Metro Transportation Facility Design Guidelines

March 1991

METRO
Municipality of Metropolitan Seattle

METRO TRANSPORTATION FACILITY DESIGN GUIDELINES

Municipality of Metropolitan Seattle

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ACKNOWLEDGEMENTS

The revision of the Metro Transportation Facility Design Guidelines was coordinated by Eileen Kadesh of the Service Development Division.

Special thanks are extended to the individuals who served on the work team that reviewed the document and provided updated information on specific facilities. Most of these staff persons are listed on page vi (Metro Contacts for Specific Facilities). Other individuals who served on the work team but are not listed include Sue Stewart (Safety and Training), Bob Carroll (Community Relations), Mike Bergman (Service Development) and Lanny Snyder (Capital Planning and Development).

Appreciation is also extended to Jack Lattemann of Service Development, Nancy Dudgeon of Word Processing, and Doug Hammond of Graphics for making this project possible.

To all the Metro staff who worked together to produce this document, thank you.

Paul Toliver
Director of Transit

INTRODUCTION

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The purpose of this document is to provide information concerning the guidelines and standards used by the Municipality of Metropolitan Seattle in the design of transit and ridesharing facilities. These guidelines are intended for use by state agencies, public works and planning departments, developers, and interested individuals. Metro's objective in providing this information is twofold. The primary objective is to encourage the inclusion of transit and ridesharing facilities in the initial design stages of new developments and roadway improvement projects. It is Metro's hope that this will enhance public transportation's ability to serve these new developments. In addition, costly and time consuming changes may be avoided which might otherwise delay the permit approval process. A secondary objective is to inform agency staffs and the general public how Metro sites and designs its facilities.

Rather than presenting detailed engineering specifications for each type of transportation facility, this document endeavors to provide an overview of each facility, including a definition of the facility, method of operation, basic dimensions, design criteria, and accepted standards. For additional details, outside agencies and individuals are invited to contact appropriate Metro staff at the phone numbers listed on page vi.

The dimensions presented in this document are intended as r mended standards. They may need to be modified in individual cases to meet constraints or applicable local, state, and federal land use and permit requirements

These <u>Transportation Facility Design Guidelines</u> are meant to serve as a companion document to Metro's <u>Transportation Service Guidelines</u> (revised), which describes the conditions for establishing and evaluating new and existing transit service, and <u>Encouraging Public Transportation through Effective Land Use Actions</u> (May 1987).

It should be noted that Rail and Bus Facility Design Guidelines are being prepared as part of Metro's High Capacity Transit Program. Once read, this information will be used for future facility siting and planning by Metro and other agencies, as appropriate.

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METRO CONTACTS FOR SPECIFIC FACILITIES

For additional details regarding facilities covered in this document, interested individuals should contact the designated Metro staff representatives at the phone numbers listed below or write to them at Metro at 821 Second Avenue, Mail Stop Number, Seattle, WA 98104.

It should also be noted that the Construction Information Center (684-1595) is the primary single source for receiving all information on construction projects affecting transit operations in King County. The Center is a centralized office where agencies, developers and contractors can provide information and have a single primary contact. In turn, this Center is responsible for distribution of information to the proper Metro divisions.

Facility Type	Metro Contact	Phone #	Mail Stop
Layover Space	Chuck Gehrts	684-1404	64
Transit Centers	John Earley	684-1637	51
Park-and-Ride Lots			
Permanent	Sondra Earley	684-1848	51
Leased	Paul Alexander	684-1 599	64
Bicycle Parking Facilities	Bob Flor	684-1611	64
HOV Facilities	Tanya Jimale	684-1853	64
Commuter Information Centers	Donna Stark	684-2692	CK
Bus Zones	Doug Johnson	684-1597	64
PassengerShelters	Paul Alexander	684-1599	64
Design Considerations for Access by Elderly and Disabled Passengers	Cathryn Rice	684-1601	64
Bus Stop Information Signs	Mary Kay Bauer	684-1566	42
Transit Vehicle Specifications	Mike Voris	684-1629	51
Vanpool Van Specifications	Syd Pawlowski	684-1542	60
TFASP	Paul Alexander	684-1 599	64
Trolley Overhead	Andrea Tull	684-1642	51

Section 1
Vehicle Specifications and Needs

VEHICLE SPECIFICATIONS

Metro's vehicle fleet includes standard 40-foot and 35-foot buses and 40-foot trolleys; articulated 60-foot buses, trolleys and dual power buses; and vans. The characteristics and requirements of each of these vehicles can affect roadway design.

I. Vehicle Fleet Composition

A. Current Fleet Size

As of February 1991, Metro's fleet (including vans) consisted of a total of 1,521 vehicles in the following categories:

587	Standard diesel buses
352	Articulated diesel buses (An articulated bus is a two-section bus permanently connected at a joint. Fifty percent longer than a standard bus, an articulated bus can bend around corners. It has three axles.)
109	Standard trolley buses (A trolley bus is electrically powered and draws its current from a pair of overhead trolley wires.)
46	Articulated trolley buses
143	Articulated dual-power buses (These buses can operate as a diesel bus and as a trolley bus.)
284	Vanpool vans

A total of 916 of these vehicles are accessible.

B. Buses on Order

93 articulated dual-power buses are yet to be delivered. They are accessible and will operate on routes scheduled through the downtown Seattle bus tunnel.

II. Future Transit Vehicle Specifications

Of the transit vehicles to be added to Metro's fleet in the future, standard buses will operate like the 40 foot buses in service today; articulated buses have a nonsteered third axle, which means that the inner turning radius is less than that for an articulated coach with a steered third axle.

Vehicle specifications for Metro's fleet are shown on pages 1-3 and 1-4.

III. Transit Vehicle Requirements

Special consideration needs to be given when designing new facilities to be used by transit buses. Compared to automobiles, transit vehicles have longer wheelbases, more overhang, are wider, longer and taller, and have slow acceleration rates.

A. Bus Wheelbases

A longer wheelbase means that buses need more space to turn corners. (See pages 1-6 and 1-7.) The longer overhang means that the approach and departure angles on a bus are less than those on a car. Buses cannot negotiate changes in grade as well as cars. "Crest" vertical curves, such as those on the west sides of First through Fifth Avenues in downtown Seattle, are negotiable by transit buses if there is adequate vertical clearance midway between the axles. "Sag" vertical curves, such as those on the east side of First through Fifth Avenues in downtown Seattle, are negotiable by transit buses if there is adequate vertical clearance below the wheelchair lift, the front bumper and the rear bumper.

B. Bus Width and Length

The width and length of buses affect parking space size, lane width, and room for turning maneuvers. The height of buses must be considered when designing sky bridges, projecting canopies, etc.

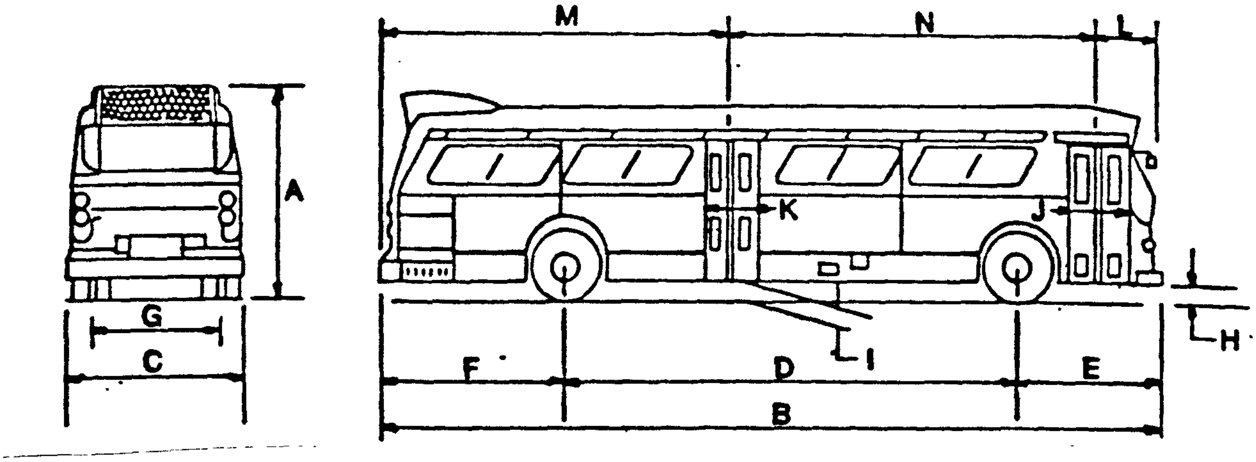
C. Acceleration

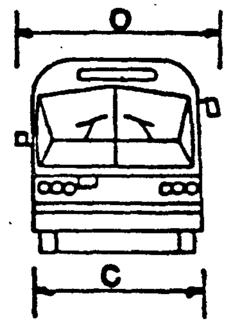
Freeway on-ramps with appreciable grades must be longer, or have bus and truck lanes to accommodate slower bus acceleration. Long, steep grades may require a slow lane for buses and trucks.

IV. Vanpool Requirements

The Metro VanPool Program uses 8, 11, 12 and 15 passenger one ton vans which require a minimum clearance of 7 feet, 3 inches. To accommodate these vans, parking garages need to be designed to provide safe access and circulation. Street level parking and/or the first level of parking in the garage should provide adequate van clearance.

Prior to purchasing vans or designing parking facilities, developers and employers are encouraged to contact Metro's Van Pool Program.

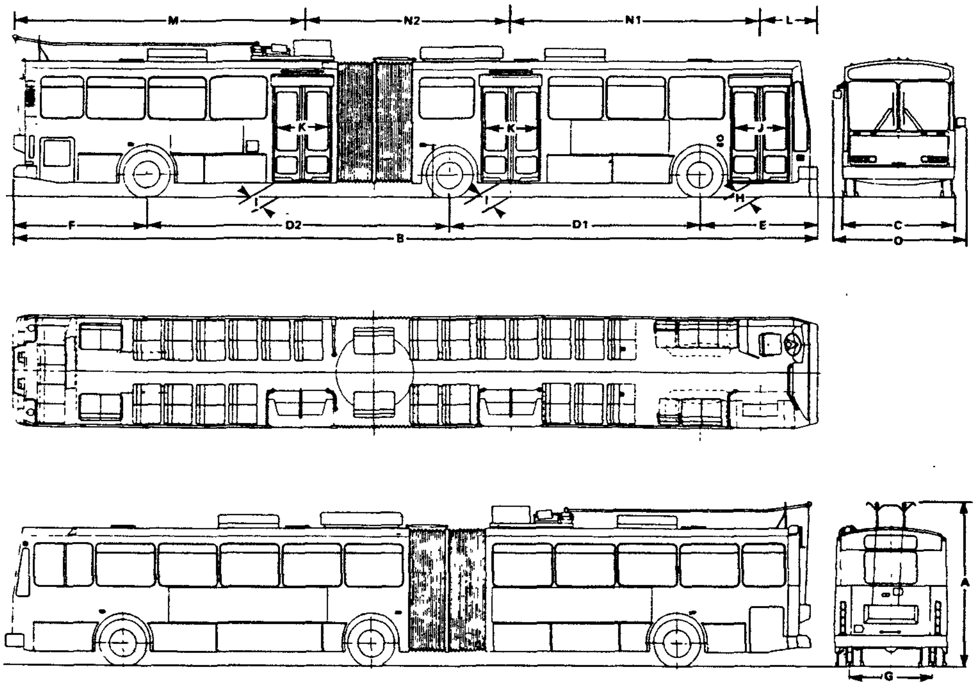




Quantity:	587 (+109 trolleys)
Year Built:	1976 - 1987
Make:	AM General, Flyer and M.A.N.
Fuel:	Diesel (579), Methanol (10), Electricity (109)
Seating Capacity:	44 - 46

Item		Design Vehicle
A	Overall Height	10' 5" motor; 11' 4" trolley
B	Overall Length	40' 1"
C	Overall Width	8' 6"
D	Wheel Base	23' 9"
E	Front Axle to Bumper	7' 2"
F	Rear Axle to Bumper	9' 4"
G	Distance between Rear Wheels	6' 5"
H	Step to Ground, Front	15"
I	Step to Ground, Rear	17"
J	Clr. Door Opening, Front	2' 4"
K	Clr. Door Opening, Rear	2' 3"
L	Centerline Door to Front	2' 11"
M	Centerline Door to Rear	17' 3"
N	Centerline Door to Door	20' 1"
O	Edge Mirror to Mirror	10' 4"
	Driver's Eye Height	87"
	Weight - empty	28,240 lbs.
	Weight - with 130% load	37,090 lbs.

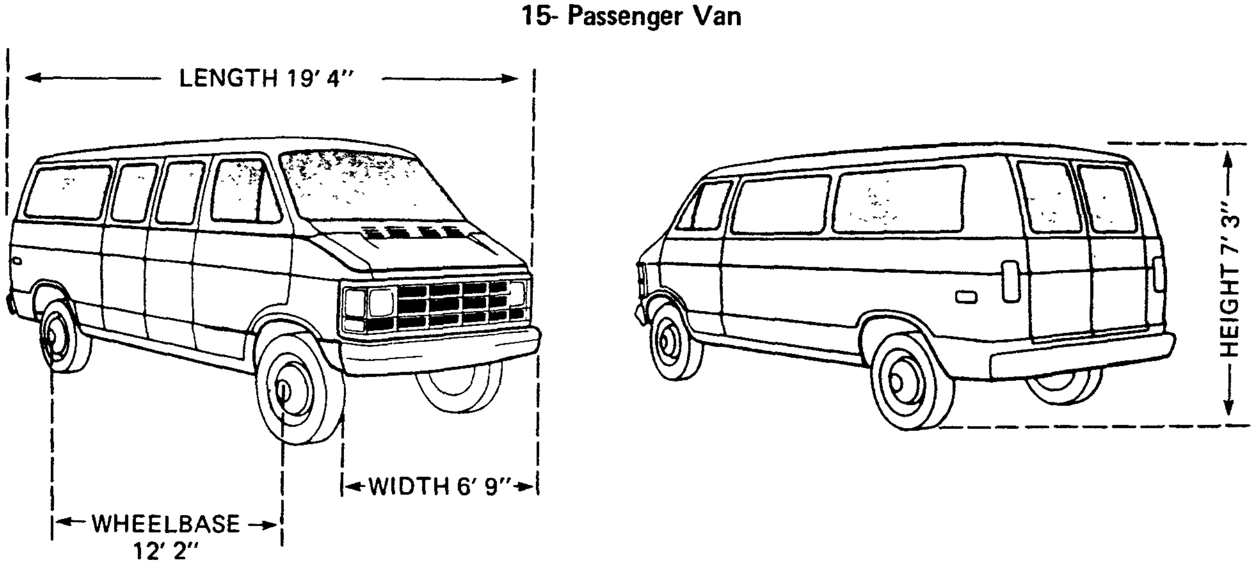
FIGURE 1-1
Standard Bus Specifications



Quantity: 352 + 46 + 236
Year Built: 1978 - 1991
Make: M.A.N., Breda
Fuel: Diesel (352), Electricity (46), Dual Power (236)
Seating Capacity: 63 - 72

Item		Design Vehicle
A	Overall Height	12' 2"
B	Overall Length	61' 3"
C	Overall Width	8' 6"
D_1, D_2	Wheel Base (First/Second)	19' /17' 5"
E	Front Axle to Bumper	8' 11"
F	Rear Axle to Bumper	10' 1"
G	Distance between Rear Wheels	6' 3"
H	Step to Ground, Front	1' 2"
I	Step to Ground, Rear	1' 2"
J	Clr. Door Opening, Front	3' 7"
K	Clr. Door Opening, Rear	4' 2"
L	Centerline Door to Front	4' 5"
M	Centerline Door to Rear	21' 10"
N_1, N_2	Centerline Door to Door	19'/16'
O	Edge Mirror to Mirror	10' 4"
	Driver's Eye Height	91"
	Weight - empty	48,405 lbs.
	Weight - with 130% load	60,850 lbs.

