO EXTRUSION
ELEC. AD-BOX
WITH 3/16" GLASS
INSTALLED
ON DOORS
4'-9 1/4"
(5'-7 1/4")
Tolar Manufacturing Company, Inc
258 Mariah Circle, Corona CA. 92879
DESCRIPTION
10' EURO AD LOW DOME W/GLASS WALLS
CUSTOMER/VENDOR
CBS OUTDOOR / LOUISVILLE, KT
SIZE
C
MATL
DWG NO.
10580-00
REV. NO.
SCALE
DATE
3/26/2009
DRAWN BY:
mresoagli
TOLAR MFG CO., INC. 2009 ©


RIVET LOCATIONS
DIRECTION OF TRAFFIC FLOW
STREET SIDE OF POST
SECTION A–A
.165"
.750"
UNIVERSAL HE DRIVE RIVET
.500"
.375"
RIVET DETAIL
SIGN POST 1 3/4" SQUARE
A
A
TYPICAL INSTALLATION (CONCRETE)
4"
6" TO 8"
1'–6"
2'–6"
ANCHOR SLEEVE 2 1/4" SQUARE
POST ANCHOR 2" SQUARE
TYPICAL INSTALLATION (DIRT)

APPENDIX **D**

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