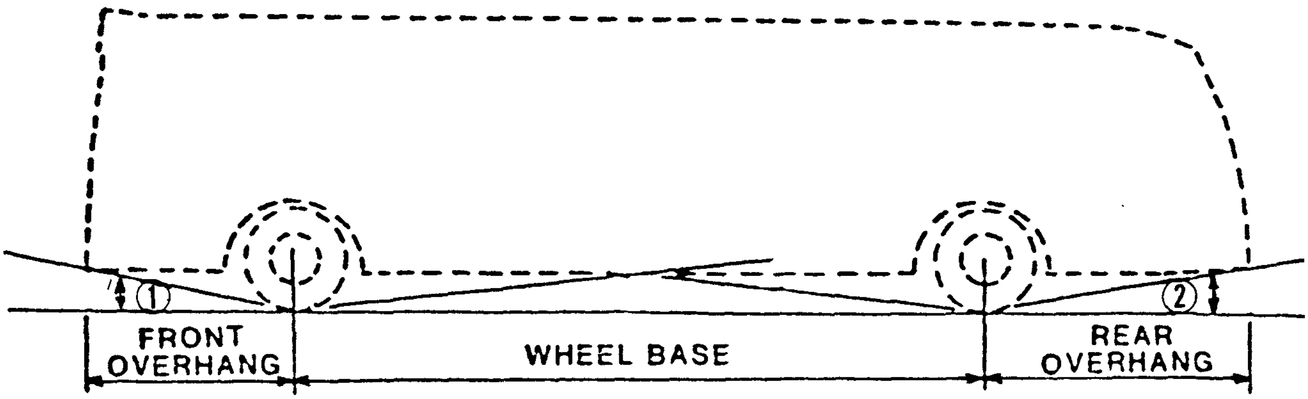
FIGURE 1-2
Articulated Bus Specifications



Quantity:	284
Manufacturer:	Chevrolet and Dodge
Year Built:	1986 - 1990 models
Seating Capacity:	8, 11, 12 and 15 including the driver
Wheelbase:	Most minivans may be accommodated in all existing parking garage designs. The maximum wheelbase length for vans is 146".
GVW:	8,500 lbs. minimum (except mini-vans)
Turning Radius:	A 15-passenger van will require a minimum turning radius of 26 feet, 4 inches with a turning diameter (curb to curb) of a minimum of 52 feet, 5 inches.

Dimensions	12-passenger van	15-passenger van
Length	16" 10"	19' 4'
Width	6' 8"	6' 9"
Height	7' 3"	7' 3"
Wheelbase	10' 6"	12' 2"
Turning Radius	26' 4"	26' 4"

FIGURE 1-3
Vanpool Van Specifications



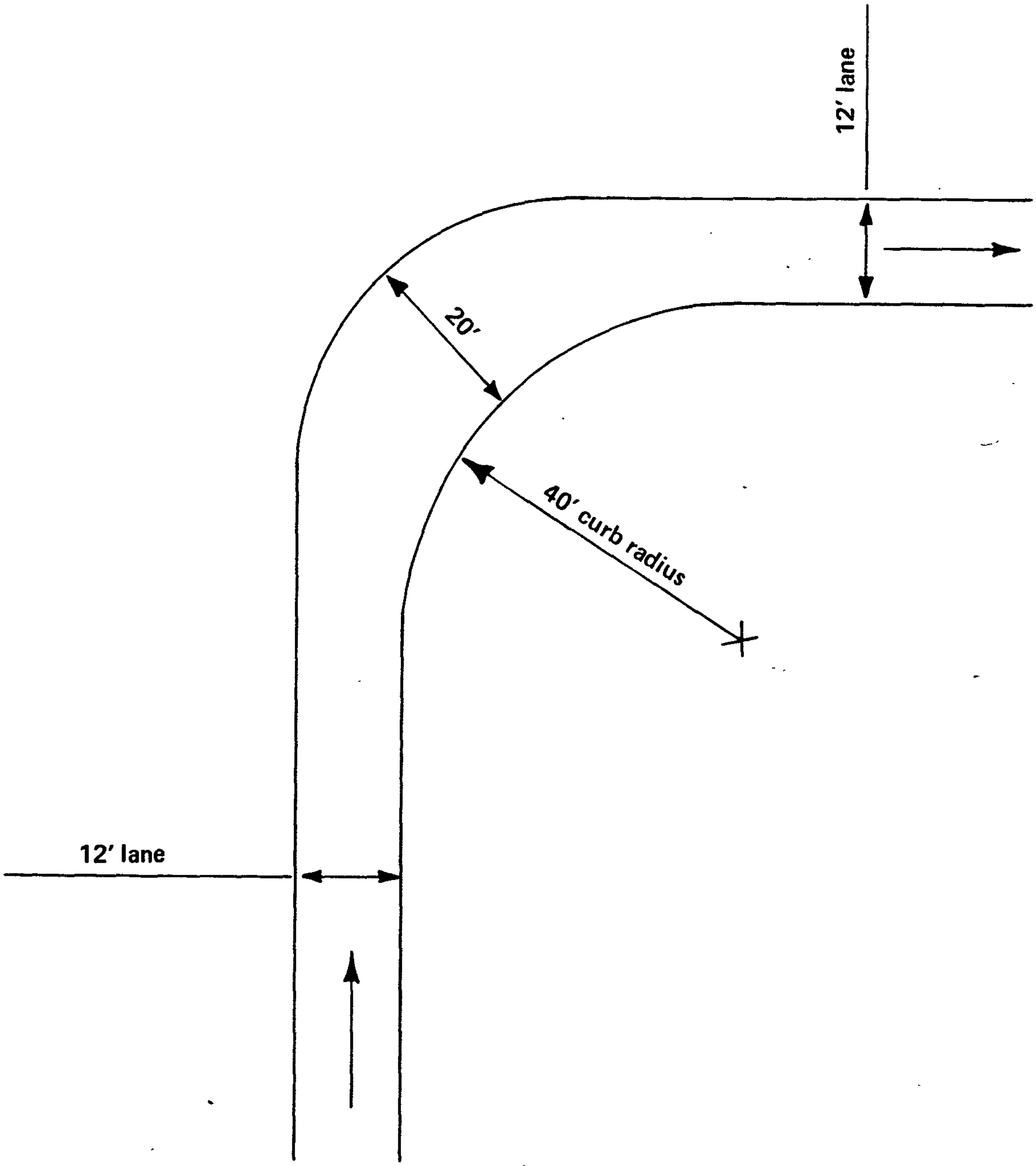
1 Approach Angle

2 Departure Angle

Vehicle Class	Approach	Departure
60′ Articulated Transit Bus	9°	8°
40′ Standard Transit Bus	8° 45′	8°

FIGURE 1-4

Underbody Clearance for Driveway Design



This configuration allows comfortable street speed operation for 35 foot, 40 foot, and 60 foot transit buses. Anything less requires the buses to occupy two lanes entering and departing from such turns.

FIGURE 1-5
Transit Bus Turning Template

LAYOVER SPACE

A layover is when a bus is scheduled to be at a bus stop longer than the time needed to load and unload passengers. All layovers are shown in the planning schedule pages by listing both an arrival time at the end of a trip and a departure time at the beginning of the next trip from the specific time point. A layover may occur at any location along the route.

I. General Guidelines

A. Distance from route

Metro tries to minimize the distance between the first/last stop served by a route and the layover location. A common zone for both functions is ideal if space permits. If a layover space is not located at the last stop, the layover should be beyond, rather than on, the revenue service portion of the route.

B. Turnaround Routing

Since layovers are needed at the ends of all routes the adjacent Street system must have room for buses to turn around. Factors that would restrict turnaround operations include street width, pavement condition and sight clearance at intersections.

C. Paving

Concrete is preferable to asphalt. A minimum of 8 inches of concrete on 2 inches crushed rock or 2 inches of asphalt on a 4 inch ATB (Asphalt Treated Base) and 4 inches of 14” crushed rock base is recommended. The material used for the bus pad (concrete or asphalt) should be consistent with the material of the existing street surface.

D. Comfort Stations

To minimize service interruptions it may be best to locate the comfort station at the end of the line layover.

E. Engine Cool-down and Shut off

Diesel engines are to be idled for three minutes upon arrival at a layover point to allow cooling and are then to be shut off.

II. Location Considerations

Metro's buses begin and end (route) runs in both residential and commercial neighborhoods. Layover zones may be located in either neighborhood.

A. Residential Neighborhoods

To minimize impacts in residential neighborhoods, Metro's standard is to locate zones a minimum of 50 feet away from the nearest residence; 100 feet or more is optimal. Residential layover zones are typically used the most during the morning peak period because people are leaving the neighborhood to go to work.

B. Commercial Neighborhoods

In commercial areas, Metro attempts to avoid Sight clearance problems, blockage of signs, and preemption of economically important short-term parking space adjacent to commercial property. In congested areas, several routes are usually scheduled into each layover zone. This complicates estimation of zone length required, and requires more intensive management by bus operators and supervisors.

III. Dimensions

The appropriate length of a layover space is determined by the number of routes sharing the zone, the scheduled overlap of layovers (if any), any special sight clearance problems for nearby driveways or intersections, and whether there is a need for independent pull-outs. This is all determined on a case-by-case basis, but the typical component of layover space for multiple coaches should be 60 feet straight curbline for each bus intended. In addition to this curbline actually required to park the coaches, space must also be provided for pull-in and pull-out. Sixty feet should be set aside for pull-in and, generally, 40 feet for pull-out. A 40-foot pull-out must be provided whenever buses are expected to merge back into travel lanes with competing general traffic. However, under special circumstances, the pull-out dimension may be reduced to 20 feet for standards and 30 feet for articulated coaches. This may occur if the buses are merging back into a bus-only lane, such as occurs at an off- street transit center. Additionally, within the coach parking area, it is customary to allow 2 feet between coaches along the curbline, recognizing that the buses will not actually park bumper to bumper. The actual parking lane used for parking, pull-in, and pull-out should be 12 feet wide.

The two examples on page 1-10 show how these guidelines might be applied to specific situations.

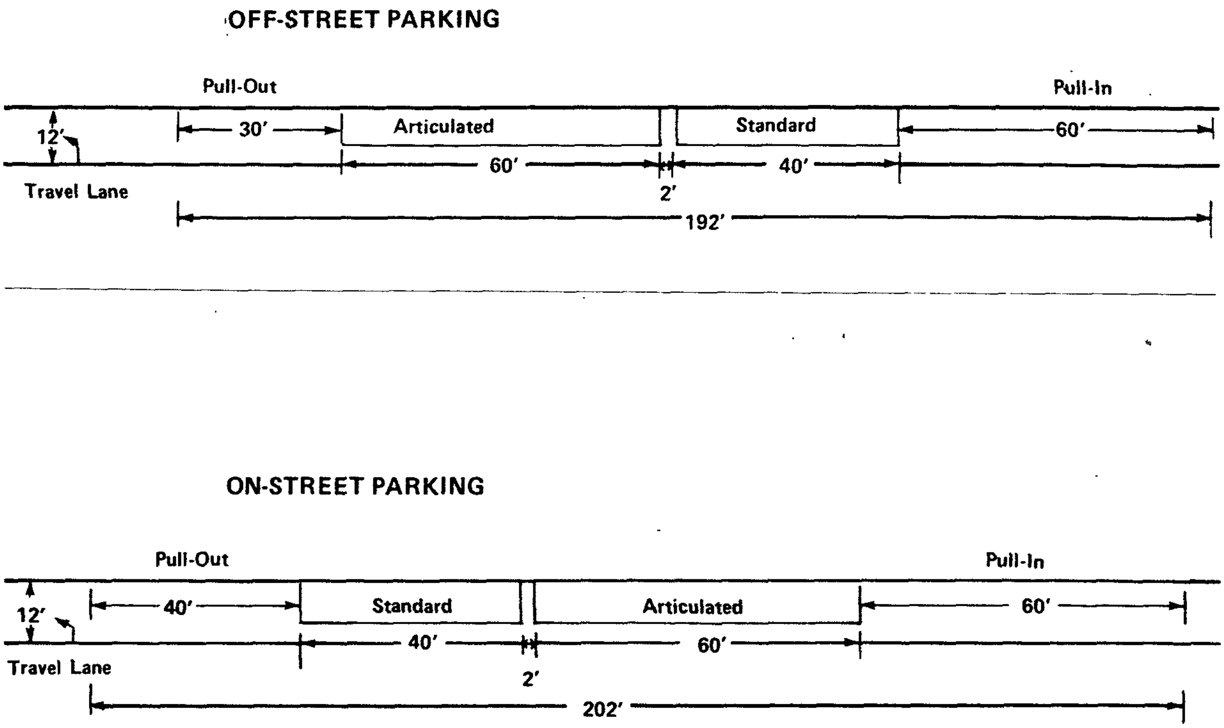


FIGURE 1-6
Typical Dimensions for Parking Multiple Coaches at Layover Areas and Transit Centers

TROLLEY OVERHEAD SYSTEM

I. Street Repairs

If local jurisdictions plan to make repairs to city streets where trolley coaches operate, trolley operating requirements need to be considered to prevent disruption to service. Trolley coaches can operate 12 to 15 feet beyond the centerline of the trolley wire to the outside edge of the coach so street repairs need to be accomplished within or outside that space. See attached drawing.

II. Trolley Wire Location

Trolley wire is located 12 feet and 14 feet from the curb (two parallel wires) if there is parking on the Street, and 9 feet and .11 feet if not. Trolley wire is hung on cross spans at a height of 18-1/2 feet but it may sag to 17 to 17-1/2 feet in the middle of the Street. Trolley wire height varies in some locations in Seattle. Questions about specific locations should be directed to Metro Power Distribution at 684-1910.

III. Eye Bolts

The use of eyebolts in lieu of trolley wire poles is pursued whenever reliable buildings or other structures are available. This is a cost saving measure which also minimizes impacts on sidewalks.

IV. Joint Use Poles

Joint use poles which include lighting and wire for traffic signals as well as trolley overhead support wire are pursued whenever possible to minimize impacts on sidewalks, and improve sightlines and Street aesthetics as well as minimize the number of poles in specific areas. Cost sharing with the affected local jurisdictions is pursued. Specifications regarding the use of wood and steel poles should be followed. These are available from the Trolley Overhead-Electrical/Civil section at 684-1295.

V. Maintenance

Trees and shrubbery should be kept clear of trolley overhead wires. This is the responsibility of the local jurisdiction.

VI. Billing

Relocation of trolley overhead wire, eyebolts and poles will be done by Metro with costs borne by the contractor or developer requesting the move. Metro will bill the contractor or developer. These modifications to the trolley system will always be Metro’s responsibility. This also covers the streetcar overhead and rails.

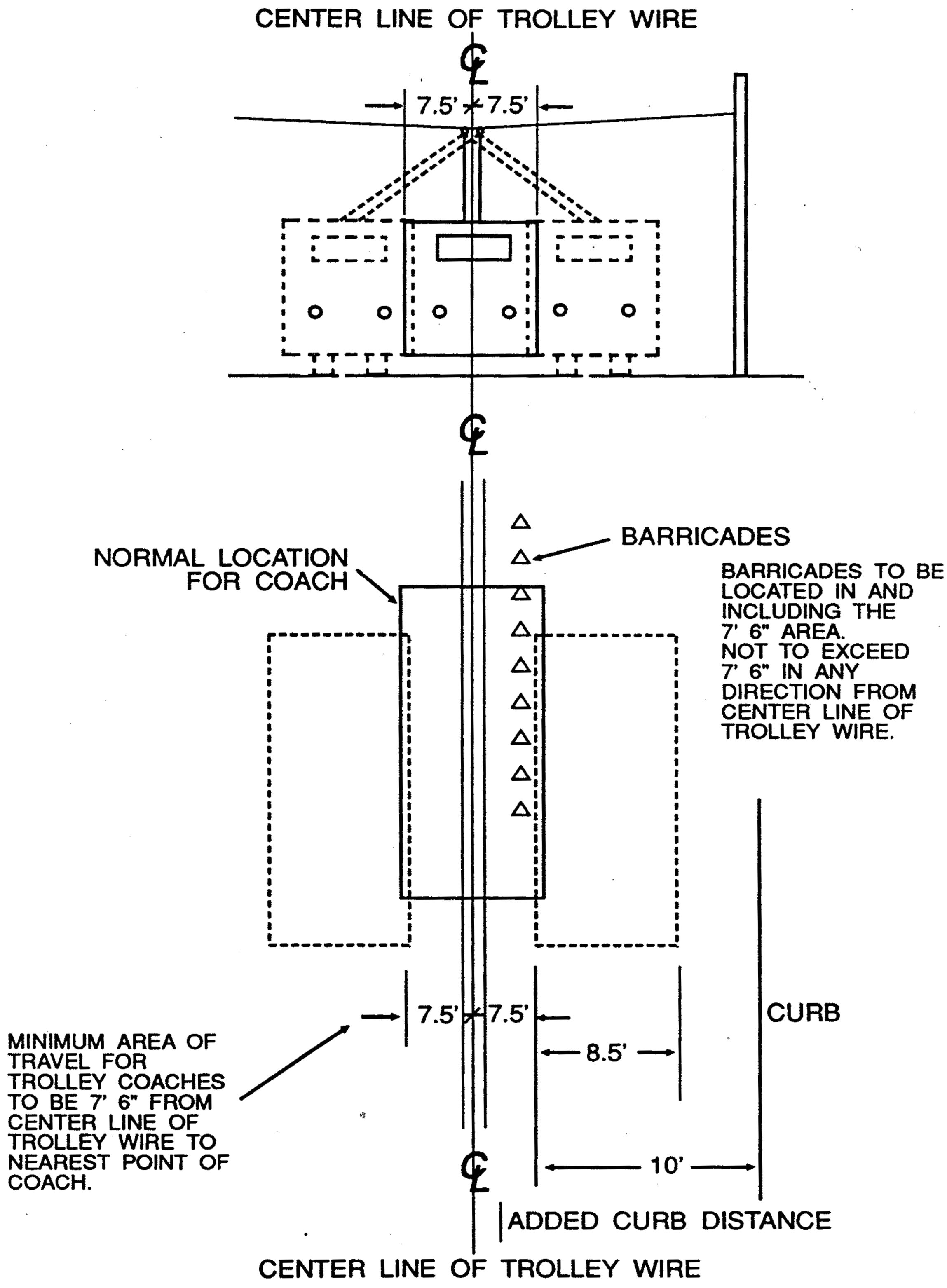
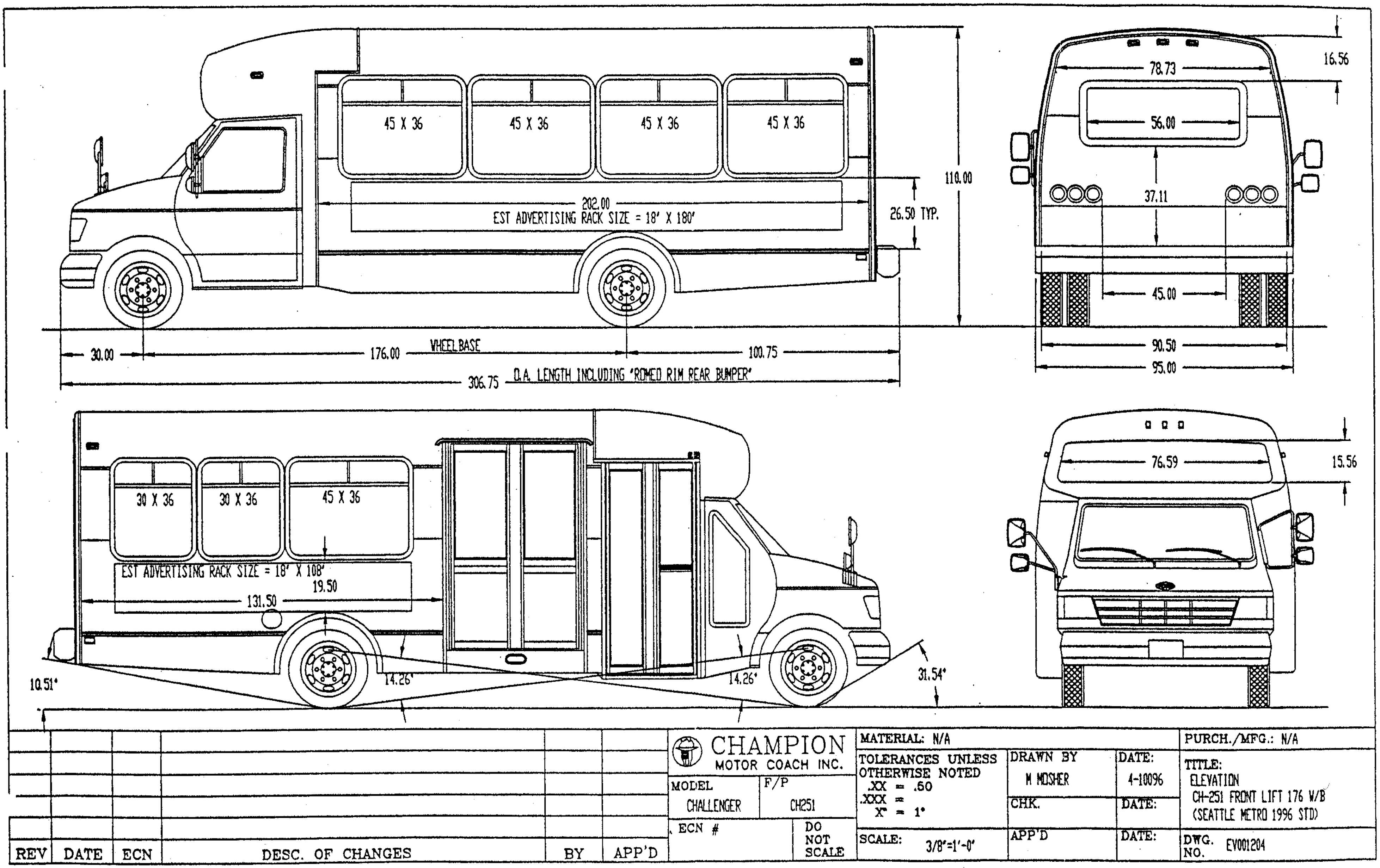
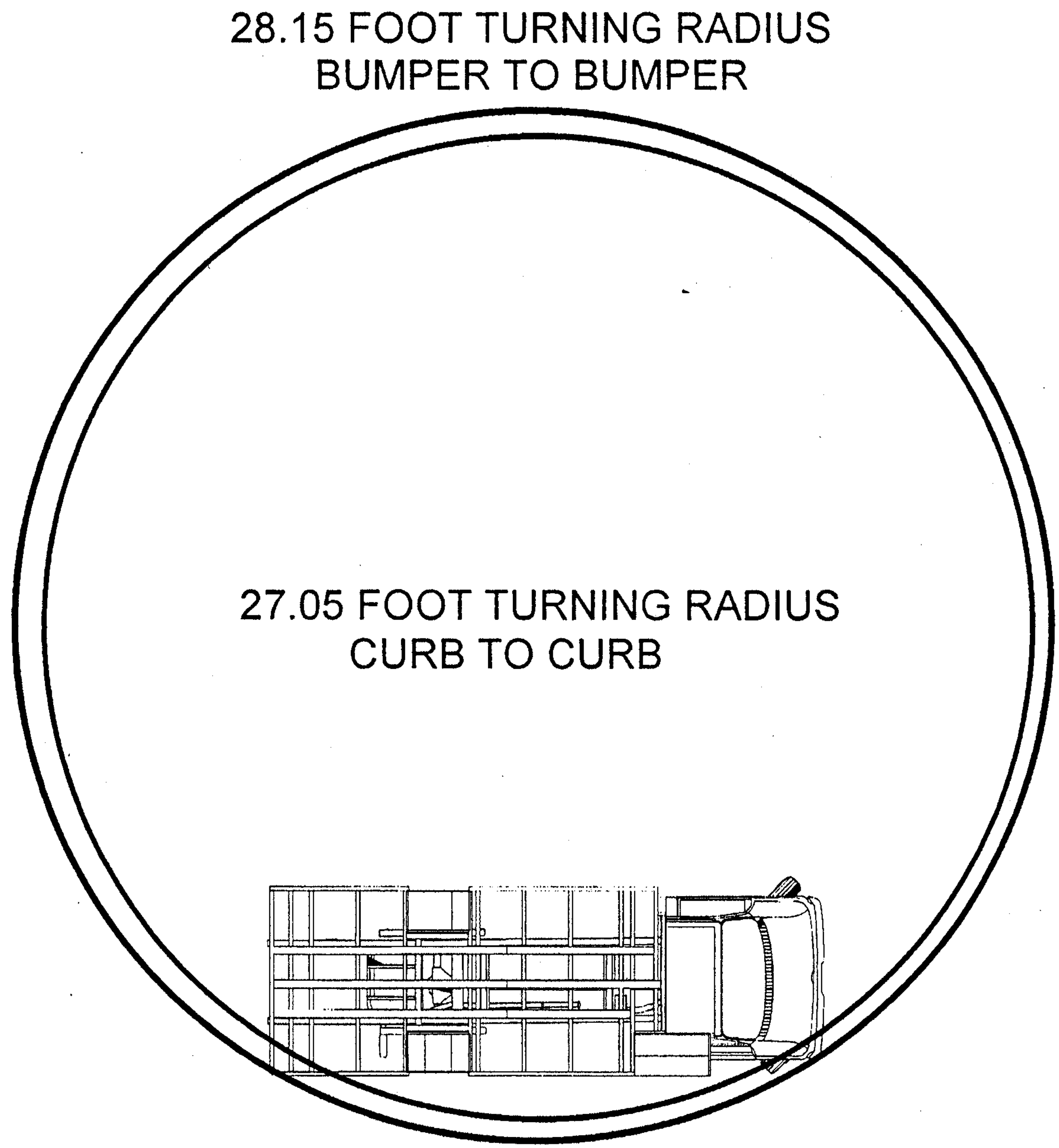


FIGURE 1-7

Trolley Coach Travel Area Required versus Construction Area

Exterior Height	110” (120” with raised floor and open roof vent)
Exterior Width	96” (105” OAW includes front mirrors OD)
Overall Length	25’6” (OAL Includes from bumper to bumper)





CHALLENGER 250

Section 2
Transfer and Destination Points

TRANSIT CENTERS

Transit centers are locations where groups of buses or other public transportation vehicles can be brought together. These facilities can vary from major bus stops on public right- of-way to off-street facilities with internal circulation entirely separated from general traffic.

I. Functions

Transit centers perform one or more of the following functions:

A. Transfer Point

Transit centers enable buses on two or more routes to come together at the same time, allowing patrons to transfer between the routes. The way transfers are scheduled dictates how many buses have to be accommodated at one time. This type of scheduling is called "timed-transfer."

B. End-of-Line Terminal

Transit centers can simply provide space to temporarily park coaches at the end of the line before the coach goes back into service and retraces its original route. These layovers, built into each route schedule, normally occur at the end of the line.

C. Destination Point

Transit centers can be sited to optimize pedestrian access to major activity centers, such as shopping areas. By locating the center at a major trip attractor, the transit center becomes a destination point for people who travel by bus.

D. Interface with Other Public Transportation Operators

Transit centers can promote transfer connections between different transportation systems. For example, Metro has developed transit centers at the north and south ends of its service area to provide an interface with Community Transit and Pierce Transit, respectively. Service coordination is not limited to conventional, fixed route bus systems. Taxis, intercity buses, and other paratransit operators can also be accommodated.

E. Public Visibility

Transit centers make transit service more visible to the community. By routing service through these centers, there is a physical presence that fosters greater public awareness of transit.

II. Siting Considerations

A. Site Identification

Locating the correct site for a transit center and securing community support for this decision is generally the most difficult task in developing a transit center. Once the functional requirements have been determined, alternative sites can be identified.

The following major criteria are considered in siting a transit center:*

- The location should not require major rerouting and excessive additional travel time for buses approaching or leaving.

- Adequate on-street or off-street area is needed for efficient and safe transit operation.

- Convenient pedestrian access should be provided to adjacent office, retail, or residential areas. For retail areas, 600 feet or less is desirable. For office and residential areas, 800 feet or less is preferred and 1,500 feet is maximum.

- Arterials with heavy traffic volumes should be avoided to minimize delays for transit vehicles entering or leaving the transit center, but the location should be accessible for pickup/dropoff and bicyclists.

- The location should be a point that can be served by three or more transit routes in an efficient schedule.

- A minimum of four in-service buses will be present simultaneously at the transit center.

B. Community Issues

The community concerns that surface most frequently during transit center siting negotiations are:

- markets to be served and projected changes in demand for transit service to the activity center
- impact on general traffic and congestion
- impact on parking supply
- concerns about security and pedestrian safety
- business access and visibility
- public right-of-way vs. private property
- identification of benefits for the affected community

*Source: Vukan Vuchic et al., Timed Transfer System Planning, Design and Operation, Final Report (Washington, D.C.: Urban Mass Transportation Administration, October 1981).

Metro is likely to approve a transit center if the center supports and improves Metro's service plans, supports adopted local plans and zoning, has an adopted budget for planning and construction, and has the support of the local community.

C. On-Street vs. Off-Street Designs

A critical factor determining the cost and complexity of a transit center is its location as either an on-street or off-street facility. On-street transit centers are located on or immediately adjacent to the public right-of-way along a public street. Property acquisition, if any, is minimal and is limited to the property required to augment existing public right-of-way. Easements, as opposed to purchase, are the preferred method of acquisition.

On-street transit centers require relatively low investment in signage, shelters, waiting areas, and pavement areas where buses stop. When siting an on-street transit center, the following criteria are considered:

- Street traffic volumes are low enough that they will not interfere with bus or pedestrian movements.

- Transferring passengers will not have to walk more than 120 feet along a linear set of stops to board a bus.

- Six or fewer in-service buses will be present at the transit center at one time.

On-street transit centers can take the form of straight curb stops, sawtooth curb stops, or bus pullouts. Straight curb stops can be located on the farside at an intersection, but this design requires transferring passengers to cross the intersection. An alternative is to locate far-side stops on one street, and near-side stops on the other, to avoid street crossings. Where transferring passengers must cross a Street, attention must be given to safety and convenience in the form of designated crosswalks, signal protection, and directional information. See Figure 5.1.

Sawtooth curb stops have the advantages of shorter curb length and the capability for independent arrivals and departures. However, wider sidewalks must be built to accommodate the sawtooth bays.

The third type of on-street transit center utilizes bus pullouts. Although pullouts have the advantage of not blocking traffic lanes, they can have the shortcoming of making bus re-entry difficult into the general traffic lanes. Bus pullouts can be used on streets with only one travel lane per direction.

Off-street transit centers are located on private or other property, and internal circulation within the center is largely separated from general traffic on adjacent streets. Land acquisition for off-street transit centers can constitute a major portion of the project budget and add six months or more to the project schedule. Off-street facilities are more costly and complex than on-street facilities, but may represent the only feasible design if a suitable arterial street is not available.

When siting a transit center, off-street sites are only considered if one or more of the following criteria are met:

- The transit center is projected to accommodate four or more in-service coaches at one time.

- An acceptable off-street site that satisfies the locationa! and size requirements of the proposed transit center is made available to Metro, from either public or private sectors, at a nominal cost and with minimal procedural or legal complexity.

- There are no on-street sites that can offer sufficient platform space for pedestrians.

- Available on-street curb space cannot provide the required number of independent bus bays.

- Heavy traffic on local arterials has the potential to interfere with transit, pedestrians and other feeder modes. This is more a problem with on-street alternatives.

- Market demand, such as a regional shopping center, dictates that customers are better served by an off-street facility.

In addition to separation from general traffic, off-street transit centers should be designed to allow buses to turn into and out of adjacent streets in both directions. An off-street facility should also allow transit vehicles to turn around and provide adequate storage for waiting buses or vans. If the number of buses is small and visibility is good, passengers can be allowed to cross the roadway. Otherwise, an island design is desirable to minimize pedestrian crossings.

III. Facility Guidelines

A. Sizing Criteria

The size of any transit center is determined by the maximum number of coaches and pedestrians it must accommodate at one time. The service plan defines the maximum number of coaches that must be accommodated as well as the size and number of independent bus bays. Projected ridership determines the size of pedestrian facilities that must be provided.

1. Bus Parking Requirements

   a. Pulse scheduling requires the maximum amount of bus parking. Enough space is needed to accommodate all buses simultaneously for a 5- to 10-minute period. If there is little or no overlap in coach arrivals and departures, a set of coaches can operate with much less parking space.

   b. Parking space is determined by the maximum number of buses requiring independent pull-in and pull-out space. If all coaches are scheduled to arrive and depart simultaneously, sufficient curb space is provided to park all coaches head to tail. If each coach is independently scheduled, an independent parking space is provided for each.

   c. Dimensions required for parking multiple coaches at transit centers are the same as for layover areas. These dimensions are provided on Page 1-10 in Figure 1-5.

   d. For sawtooth bays, the transition area on either end of the bus is approximately 32 feet in length and 10 feet in depth. Sawtooth bays designed to accommodate one standard and one articulated coach require 174 feet of linear curbline.

   e. Although there is no limit to the number of coaches that can be assigned to an individual bay, it is generally desirable to assign no more than three coaches. There is independent pull-in and pull-out between bays but not for the two to three coaches within each bay. Since buses within each bay have no assigned position, passengers waiting to catch a particular bus must check all three positions to locate their coach. For three articulated coaches, this can result in a walk of 120 feet from the front coach to the third coach. Walking distances more than 120 feet are inconvenient for passengers and make transfers less reliable because patrons may not recognize that their coach has arrived.

2. Pedestrian Requirements

   a. Pedestrian volumes tend to peak if coaches are to make a coordinated connection under pulse scheduling. The transit center must be designed to meet these peak requirements.

   b. Pedestrian Planning and Design, by John J. Fruin is the most frequently consulted book on pedestrian design issues. Suggested guidelines for assessing the adequacy of platform space are as follows:

   - Enough sidewalk/platform space must be provided to accommodate all pedestrians (including those who are waiting, queuing, or simply walking up and down the sidewalk or platform) as well as disabled persons (visually impaired and those using wheelchairs).

- Using the projected peak pedestrian volume, 10 square feet per person is allowed for queing and waiting functions.

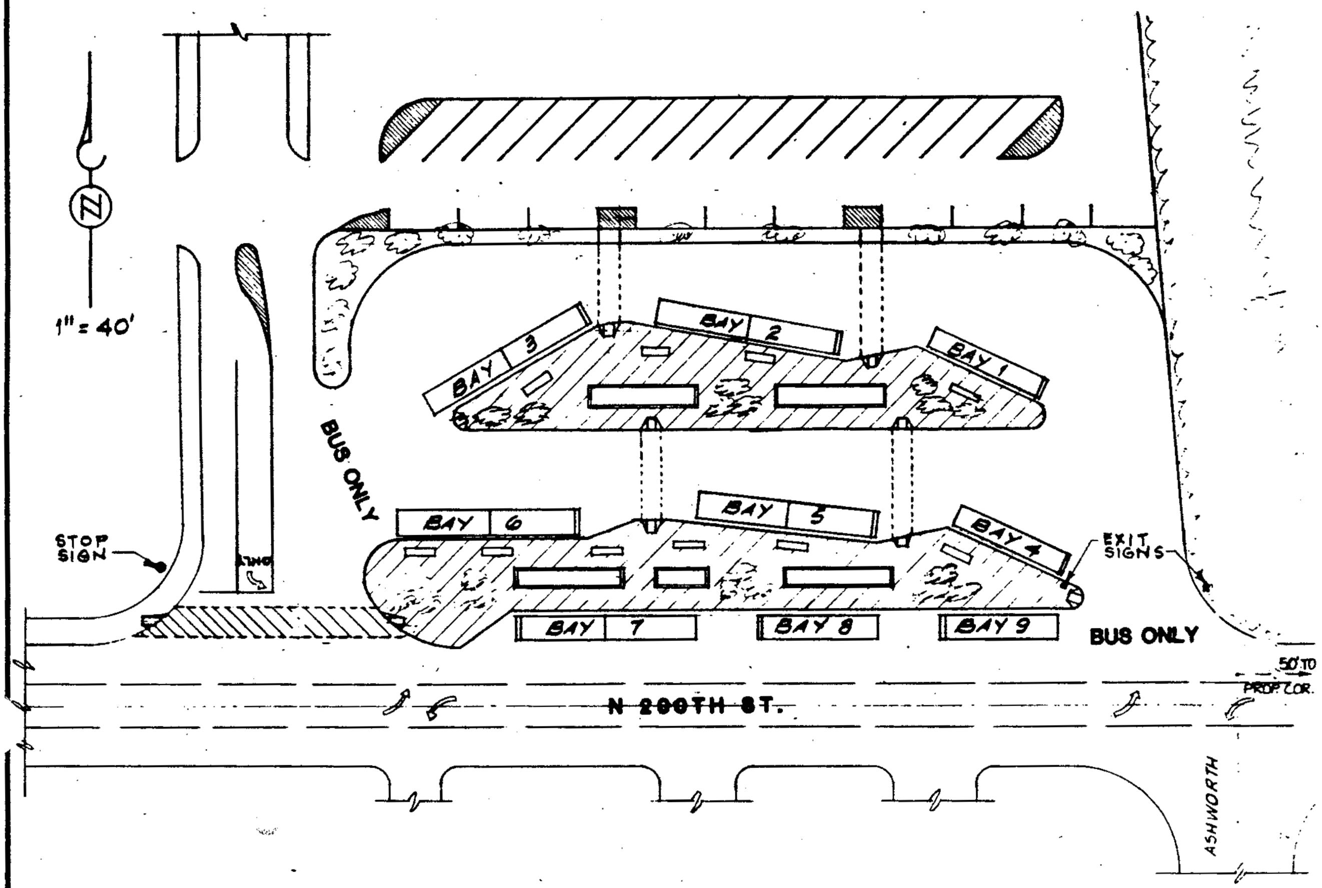


FIGURE 2-1

Configuration of Sawtooth Bays at Aurora Village Transit Center

B. <u>Design Guidelines</u>

1. Pedestrian Spaces

a. Pedestrians passing through the center should be separated from those who are waiting, transferring between buses, and queuing to board and deboard.

b. The curb space immediately adjacent to the bus loading areas should be free of all street level obstacles; except for the bus stop signs, all street furniture (trash cans, benches, payphones, light standards, shelters and information displays) and related pedestrian amenities should be set in 8 feet from the curb where space is available. Where space is not available, the minimum lateral clearance is 3 feet. Street furniture should be placed so it does not block the operator's view of intending passengers or obstruct sight distance. Minimum height clearance for all signs in the bus stop zone should be 7 feet from the bottom of the sign to the ground. Overhanging tree branches should be at least 8 feet from the ground so as not to obstruct signage or interfere with mirrors on the coaches.

c. Pedestrian spaces should be designed to be accessible to people with disabilities. This includes ramps, curb cuts, and other architectural measures such as braille signage, audible signals, and textured walkways to minimize or eliminate barriers for people with visual impairments or other disabilities.

d. Paving materials in pedestrian areas should provide good traction to reduce the risks of falling or slipping. Care should also be taken to vary pavement texture to communicate function and spatial relationships for patrons with sight impairments.

e. Pedestrian spaces should be well lit and should have clear sight lines throughout the facility to promote a secure environment for the users. Passenger shelters should provide a view of passengers through the side panels.

f. Street furniture and shelters should be constructed of durable, vandal-resistant materials. Aesthetics and maintenance needs should be considered in the initial design.

C. <u>General</u>

Transit centers should be designed to minimize conflicts between buses and pedestrians and between buses and autos, both on-site and off-site.

Whenever possible, employee restrooms should be provided at transit centers since drivers often have limited restroom options along their routes.

PARK-AND-RIDE LOT CLASSIFICATIONS

Metro classifies park-and-ride lots as follows:

I. Permanent Facilities

A. Owned or leased by Metro or WSDOT
B. Metro lots maintained by Metro; state lots maintained by Metro or WSDOT
C. High capital investment and/or ongoing budget items
D. Improved facilities and landscaping
E. Generally served by one or more transit routes
F. Usually have passenger facilities
G. Life span of 20 years or more.

II. Metro-Leased Facilities

A. Usually maintained by property owner
B. Low-budget item
C. May or may not be served by a transit route
D. Limited or no passenger facilities
E. Restrictive hours
F. Short-term lease
G. Generally less than 100 stalls
H. Located within the Metro service area.

PERMANENT PARK-AND-RIDE LOTS

A park-and-ride lot is a facility providing free parking for commuters in suburban and lower density communities. Direct transit service between the lot and a major activity center(s) is the fundamental component. The primary function of a park-and-ride lot is to serve a geographic draw area as a transfer center between automobile and public transportation modes and to accommodate other rideshare modes, such as carpools and vanpools.

General Policies

Entrance to the parking facilities is free at all times to persons accessing transit, carpools and vanpools.

The principal objective of park-and-ride lots is to provide parking and ensure that commuter access to public transportation is as inviting as possible. The most successful lots are those located close to major freeway interchanges upstream of transit destinations.

The use of lots by ridesharing vehicles for the purpose of forming carpools and vanpools is encouraged, except as specifically noted due to space limitations.

I. Location Considerations

- Permanent park-and-ride lots should be located at or near freeway interchanges: (1) to maximize the ability of subsequent transit service to compete timewise with the private automobile, (2) to intercept the greatest number of private automobiles before accessing the freeway, and (3) where service will be provided and is consistent with service planning objectives and service plans.

- Special high occupancy vehicle (HOV) or bus-only facilities/treatments such as exclusive lanes, signal preemption, and queue jumps should link the lot with the nearest freeway if it is not located at or near a freeway interchange.

- Lots should be located alon.g corridors that experience significant perceived traffic congestion.

- Lots should be located prior to the point of the most serious traffic congestion (an HOV treatment through the point of congestion would be a further advantage).

- Lots should be located along customary travel corridors that do not require potential patrons to significantly alter their travel patterns to use the lot. This is consistent with the view that park-and-ride lots “intercept” commuter trips and avoid attracting “new” congestion to locations.

- Lots should be built in highly visible locations with good access. Directional signage in the general area may be helpful.

- Existing successful park-and-ride lots should be expanded, where possible, to provide additional capacity, especially if the expansion is made in concert with service improvements.

II. General Site Selection Considerations

In selecting a site for a park-and-ride lot, there are a number of considerations that must be taken into account. They fall into five major categories —engineering, financial, environmental, land use and service/location.

A. Engineering

Engineering considerations include the usable site area, parking capacity, ease of access for both autos and buses, bus storage, topography, and development restrictions.

B. Financial

Financial elements include the costs of acquisition and development, easements, ULIDs, mitigation costs, and impacts on long-term maintenance. Relocation costs, if any, must also be considered.

C. Environmental

An appropriate environmental process is completed before a final site is selected. The principal environmental considerations include visual, traffic, noise, air and water quality impacts, surface water management, and drainage.

D. Land Use

Land use issues include zoning, comprehensive plan designation, development regulations, compatibility of the lot with adajcent land uses, and joint use potential.

E. Service/Location

Service and location issues include the site's ability to serve the draw area, directness of transit access from major travel corridors, the cost of providing the new service and the security of passengers and vehicles. A service plan should be developed for a new park-and-ride lot prior to commitment of budget for capital improvements.

F. Security

Facilities should be designed with security of patrons and property in mind. Transit Security will be submitting comments on general security concerns at park-and-ride lots in the near future.

G. Joint Development Opportunities

Several steps can be taken to integrate park-and-ride facilities into the developed environment and provide some benefits to riders.

- Explore opportunities for shared parking, with non-competitive uses such as theaters, parks, etc.

- Orient park-and-rides to make connections to adjacent development — retail, office, housing.

- Provide pedestrian connections to adjacent uses with sidewalks and signage.

- Determine if development is planned for land adjacent to park-and-rides and work with developers to integrate park-and-rides into the area.

III. Capacity

Park-and-ride lot capacity is initially determined by analyzing the present and projected population and travel characteristics of the area to be served and the use of other park-and-ride lots in the area. Lots usually have 300 to 600 stalls, but exceptions in both directions are possible. Land availability can be a factor affecting the ultimate capacity of any given lot. As a rule of thumb, one acre can accommodate 90 autos in a park-and-ride configuration. Capacity should also be sited in response to customer needs or demands.

IV. Means of Access

Patrons use five basic transportation modes to arrive at and depart from parkand-ride lots. These modes include walking, bicycle, bus, automobile and motorcycle. An automobile can be used in three different ways as a means of transportation to a lot. Patrons can carpool or vanpool, park their private auto at the lot, or be picked up or dropped off by private auto or taxi (drop-and-ride).

V. Prototype Layout

The following guidelines for park-and-ride lots are subject to adjustment based on site shape, topography and relationship to adjacent streets.

A. HOV Access

HOV access to park-and-ride lots should be developed to give equal priority to both transit and vanpool vehicles. If the lot has a flyer stop, the vanpool may enter on the HOV lane. A queue-jump HOV lane should be considered for egress from large lots. Entrance and exit roadways for HOVs should be located at least 150 feet from other intersections. The need for present or future signalization may increase this distance consistent with traffic engineering warrants of the local jurisdiction.

B. Bus LayoverArea

The bus layover area should be located on the inbound roadway to the passenger loading area. Storage capacity should be provided according to the service plan developed for the tot. The minimum layover area should be designed to accommodate two articulated buses. Scheduling of timed transfer operations at some lots could increase the space required for bus loading or layover. The layover area can serve buses directly from the street or after unloading the passengers. This concept enables buses to drop off passengers, then circulate back to the layover area, and finally to pick up passengers at the loading area and proceed out of the lot.

C. Bus Loading Area

The bus loading area should be separated from roadways used by other vehicles. This area is accessed directly from the street and should be consistent with the capacity requirements of the service plan. Future growth and/or expansion of the lot should be taken into account. The minimum space should be able to accommodate one standard and one articulated coach.

D. Passenger Waiting Area

The passenger waiting area is located between the bus loading area and the vehicle parking area. Pedestrian access should be provided directly from the adjacent street sidewalk, the vehicle parking area, the disabled parking spaces for disabled people, the drop-and-ride spaces, and the bicycle parking area. At least one passenger shelter should be provided adjacent to each passenger loading area.

E. Parking for People with Disabilities

Parking for people with disabilities should be provided at the passenger waiting area on either side of the shelter.

F. Drop-and-Ride Parking

Parking for motorists waiting to pick up a passenger from the bus or rideshare vehicle should be provided at the passenger waiting area on either side of the shelter. Motorists can drop passengers off in the circulation aisle adjacent to the passenger waiting area. Drop-and-ride parking should not mix with the flow of buses.

The vanpool drop-and-ride or staging area should be located adjacent to the transit vehicle loading area out of the way of bus passengers and easily accessible by HOV lane.

G. Cycle Parking

Bicycle and motorcycle parking should be provided adjacent to the passenger waiting area and the adjacent street. This provides bicyclists with direct access from the Street and motorcyclists with direct access from the parking area. Ample lighting and barriers should be provided to ensure that cycle parking does not pose a hazard to pedestrians.

H. Vehicle Parking

Park-and-ride parking aisles should be perpendicular to the passenger waiting area. Parking spaces should be at 90-degree angles and served by two- way aisles no more than 450 feet long. Bus patrons would have a maximum walk of 300 to 400 feet. This parking layout allows vehicles to circulate in the parking area away from the passenger waiting area. Motorists would approach a parking space generally driving towards the waiting area, park, and then continue walking in that direction to the passenger waiting area. The reverse movement would occur for people leaving the buses. This circulation pattern minimizes conflicts between pedestrians and motorists.

I. General Vehicle Access

Vehicles may access the parking area by at least one two-way driveway located away from the passenger waiting area. Vehicles can circulate within the lot away from the pedestrians, thereby minimizing conflicts between vehicles and pedestrians.

A sufficient number of entrances and exits should be provided so that the volume per lane does not exceed 250 vehicles per hour where sufficient street frontage exists. The number of entrances and exits should match circulation requirements. Wherever a park-and-ride lot has more than 300 parking stalls, at least two exits should be provided.

VI. Internal Circulation

A. General Guidelines

- The arrangement of parking aisles and stalls should minimize vehicle travel distances, conflicting movements, and the number of turns.

- Separation should be maintained between vehicle and pedestrian traffic.

- Circulation patterns should be simple and direct, allowing for easy driver orientation.

- Circulation patterns for arriving vehicles are more critical than for departing vehicles. Arriving vehicles are meeting scheduled bus departures. In the evening, departing passengers have fewer time constraints.

- The number of evening drop-and-ride vehicles is usually greater than in the morning.

- Access points should be located to minimize conflicts near the passenger shelter and waiting area.

- At-grade railroad crossings within lots are unacceptable.

B. Bus Circulation

- Bus travel time within the lot should not exceed two minutes and the bus circulation path should be as direct and short as possible. Bus turnouts immediately adjacent to public roads may be used as loading areas.

- Parallel type bus stops or sawtooth bus bays should be used in park-and-ride lots. Bus stops on adjacent public streets should use the “turn-out” designs to the standards of the agency having jurisdiction, or Metro’s, whichever is greater. See additional guidelines under “Bus Loading Area.”

- Access roads used exclusively by buses should be a minimum of 20 feet wide in each direction with minimum curb radius of 40 feet.

- Pedestrian entrance and exit points should be within the bus driver’s field of vision.

C. Drop-and-Ride Circulation

Approximately 10 percent of the total number of vehicles using a park-and-ride lot could be drop-and-ride vehicles. The average waiting period in the evening for a drop-and-ride vehicle is 6 to 10 minutes. Space for drop-and-ride vehicles should be provided for approximately 1 to 1.5 percent of the lot’s capacity.

D. Van pool Circulation

A separate staging area/loading area/drop-and-ride area needs to be developed for vanpools adjacent to the transit vehicle loading area.

VII. Special Parking Needs

A. Parking for People with Disabilities

Parking spaces for patrons with disabilities should be located near the bus loading zone. The vanpool staging area will also require such parking. The following guidelines should be used in locating these spaces:

- A patron with a disability should not have to cross an access road enroute to the bus loading zone or vanpool staging area, nor should the person have to travel behind parked cars.
- Each parking stall should be 12 feet wide. Alternatively, stalls could be 8 feet wide with a 4-foot common walkway between them.
- Appropriate signing or pavement markings should indicate the restricted use of the space for persons with disabilities. Curbs to and from the bus loading area should be depressed for wheelchair users or have ramps.
- More detailed specifications for parking for people with disabilities can be found in the Washington State Code. See An Illustrated Handbook for Barrier-Free Design by Barbara Ellen and Bob Small.
- Local jurisdictions may also have their own standards for design of parking spaces for disabled people.

B. Rideshare Vehicle Parking

Remote/outer edge parking (away from the bus/vanpool loading zones) for carpoolers within a park-and-ride lot may be developed through site design. Elements such as access to/from the lot, security, etc. need to be considered to promote voluntary use of remote parking areas.

VIII. Pedestrian Facilities

A. Sidewalks

A route of travel accessible to wheelchair users should be provided through all park-and-ride lots. Pedestrian facilities must provide a means of safe access to bus loading zones and vanpool staging areas. A sidewalk should be located next to all curb-side parking lanes and to all loading zones.

Sidewalks should be a minimum of 5 feet wide for two-way pedestrian traffic. Parking areas should be designed so that vehicles do not overhang the side-walk. Sidewalk design should be compatible with existing sidewalks in the area. Where sidewalks abut public roadways, the width should be in accordance with the local design standard. The minimum width of sidewalk adjacent to a bus or taxi loading zone should be 12 feet, or the adjacent sidewalk width plus 7 feet, whichever is greater; unobstructed space should be 8 feet from the curb.

B. Bridges and Tunnels

Construction of pedestrian bridges and tunnels should be avoided if another acceptable alternate design is feasible. Where tunnels are built, they should have a generous cross-section and be well-lighted. Tunnels should be placed so that continuous visibility is provided into the tunnel when viewed from the approaches; maximum consideration should be given to the safety of patrons and disabled users.

C. Walking Distances

The distance a pedestrian should have to walk from the car to the bus load zone should be a maximum of 800 feet.

D. Pedestrian Crossings

Pedestrian crosswalk markings should be placed to represent an extension of sidewalks and provide acceptable line-of-sight distances for pedestrian safety (refer to local jurisdiction standards). Crosswalk lines should ideally be located at intersections. Crosswalk lines should be used when sidewalks are present and if any of the following conditions exist:

- at signalized intersections across all approaches.
- at stop-controlled intersections across the controlled approaches.
- at any intersection across those approaches with a pedestrian volume exceeding 50 pedestrians in any hour.
- at any location where it is desired to encourage pedestrian travel.

- at any location where pedestrians could not otherwise recognize the intended place to cross a roadway.

E. Pedestrian Spaces

- The curb space immediately adjacent to the bus loading areas should be free of all Street level obstacles. Except for bus stop signs, all street furniture and related pedestrian amenities should be set in a minimum of 8 feet from the curb. Street furniture should be placed to avoid blocking the operator's view of intending passengers or obstructing sight distance. Bus stop signs should have a minimum clearance of 7 feet and overhanging trees should be a minimum of 8 feet from the ground.

- Paving materials in pedestrian areas should provide good traction to reduce the risks of falling or slipping.

- Throughout the facility, pedestrian spaces should be well lit and have clear sight lines to promote a secure environment for the users. Passenger shelters should have clear side panels so passengers can be seen.

- Street furniture such as trash cans, benches, pay phones, light standards, shelters and information displays should be constructed of durable, vandal-resistant materials. Aesthetics and maintenance needs should be considered in the initial design. Every permanent park-and-ride lot should have a public pay phone.

- Tactile markings should be provided on the platform for people with visual impairments.

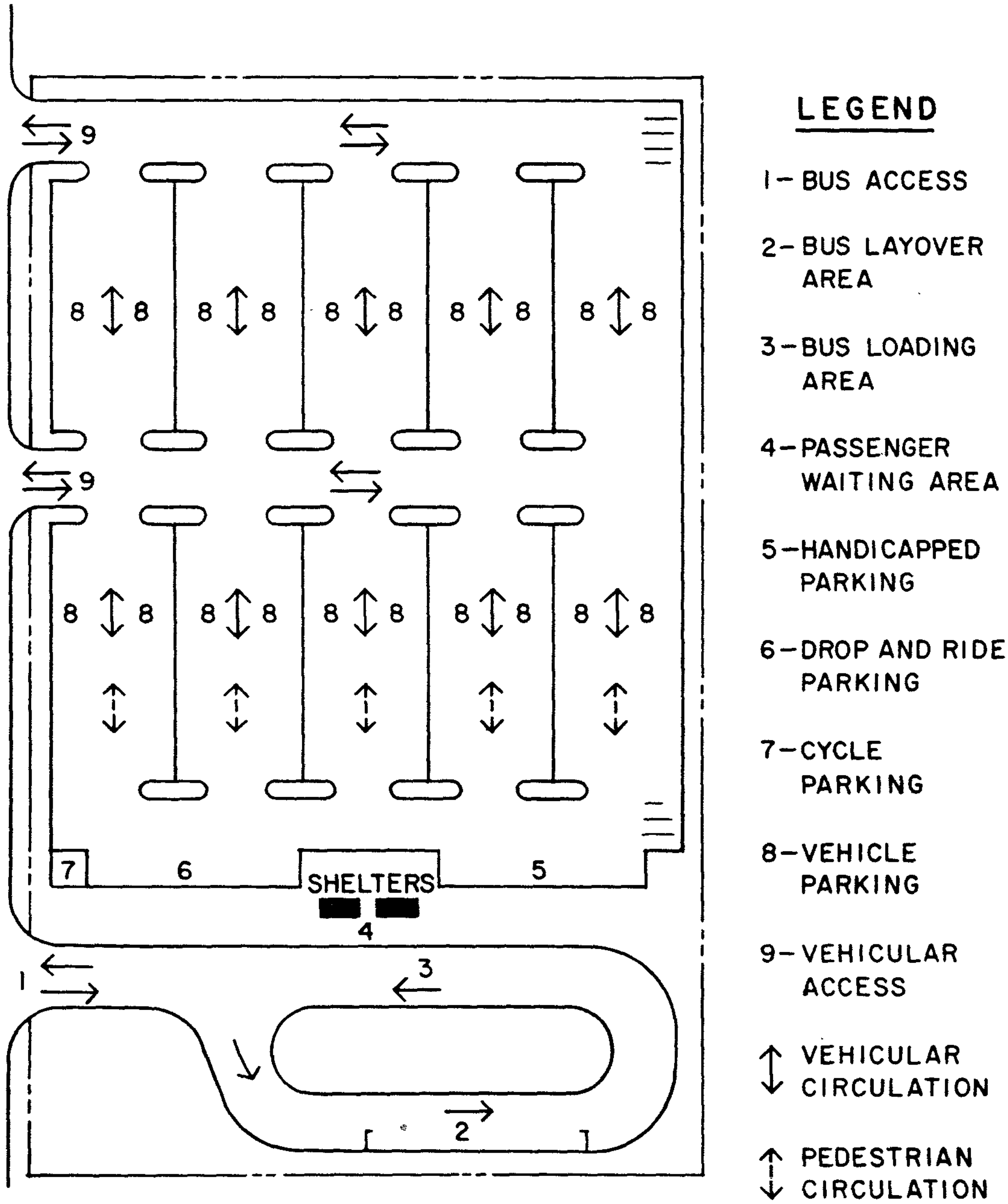


FIGURE 2-2A
Prototype Park-and-Ride Lot

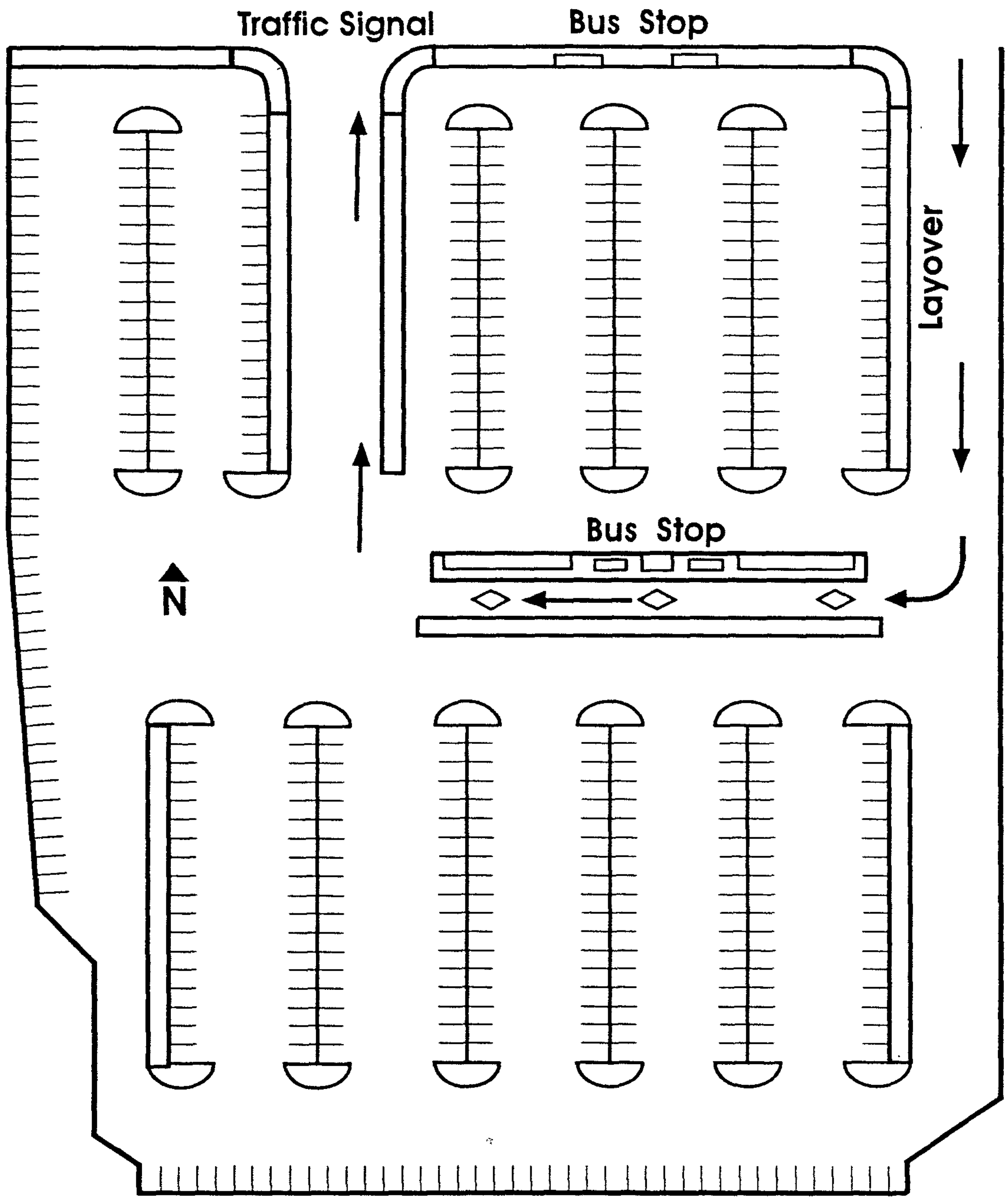


FIGURE 2-2B
Alternative Prototype Park-and-Ride Lot
(Based on S. Federal Way Park-and-Ride)

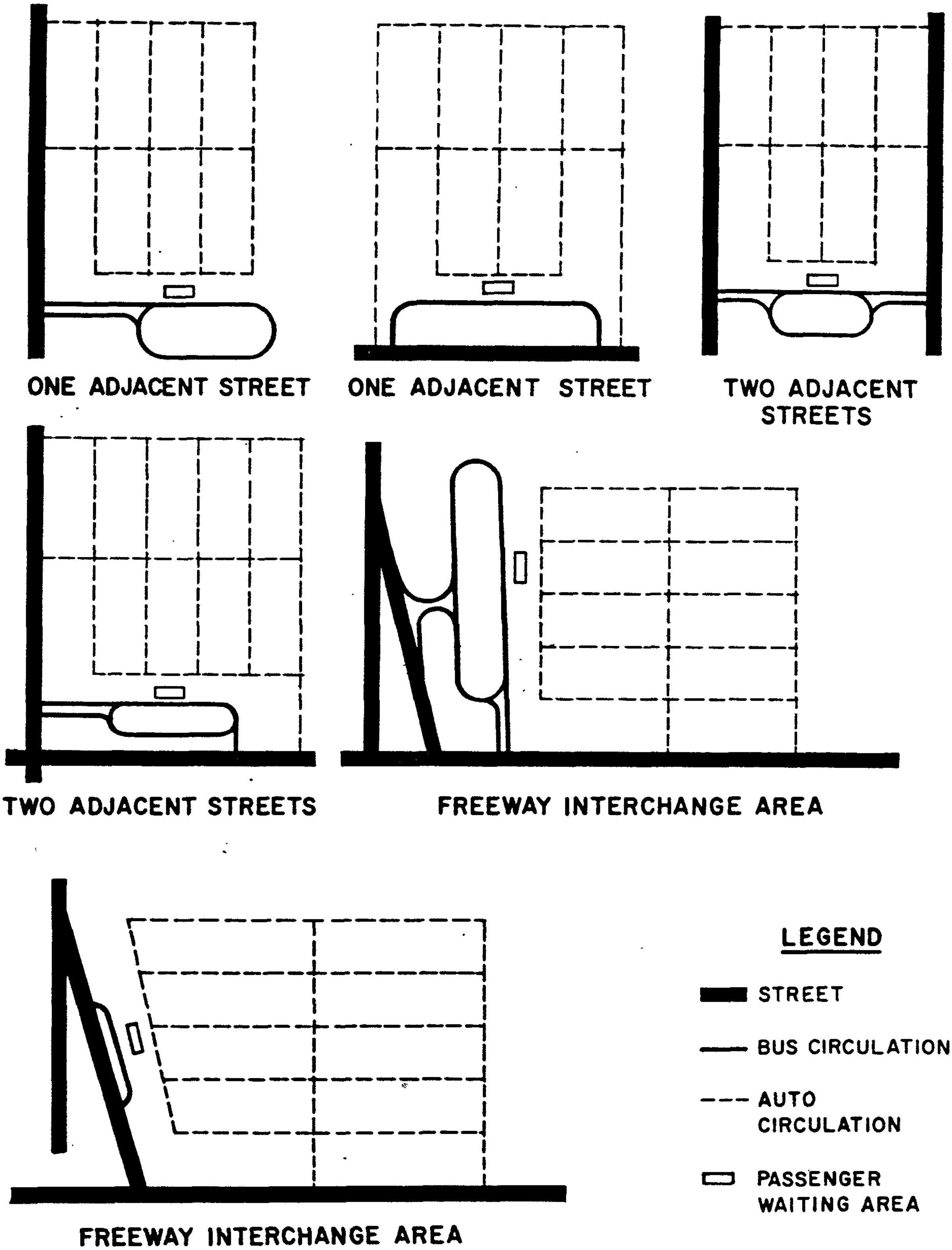


FIGURE 2-3

Application of Prototype to Varying Site Conditions

LEASED PARK-AND-RIDE LOTS

I. Reasons for Establishing a Leased Park-and-Ride Lot

- The lot is already being used as an unauthorized parking area by commuters.
- The site provides additional parking capacity for a nearby full permanent park-and-ride lot.
- It is unlikely that a permanent lot will be proposed in the general area.
- The lot provides capacity prior to building a permanent lot.
- The lot can be brought on line quickly at a low budget.

II. Site Evaluation Criteria

- Prime candidates for leased commuter lots are existing or developing large shopping centers, churches, skating rinks and theatres, etc.
- Lots can be either small tots with less than 100 stalls that are no more than 25% occupied on a weekday or larger parking areas that appear to have a block of 100 or more parking stalls consistently empty during weekdays.
- The site should provide quick, direct access to the commuting corridor. This is usually on the inbound side of a major arterial approaching an interchange that has high peak hour traffic levels.
- The site should be highly visible and accessible from as many directions as possible and should meet the standard design criteria referred to in the Park-and-Ride section.
- Sites with direct access to an HOV lane on metered ramps with HOV bypass are highly desirable.
- The site should not present a safety hazard for vehicles or pedestrians when cars enter and leave during peak hours.
- The site is usually located within a one-half mile radius of a major freeway interchange or commuter route.
- Areas with the greatest potential contain arterials or highways which funnel into the freeway interchange from areas of high to moderate residential density.

- The majority of lot users reside within a 4 to 6 mile half circle “upstream”— in the direction opposite to the morning peak hour flow — from the leased lot facility.

- There should be high peak hour occupancy counts within the corridor.

III. Contract/Lease Fees/Maintenance Terms

- The contract length varies, normally 3 to 5 years or longer.

- The property owner is held harmless.

- The lease fee is normally paid in the form of a maintenance fee, such as $1.20 per stall per month; however, this fee can vary.

- The lease fee covers maintenance and cleaning of the lot by property owner.

- Metro provides appropriate signage for the lot.

IV. Sizing of Leased Lots

- A leased lot normally has 100 or less stalls. In areas where demand is greater than 100 stalls, larger lots are obtained.

V. Restriction in Use

- The lots are normally available for use by commuters Monday through Friday only. Most lots have restrictions on hours of use; usually 6 a.m. to 7p.m.

- Buses are normally restricted from entering the property.

VI. Signing

Four different types of signs are used in conjunction with teased park-and-ride lots. These signs are shown in Figure 2-4A and Figure 2-4B.

A. <u>Location Sign</u>

There is one type of location sign — Park-and-Ride. Each contains telephone numbers for ‘obtaining information about transit and ridesharing opportunities. The 24-inch by 36-inch aluminum sign is mounted on a single pole. All signage is approved for copy by the property owner.

B. Welcome Signs

These signs welcome commuters to the lot and identify the property owner as the provider of the lot.

C. Trailblazers

These signs are used to direct commuters to all commuter parking lots in the Metro service area. The standard green and white highway sign says “Commuter Parking” and displays a directional arrow.

D. Parking Control Signs (Figure 2-4B)

These three signs identify where commuters may and may not park within the lot. Additional special signs can be used in specific situations as the need arises, although every effort is made to use the standard signs first. These signs cover parking days and hours..

Name	Description
P–401	Commuter Parking Only Internal sign with two-way arrow, white background with green letters
P–402	With Right Facing Arrows
P–403	With Left Facing Arrow

INTERNAL LOT SIGN

Name	Description
P–501	Church Parking Only Internal Sign with two-way arrow, white background with red letters
P–502	With Right Facing Arrow
P–503	With Left Facing Arrow

INTERNAL LOT SIGN

Name	Description
P–601	No Cummuter Parking Internal Sign with two-way arrow, White background with red letters
P–602	With Right Facing Arrow
P–603	With Left Facing Arrow

INTERNAL LOT SIGN

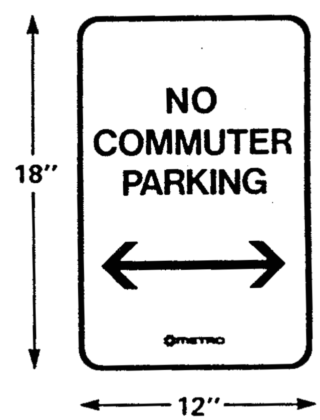


FIGURE 2-4B

Signing Used at Leased Commuter Lots

(continued)

BICYCLE PARKING FACILITIES

Bicycle parking facilities refer to devices located within a designated area which lock both wheels and the frame of a bicycle without the use of a cable.

General Policies

Normally six secure bicycle parking spaces should be provided at each park-and-ride lot. The number of bicycle parking spaces provided at transit centers, flyer stops, major bus stops, Metro transit bases, and commuter parking lots should be determined on a case-by-case basis.

Bicycle racks should be supplied at no cost to the user.

I. Location Considerations

At all facilities, consideration should be given to setting aside space for bicycle parking expansion.

Bicycle parking facilities should be placed in prominent and visible locations with maximum pass-by traffic, yet not directly in a pedestrian pathway.

II. Facility Components

A. Railing

In addition to bike racks, a railing should be installed so that cyclists may lock their bicycles with a self-provided cable or high security lock. The railing should surround the bicycle parking area to prevent pedestrians from tripping over low racks.

B. Foundation

A concrete pad of approximately 14 feet by 30 feet should be poured at all park-and-ride lots for installation of bicycle (and motorcycle) parking facilities, either when the facility opens or at some future point in time.

C. Lighting

The bicycle parking area should be lit to ensure that the environment is secure from theft and to light the way for safe access to the platform and cars.

III. Unit Selection Considerations

Bicycle storage units should be evaluated on the basis of the following:

- Independent strength of the rack and ability to withstand tampering.
- Ease of use.
- Ability to accommodate a high-security lock.
- Maintenance requirements.
- Ability to hold the bicycle upright without damaging any part of the bicycle.

MOTORCYCLE PARKING FACILITIES

Facilities for securing motorcycles are located within a specially designated area at Metro transit facilities.

General Policies

Normally six motorcycle parking spaces should be provided at new permanent park-and-ride lots. The number of motorcycle parking spaces provided at bus bases and at leased park-and-ride lots should be determined on a case-by-case basis.

I. Location Considerations

Space for motorcycle parking should be included within the same area designated for bicycle parking, whenever possible. The motorcycle parking facilities should be placed in a prominent and visible location with maximum pass-by traffic.

II. Facility Components

A concrete pad should be poured at all park-and-ride lots for installation of motorcycle (and bicycle) parking facilities, either when the facility opens or at some future time. Devices to secure motorcycles should be provided at each park-and-ride lot.

Section 3
HOV Facilities

HIGH OCCUPANCY VEHICLE (HOV) FACILITIES

High Occupancy Vehicle (HOV) facilities are those designed for the exclusive use of transit and ridesharing vehicles, i.e., carpools and vanpools.

Although HOV lanes are probably the most familiar type of treatment, there are a wide range of facilities that give priority, and consequently, timesaving advantages to transit and ridesharing vehicles. Ultimately, these advantages encourage mode shift. The development of such facilities can occur over a wide range of costs.

I. Guidelines for HOV Facilities

A. Economic Factors

- Economic guidelines are used to identify when and where transportation system changes and/or investments for various types of treatments are justified from the standpoint of costs and benefits.
- The project must allow more people to be moved during the specified time period than could be moved without the measure or must allow them to be moved faster.
- The evaluation is based on future design year demands, while considering base year conditions.
- The economic benefits realized by preferential users should equal or surpass the negative impacts on nonpreferential users.

B. Physical Factors

- Physical factors are used to identify specific design conditions of the roadway under which regular auto traffic flow can be reasonably and safely preempted for HOVs.
- Physical factors can be used to identify existing design year characteristics which may or may not allow HOV preferential treatments, i.e., availability of enough space within the right-of-way.

II. Types of Facilities

A. <u>Low Cost Facilities (Up to $150,000)</u>

1. Preferential Turns

Preferential turns allow transit and/or HOVs to make turns at intersections where they are prohibited for general traffic. This allows transit operators to follow the most efficient route available and gives HOVs an advantage where congestion is a concern. These turns can be allowed by signing, or, in some cases, by special traffic signals.

2. Preferential Parking for Carpools and Vanpools

The designation of priority HOV spaces within existing parking facilities often does not require any new design other than restriping some parking spaces.

Walking distances from HOV parking spaces to transit stops, carpool staging areas, or activity center destinations should be minimized. Maximum walking distances of 600-1,000 feet are recommended.

3. Parking Prohibitions (bus loading lanes)

Curb access demands are typically found from three sources —parking, goods deliveries, and taxi pick up/drop off. One means of dealing with this problem is to restrict curb access to designated times, e.g., off-peak hours. This solution, typically employed on peak period HOV treatments, requires strict enforcement to remove illegally parked vehicles.

4. Corner Radius Work, Landing Pads, and Bus Pullouts

Some low cost facilities (e.g., corner radius work, landing pads, and bus pullouts) are covered in the Transit Flow and Safety Program (TFASP) section beginning on page 4-1.

5. Concurrent Flow HOV Lane (on existing roadway or shoulder)

Concurrent flow HOV lanes are lanes designated for HOVs in the normal or with-flow direction.

Following are some guidelines for concurrent flow HOV lanes on a surface Street:

- Prohibit taxicabs and other vehicles from stopping in the curb lane to pick up and drop off passengers, or to make deliveries.

- Encourage strict parking enforcement and removal of illegally parked vehicles from the curb lane.

- Signing and markings should conform to the MUTCD (Manual on Uniform Traffic Control Devices) standards, but special supplemental signs should be used as needed.

- For inside concurrent flow lanes, left turns should be prohibited at selected locations, if not at all locations. Closing of non-signalized intersections by cones or other implements should be considered to stop vehicles from crossing the HOV lane.

- For a median lane HOV treatment, use of left-turning bays (closed off due to left turn restriction) have proven to be an effective area for enforcement vantage points and detention areas.

- Enforcement of parking and turning restrictions is essential and may require more attention than violations of the HOV lane itself.

- For a curbside lane HOV treatment, locations should be available or provided where officers can apprehend and issue citations to violators without encroaching onto the main roadway. The use of cross streets may be an appropriate detention area.

- For a curbside lane HOV treatment, the signing permitting right turns should specifically state the point at which a right-turning vehicle may enter the priority lane.

- Variable speed control signing on the HOV lane may be used to limit the speed differential between the HOV lane and general-use lanes. However, the effectiveness of the HOV lane may also be reduced.

6. Contraflow HOV Lanes (on an existing roadway or shoulder)

Contraflow HOV lanes are lanes designated for HOVs in the opposite direction to normal traffic flow. Design considerations for a contraflow HOV lane on a surface Street are:

- Left turns should generally be prohibited along the contraflow lane operation unless separate turn phases are provided. Strict enforcement of any left-turn prohibition should be provided. Left-turn prohibitions with physical impediments should be used where possible. Enforcement on curbside contraflow lanes also needs to focus on parking restrictions.

- Geometric and/or traffic control techniques intended to eliminate or physically impede entering and exiting at intermediate intersections greatly enhances enforcement on contraflow facilities, and should be employed where possible.

- Overhead lane-use control signals and overhead signs should be used, especially where extensive visual clutter exists.

- If possible, curbside contraflow lanes should be wide enough for a bus to safely pass a disabled bus. Wide lanes enhance enforcement by providing 1) an enforcement vantage point, 2) a passing lane for violator apprehension, and 3) a detention/citation area.

- If possible, inside contraflow lanes on two-way streets should have a median from which enforcement officers can monitor the project's operation.

- It may be desirable to impose additional restriction on both contraflow lane and/or opposing lane traffic. Reduction of the speed limit and vehicle headways are the most common restrictions, although the effectiveness of the HOV lane may be diminished as a result.

7. Signal Priority - Signal Coordination

Traffic signal changes that provide priority for HOVs include signal

preemption, separate HOV phases and signal offset adjustments.

Signal priority treatments for HOVs range from minor offset and phasing adjustments to more complex signal preemption techniques that would require changes in controller equipment and occasionally on-board bus equipment. The design of signal priority treatments should consider the following:

- HOV lane volumes
- Delay to non-HOV traffic
- Bus stop locations and spacing
- Type of signal control
- Variance in transit dwell times and run times

- Position of the intersection with respect to other signalized intersections.

Special signal phases for HOVs can be inserted into cycles with or without signal preemption. These priority HOV movements may be instituted as part of a “setback” technique or at independently selected locations.

8. Queue Jumping Lanes

Queue jumping lanes are provided for transit and HOVs in areas of congestion. They provide a separate lane for a short distance that allows them to bypass the queue and enter the flow of traffic just prior to the point of congestion — such as a signalized intersection, narrowing of roadway, or merging traffic.

9. Separate Turn Lanes

Separate turn lanes may be provided for HOVs at intersections for various reasons. One reason would be to allow transit to make left turns where they are prohibited for general traffic. Another reason would be to provide HOVs an advantage at highly congested intersections.

10. Ramp Control, Bypass Lanes

The following are design issues concerning ramp treatment for grade-separated HOV facilities:

- Ideally, ramp meter bypass (RMB) HOV lanes should be physically separated from the metered lane(s). This is particularly important at the ramp entry.

- Where physical separation is not possible on a long ramp with sufficient storage capacity, RMB lane should begin after the entrance point so there is a single entry lane.

- Sufficient merging distance should be provided so that HOVs and general traffic can merge together and assume the same speeds before merging on the freeway.

- The intersection with surface streets is of particular concern for HOV ramps. This is especially true if the ramp is reversible. Hazardous maneuvers or conflicts with surface traffic should be minimized by proper geometric design or traffic controls.

- A vantage point should be provided for a stationary officer to monitor the RMB lane out of view of the motorists. Adequate shoulders should be provided for apprehending and ticketing violators.

Use of an existing shoulder involves several design issues:

- A change in the geometrics of entrance and exit ramps as well as surface street intersections may be required.

- If the available weaving distance is too short, the shoulder lane may cause a reduction in capacity.

- Reconstruction of the shoulder subbase may be required if the shoulder pavement is not thick enough to handle heavy volumes of HOVs, especially buses.

- If sight distance is restricted, HOV speeds may need to be limited or the HOV lane width increased.

- The selection of right or left lanes as the HOV lane is important, particularly on non-separated RMB ramps. Consideration should be given to ramp access, ramp geometrics, position of signals, vis. a vis. the stopped queue and how the two lanes will merge.

B. Capital Intensive Facilities ($150,000 or more)

High-cost HOV treatments, such as exclusive busways, separate HOV roadways, and transit malls, are unlikely to be undertaken by most local government agencies or developers and will, therefore, not be covered in this document.

III. Design Guidelines for HOV Projects

A. Lane Width

The following lane widths are recommended for HOV facilities:

- Surface street facilities - 12 feet
- Grade separated facilities - 12 feet

Widths of less than 12 feet are not recommended where transit volumes are high. One design option on limited width facilities is to establish one wide lane (i.e., 12 feet or wider) for HOVs and reduce the width of the other lanes.

B. Signing

Roadside signs should be mounted on posts directly adjacent to HOV treatments. The sign wording must identify the lane that is restricted, the type of HOVs allowed, and the hours of operation.

On some HOV projects it has been found necessary to install supplemental overhead signing in order to make the HOV signing more visible, especially in the vicinity of intersections or interchanges. Reversible lane operations are typical candidates for overhead lane use control signals. Overhead MUTCD signs applied on contraflow lane treatments can be equipped with flashers to help warn opposing traffic. Occasionally variable message signs are used in lieu of standard overhead MUTCD signs. The messages can be changed or blanked-out during hours in which the HOV treatment is not operational.

The following table indicates the MUTCD standard for signing HOV facilities:

	Roadside	Overhead
Adverse warning	R3-10	R3-13
Restricted lane	R3-11	R3-14
End of HOV lane	R3-12	R3-15

C. Pavement Markings

1. Diamond symbol

The MUTCD recommends use of a diamond symbol to delineate an HOV lane. The diamond is to be 2+ feet wide, 12 feet long, and formed by white lines at least 6 inches in width. This symbol should be placed coincidentally with the longitudinal center of each restricted lane. The MUTCD suggests spacing the diamond symbols as close as 80 feet apart for HOV lanes on surface streets.

2. Lane delineation

There are no specific MUTCD standards pertaining to HOV lane delineation. However, MUTCD standards relating to various types of lane delineation can be applied to HOV treatments. The following general guidelines for HOV lane delineations are based upon principles presented in MUTCD Sections 3A-5 through 3A-7 and 3B-1 and 3B-2.

- White Skip Line - Concurrent flow treatment where HOV lane operates only during limited hours.

- White Solid Line - Concurrent flow treatment where HOV lane operates on a 24-hour basis.

- Yellow Skip Line - Center line of two-lane, two-way exclusive HOV roadway where passing is permitted.

- Double Yellow Solid Line - Contraflow treatment where HOV lane operates on a 24-hour basis. Also as center line of two-way exclusive HOV roadway where passing is prohibited.

- Double Yellow Skip Line - Contraflow or reversible flow treatment where HOV lane operates only during limited hours.

- Yellow Solid Line plus Yellow Skip Line - Continuous two-way left turn lane. Also center line of two-way exclusive HOV roadway where passing is prohibited in one direction.

3. Word markings

The use of word markings on the pavement can often clarify an HOV treatment restriction, especially when used in conjunction with the diamond symbol. Word markings are not suggested on HOV treatments which operate during limited hours unless the designated hours are included in the message.

Textured pavements can be used on permanent all-day HOV treatments to provide added visibility to the projects. Most applications of textured pavement have been on transit mall projects. Textured pavements have also been used on median HOV lanes along surface streets.

D. Buffers and Barriers

Buffers are recommended for separation of HOV and non-HOV lanes when possible. They are particularly beneficial on contraflow treatments where HOVs directly oppose oncoming traffic. Buffers vary in width from 1 to 2 feet up to a full lane width. Stanchions and/or painted chevrons may also be used within the buffer area to discourage violators.

The use of stanchions can assist in delineating HOV lane treatments. Although they come in many forms — rubber cones, plastic posts, or mechanical “pop- up” dividers, flexible plastic posts are the most common form of stanchion used on HOV projects.

Stanchions placed at 20 to 40 foot intervals are often used on contraflow projects where separation of opposing traffic flows is critical. This spacing is dependent upon vehicle.speed. Stanchion spacings at transition points are usually smaller (10 feet) than corresponding stanchion spacing along the treatment itself. When used in concurrent flow projects to keep vehicles from weaving into and out of the HOV lane, stanchions should be placed farther apart (40 to 100 feet). Where possible, the stanchions should be placed within a buffer area to create a gap between vehicles and the stanchions.

E. Intersection/Interchange treatment

How to accommodate turns without adversely affecting HOV flow is a major design problem. On concurrent flow curb lane HOV treatments, non-HOV turns are usually permitted from the HOV lane at intersections.

Normally right turns are only permitted to enter the HOV lane within 100 feet or one block from an intersection.

Left turn restrictions on concurrent and contraflow inside lane treatments range from prohibitions of all left turns to joint use of median left turn bays by HOVs and non-HOVs. The use of special signal turn phases or setback techniques can aid HOVs and non-HOVs in making turns at heavily used intersections.

F. Grades

Loaded buses are severely affected on grades steeper than 6 or 7 percent. The ensuing bus speed reduction can adversely affect travel time for carpools as well as for the bus itself, which may be able to make better time on a more level, alternate route.

G. Transition Treatments

Transition treatments may consist of various combinations of signing, marking, movable barriers, geometric changes, or signalization. A series of advanced warning signs (e.g., one mile, one-half mile, 1000 feet, etc.) could be used where possible to allow HOVs and non-HOVs to safely move into the appropriate lanes. On surface streets, these signs should be placed at least one block before the HOV treatment.

In the case of 24-hour HOV lane restrictions, the use of striped or cross hatched pavement markings or arrows can help channelize traffic at the beginning of an HOV lane. The use of permanent transition markings is not recommended on limited-hour HOV treatments.

Section 4
Transit Flow and Safety Program - TFASP

TRANSIT FLOW AND SAFETY PROGRAM - TFASP

I. Program Definition

TFASP was developed to deal with bus zone and bus route-related problems that have occurred for decades but were often just left alone or given only a temporary repair. TFASP addresses the problems from a capital improvement stance versus a maintenance perspective because: (1) maintenance of the existing condition does not adequately address safety and access issues, and (2) the capital improvement approach recognizes that the existing levet of improvement is inadequate for the requirements of current transit equipment.

The scope of the program improvements includes: passenger landing pads, bus pullouts, walkways, bus layovers/terminal improvements, wheelchair curb ramps, corner radius adjustments, and street/traffic light improvements. Many sites involve several of these improvements. Sometimes the work done includes improvements outside of this scope that contributes to the overall improvement of the area and may fulfill jurisdictional requirements.

There are two processes for development and construction of TFASP improvements—one for internal development and construction and the other for working with local jurisdictions. Internally, sites needing improvement are determined by facility planners. A sketch is prepared which highlights the work needed at a specific location. This is forwarded to Metro Engineering staff to secure a field survey of the exact conditions. A preliminary site plan of proposed improvements is prepared and forwarded to the appropriate jurisdiction for review/approval. When sufficient sites have been gathered together, permits are secured, and contract documents are developed. The work is advertised for bids, leading to construction.

The process for working with local jurisdictions also begins with planner input and site sketch preparation. A request is then sent (including the sketch) to the jurisdiction to see if the work can be completed by the jurisdiction and at what cost. The jurisdiction then either schedules the work utilizing its own forces or includes it within a contract for related work in the vicinity. Metro reimburses the jurisdiction by issuance of a purchase order prior to work being done.

The results achieved through TFASP work are: increased pedestrian and patron safety; improved vehicular safety (both auto and transit); faster bus speeds; improved public relations resulting from resolution of the problems; and improved inter-agency relations resulting from joint cooperation. The focus of these improvements is on safety for both patrons and pedestrians; whenever possible, an effort is made to make the site accessible to people with disabilities, as well.

II. Improvement Descriptions

A. Landing Pads

These are either asphalt or concrete and involve as much new paving as needed to result in a clear paved landing area measuring 10 feet in length (up and down the Street) by 8 feet in width (perpendicular to the street). This provides enough length to allow drivers to make a smooth stop and also provides enough width to allow deployment of the wheelchair lift (4 feet out from the side of the bus) and maneuverability space for the wheelchair. Paving design is equivalent to sidewalks and walkways. (See Figure 5-1, Bus Loading Pad.)

B. Bus Pullouts

This is either asphalt or concrete paving along the shoulder of the street right-of-way (outside of the travel lane) designed to allow the bus to safely stop out of traffic. Amount of paving depends on site conditions and needs. Generally, the optimal measurements for a pullout are 70 feet to 110 feet in length and 10-12 feet in width. Pullouts often include such improvements as landing pads, walkways, curb ramps, and corner radius work. Pavement design is sufficient to handle 40 foot and 60 foot buses that are classed as “heavy weight vehicles.” Specific design parameters used depend on requirements of the local jurisdiction; however, Metro’s general concern is to meet or exceed a minimum standard of a compacted subgrade and 10 inches of ATB (Asphalt Treated Base) and 3 inches of Class B Asphalt overlay.

Bus pullouts should be provided only where buses, when stopping on the roadway, present a serious traffic or safety problem. This is because of the delay bus drivers encounter when trying to get back into the stream of traffic. The following is a list of conditions under which pullouts should be considered:

- Speed limit of 35 mph or more on a two-lane road; 40 mph on a four-lane road
- Poor sight distance (on curve or crest of hill)
- Long dwell time at bus zone (more than 30 seconds)
- High accident rate (rear-end collisions, sideswipes)
- Regular disabled stop
- No area to unload passengers safely

In order to improve system on-time performance and minimize merging conflicts, a traffic study should be conducted to determine if a pullout is warranted.

C. Layovers/Terminals

These are nearly identical with pullouts; however, the key difference is that the bus will be stopping for at least five minutes and as much as one hour. The amount of fuel/oil dripping makes it desirable to have 10 inches of concrete rather than the asphalt surface. Ingress and egress areas could have an asphalt surface. Generally, pullouts and layovertterminals paving will be matched to the paving of the existing roadway.

D. Walkways

Occasionally the development of a pullout/layover and landing pad requires a walkway to provide access by ambulatory or disabled patrons who have either been using the existing shoulder of the road or boarding at the paved intersections of the two streets. The walkway is constructed of either asphalt or concrete to match existing walkways. If no walkway(s) exist, asphalt is generally used.

E. Curb Ramps

These are installed where new curb work is being done or into existing curbs where curb extensions are being made. This improvement is, along with landing pads, the key to providing accessibility for people with disabilities. Generally only the immediate ramps are constructed; however, in some cases and in some jurisdictions (as required) ramps are installed at the corners of the intersection not immediately affected. In some instances, this is the only improvement made — clearly to facilitate accessibility.

E. Corner Radius Work

These are constructed to allow for safe transit operations. Most improved intersections, especially in Seattle, were constructed at a time when traffic volumes and bus sizes allowed a standard radius of 15-20 feet. Today the minimum radius needed to provide easy, safe right turning movements is 30 feet, and 35-40 feet is desirable. This is in conflict with the current desire to make crossing areas as short as possible; frequently by development of corner “bulbs”. The problem for buses with a short radius is that the front of the bus has to cross over into the next lane (four-lane road) or the centerline (two-lane road) of the roadway the bus is traveling on; and then into the second lane or lane of oncoming traffic of the roadway the bus is turning onto. Otherwise, the right side rear dual wheels go up over the curb, presenting pedestrian safety problems and damage to the curb and sidewalk. The adjusted radius eliminates or minimizes such problems. Next to potholes in a pullout, short corner radii at intersections is the problem most often complained about by bus drivers and safety section staff.

F. Street/Traffic Light

Occasionally the safe use of a bus zone is affected by poor street lighting. In such instances, Metro will work with the local power company to establish improved lighting from one of several options. There are also instances where safe and smooth transit operations are hampered by limited traffic controls at an intersection. Metro will work with the local jurisdiction to either modify existing traffic control lights or contribute in part or whole toward the installation of new equipment where required by transit operations. Signal installations should meet one or more warrants defined in the Manual on Uniform Traffic Control Devices (MUTCD). Since MUTCD warrants do not consider vehicle acceleration and size, signals may also be considered where, in the collective opinion of the Safety Section, a significant hazard exists where buses enter an uncontrolled intersection. Each circumstance is evaluated on its own merits. It may even be deemed more effective to alter the bus route vs. installing a traffic light.

Other special types of work may be done, depending on the situations. The descriptions given above are general rather than specific detailed explanations. In some cases, greater detail is provided in the Bus Zones Section elsewhere in these guidelines. Complete details and specifications can be secured from Metro by contacting Paul Alexander, the TFASP project manager at 684-1599. All details and specifications apply as minimum standards whether the work is done by Metro, a local jurisdiction, or by a private developer as part of traffic mitigation requirements.

Section 5
Bus Zones

BUS ZONES

A bus zone is a designated space for loading and/or unloading passengers. A zone accommodating one bus is normally from 80 to 160 feet in length. In business districts, during peak hours, this length may be extended. If a bus zone is located in an area where parking is permitted, the zone length is marked to keep the area free of cars.

I. Classification

In determining the proper location of bus stops, the choice lies between near-side, far-side and mid-block stops. The standards used by Metro to designate stops are based on the recommended practices approved by the Institute of Traffic Engineers Board of Directors on August 4, 1967, and modified and adopted by Metro in November 1975.

A. <u>Near-Side Stops</u>

A near-side stop is one which is located immediately before an intersection.

1. Conditions under which near-side stops are recommended

   a. Traffic is heavier on the leaving side than on the approach side of the intersection.

   b. The cross Street is a one-way Street where traffic flows from right to left.

   c. At intersections controlled by signals, or stop or yield signs, when transit operations are more critical than traffic or parking.

   d. Where there is a right turn, if curb space is critical but traffic is not critical, a near-side stop should be established before the turn.

2. Advantages

   a. There is less interference with traffic turning into the bus route street from a side street.

   b. Passengers generally alight close to a crosswalk.

3. Disadvantages

   a. Heavy right turns can cause conflicts, especially when a vehicle makes a right turn from the left of a stopped bus.

   b. A bus standing at a near-side stop obscures the sight distance of a driver entering the Street from the right as well as pedestrians crossing.

c. A bus standing at a near-side stop obscures the sightof a stop sign on the right corner.

4. Dimensions

To accommodate a standard (40 foot) bus or an articulated (60 foot) bus, a near-side stop on streets with speed limits of 40 mph or less should be 130 feet in length. The head of the zone should be 30-50 feet away from the crosswalk when there is a stop sign. This includes 60 feet for pull-in and 70 feet of parallel curb. The intersection serves as the pull-out space. See Figure 5-3. (For bus stops with multiple coaches, see Figure 1-6 and layover space dimensions on Page 1-10.) Figure 5-4 shows recommended dimensions for bus pullouts on roadways with speed limits of 40 mph or more.

5. Stop Distance Prior to a Controlled Intersection

a. 0 feet when bus stops in driving lane with an overhead traffic signal.

b. 30 feet when there is a stop sign and flashing overhead stop beacon.

c. 50 feet when there is only a stop sign.

B. <u>Far-Side Stops</u>

A far-side stop is one which is located immediately following an intersection.

1. Conditions under which far-side stops are recommended

a. Traffic is heavier on the approach side than on the leaving side of the intersection.

b. The crossing street is a one-way street where traffic flows from left to right.

c. At intersections where heavy left or right turns occur.

d. At intersections where bus routes and heavy traffic movements diverge.

e. At intersections controlled by signals or stop or yield signs, when traffic or parking is critical and transit operations are not critical.

2. Advantages

a. Right turns by vehicles can be made with less conflict.

b. Left-turning buses approaching a far-side (around the corner) stop begin their left turn from the proper lane. Leaving a near-side stop, operators would have to cross traffic in the lane to their left.

c. Buses stopped in a zone do not obstruct sight distance to the left for vehicles entering or crossing from a side Street.

d. At a signalized intersection, buses can find a gap to enter the traffic stream without interference, except where there are heavy turning movements into the street with the bus route.

e. Waiting passengers assemble at less crowded sections of the sidewalk.

f. Buses in the bus stop will not obscure traffic control devices or pedestrian movements at the intersection.

3. Disadvantages

a. Intersections may be blocked if other vehicles park illegally in the bus stop, thereby obstructing buses and causing traffic to back up across the intersection.

b. Stops on a narrow street or within a moving lane may block traffic on both the Street with the bus route and on the cross street.

c. A bus standing at a far-side stop obscures sight distance to the right of a driver entenng the bus street from the right.

d. Where the bus zone is too short for occasional heavy demand, the overflow will obstruct the cross street.

4. Dimensions

To accommodate a standard (40-foot) bus or an articulated (60-foot) bus a far-side stop on streets with speed limits of 40 mph or less should be 110 feet in length. This includes 70 feet of parallel curb and 40 feet of pull-out. The intersection is used for the pull-in space. See Figure 5-3. (For bus stops with multiple coaches, see Figure 1-6 on page 1-10.) Figure 5-4 shows recommended dimensions for bus pullouts on roadways with speed limits of 40 mph or more.

C. Mid-Block Stops

A mid-block stop is one which is located 300 feet or more beyond or before an intersection.

1. Conditions under which mid-block stops are recommended

   a. Traffic or physical street characteristics prohibit a near or far-side stop adjacent to an intersection.

   b. Large factories, commercial establishments, or other large bus passenger generators exist, and heavy loading makes the location desirable.

   A mid-block stop should be located at the far side of a mid-block pedestrian crosswalk, if one exists, so standing buses will not block a motorist's view of pedestrians in the crosswalk.

2. Advantages

   a. Buses cause a minimum of interference with sight distance of both vehicles and pedestrians.

   b. Stops can be located adjacent to major bus passenger generators.

   c. Waiting passengers assemble at less crowded sections of the site or move to another intersection.

   d. Nearby driveways may be used as pull-in and pull-out space.

3. Disadvantages

   a. The removal of considerable curb parking is required.

   b. Pedestrian jaywalking is more prevalent. This is hazardous and creates vehicular friction and congestion.

   c. Patrons from cross streets must walk faster.

4. Dimensions

To accommodate a standard (40-foot) bus or an articulated (60-foot) bus, a mid-block stop on streets with speed limits of 40 mph or less should be 170 feet in length. The head of the zone shall be 30 feet away from a crosswalk. This includes 60 feet for pull-in, 70 feet of parallel curb and 40 feet for pull-out. See Figure 5-3. (For bus stops with multiple coaches, see

Figure 1-6 and layover space dimensions on Page 1-10.) Figure 5-4 shows recommended dimensions for bus pullouts on roadways with speed limits of 40 mph or more.

II. General Guidelines

A. Frequency of Stops

- Metro's Transportation Service Guidelines indicate that bus zones are initially located on an average of 4 to 6 stops per route mile along local residential collection and distribution segments of a new route.

- Additional stops may be added if warranted but should not exceed the basic stop spacing guidelines of 8 stops per mile and no two stops should be within 500 feet of one another. Metro attempts to locate bus stops so that no passenger will have to walk more than a quarter mile to get to a bus stop.

- Spacing may range from one stop per block where city blocks are 500 or more feet in length, to stops staggered in every second or third block where city blocks are shorter.

- Location of important buildings and traffic generators, and the configuration of side streets leading into the bus route, should be considered in spacing the stops.

- Stops on either side of a two-way street should correspond with one another whenever possible.

- When consistent with safety and adequate sight distance guidelines, bus stops can be combined with mandatory stops required for traffic signals and railroad crossings.

B. Pedestrian Considerations

- There should be no street furniture or trees within 4 feet of the curb in a bus zone, so that opening bus doors are not blocked by light poles, landscaping, or other obstructions. Eight feet of clearance is also needed for wheelchair lift operation — 4 feet for the lift to extend and 4 feet for the wheelchair to maneuver beyond the lift. The minimum clearance for a non-accessible zone is 3 feet.

- Consideration should be given to the proximity of shelters, adequate lighting, and proximity of traffic control features. Street furniture should be placed so it does not block an operator's view of intending passengers or obstruct sight distance. Bus stop signs should have a minimum clearance of 7 feet and trees should be a minimum of 8 feet from the ground.

- Along avenues with planted or grass parkway strips, a sidewalk slab should be added between the existing sidewalk and the curb where a bus passenger would otherwise have to cross wet grass or mud during inclement weather. (See Figure 5-1, Bus Loading.)

- For passenger safety reasons bus zones should be avoided at locations where there are a series of raised and lowered curbs.

- If transfer movements between bus routes are heavy, consideration should be given to locating bus stops so as to minimize crosswalk movements of transferring passengers.

C. <u>Guidelines for Accessible Bus Zones</u>

All bus zones should be established in areas in which the wheelchair lift can be used. When this is not possible, efforts should be made to have the zone improved to allow for lift usage. Only as a last resort should a zone be non-accessible.

- The width and depth of the zone shall provide an adequate physical environment which will allow the lift to properly operate and to effectively interface with adjoining surface allowing the passenger in the wheelchair to maneuver on and off the lift. A clear paved loading area measuring a minimum of 10 feet in length by 8 feet in width is needed.

- Efforts shall be made to locate all bus zones away from driveways. However, if it is determined that a zone provides a reasonable level of safety for passengers, even when located at or blocking a driveway, then it may be used for wheelchair lift service.

- Efforts shall be made to locate all zones in areas which reduce the potential for rear-end or sideswipe hazards, which have an adequate line of sight, and which have pedestrian paths located out of the street. However, if it is determined that a zone provides a reasonable level of safety for passengers, then it may be used for wheelchair accessible service if there is enough room to allow operation of the lift and maneuvering of the chair.

- All bus zones should have a reasonably close opposite zone whenever possible. When the opposite zone cannot be designated accessible nor can the previous or following opposite zone be used for lift service, then both opposing zones shall be non-accessible.

- A zone without an opposite may, however, be designated accessible upon request of a potential rider.

- In some situations, zones should be designated non-accessible even though the lift may be able to operate safely there. When a zone cannot be located at any other location, a zone may be non-accessible based on restrictions imposed by the local jurisdiction.

- Flagstop areas shall not be used by the full size transit bus for accessible service. Zones should be established if the route is to become accessible. The determination of accessibility for flag stops shall be made by the individual driver at that stop.

- The Safety Division and Service Planning shall be responsible for determining the accessibility of a zone, in accordance with the above guidelines.

D. Other Considerations

- Pull-out bus stops should be used on two-lane streets and roads with a posted speed limit of 40 mph or higher, or at heavily used stops with longer than average bus dwell times. These stops involve relocating of the curb so the street width is flared and a bus can pull completely out of the normal traffic and parking lanes.

- When a bus route turns left from a one-way street, the preceding bus stop must be located far enough in advance to allow the bus to shift to the left traffic lane.

- It is desirable to avoid "boxing in" a commercial establishment at a corner by having bus zones on both sides of it. However, if there is one predominant transfer movement at an intersection, the bus stop should be located so that passenger walking will be minimized.

- At major passenger generators, bus stops should be located to minimize crosswalk movements.

- Pavement width should be considered in deciding which side of the intersection to locate the bus stop.

- Devices and markings that give the bus stop prominence, such as transit curb painting and tow-away zones, may deter motorists from parking in the bus zone and aid enforcement efforts to keep the zone clear.

- For a description of pullout requirements, see Section II-B in the TFASP section of these guidelines (p. 4-2).

III. Bus Zone Relocation Guidelines

Metro will not move a bus zone that is safely and efficiently meeting Metro's and a local jurisdiction's needs, despite a request by an adjacent property owner, unless the following criteria are met:

- The local jurisdiction approves of the relocation.
- An equal or better location exists that meets Metro's standards for safety, access, landing area, elderly and disabled access and zone spacing.
- The property owner requesting the move secures the initial permission from the new adjoining property owner.
- In the case of a bus zone with a shelter, the property owner requesting that the zone and shelter be moved will be asked to pay for the cost of relocating the shelter (i.e., new shelter footing).

Exceptions to this policy may be justified in the following situations:

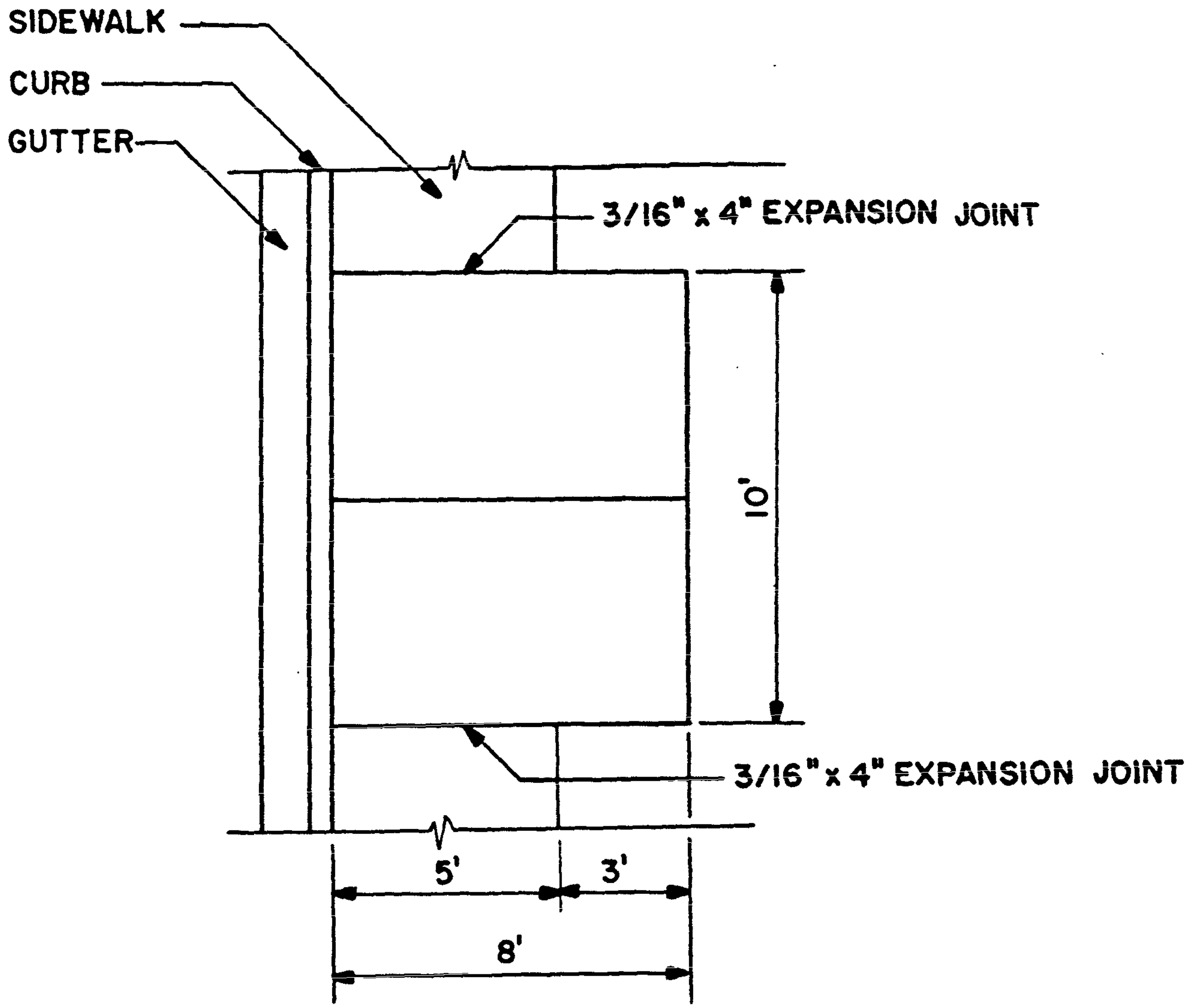
- In cases where numerous acts of vandalism against private property or harassment to adjacent property owners have occurred (backed up by insurance claims or police reports), Metro can waive the last two criteria listed above if it feels relocation will help and not just shift the problem.
- As a last resort, Metro will consider closing a zone if numerous acts of vandalism against private property or physical assault are reported (insurance or police reports) which can be shown to have a direct connection to bus zone users.

IV. Bus Stop Signs

The bus stop sign should be mounted independently of other signage on its own 2-inch by 2-inch galvanized pole, or if appropriate, on existing light standards. The exact location and mounting is usually determined by a joint survey between Metro and the appropriate jurisdiction.

The bus stop sign should be side mounted on the pole **900** to the street (at a right angle to the direction of travel) with 7 feet of clearance from the ground to the bottom of the sign. When the pole is located between the curb and sidewalk, the sign should be mounted toward the sidewalk. Conversely, if the pole is located outside of the sidewalk, the sign should be mounted toward the street.

In urban areas where curbs and sidewalks exist, the sign should be installed at the head of the zone, not closer than two feet of lateral clearance from the curb face, but always in alignment with existing signage. In rural areas where curbs are non-existent and the bus is stopping on the shoulder, the pole should be installed at the head of the zone with a lateral clearance normally not closer than 10 feet from the edge of the road. Where a bus is stopping on the roadway, the post can be 2 feet off the edge of the road with the sign mounted away from the street. (See King County standards.)



BUS LOADING PAD

NTS

FIGURE 5-1
Bus Loading Pad

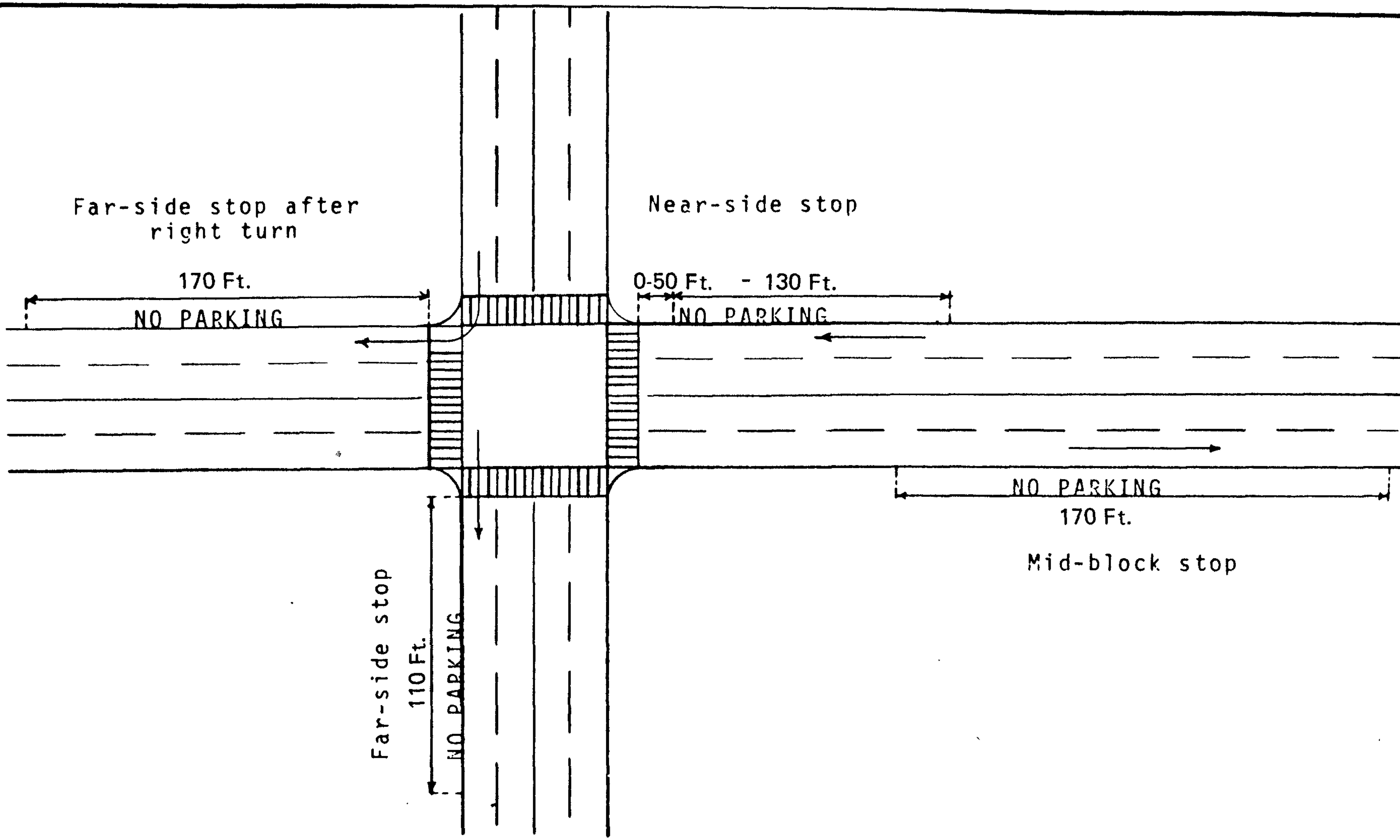
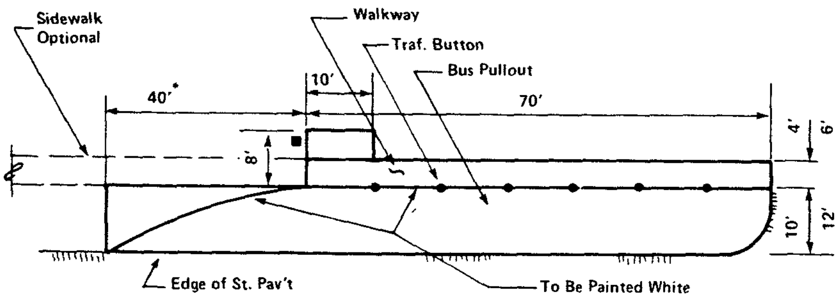
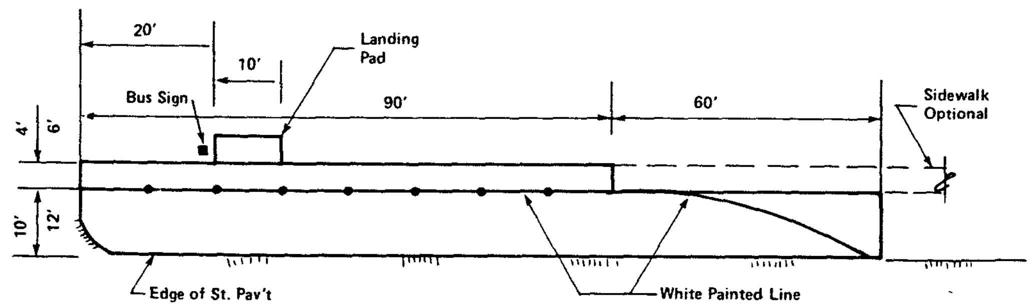


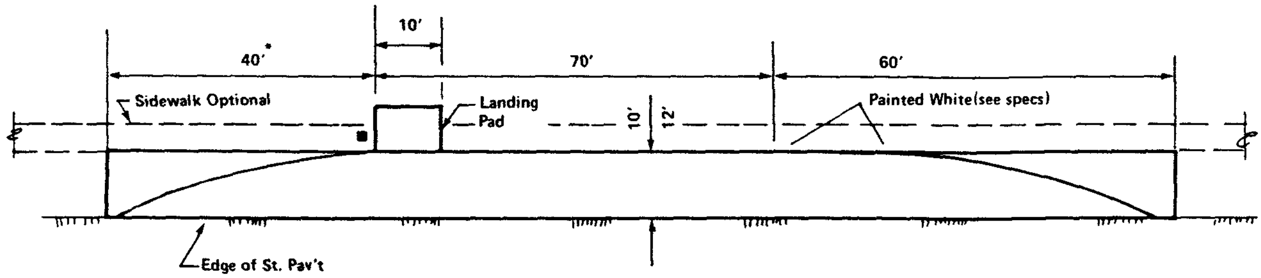
FIGURE 5-2
Bus Stop Lengths



STD FARSIDE BUS PULLOUT



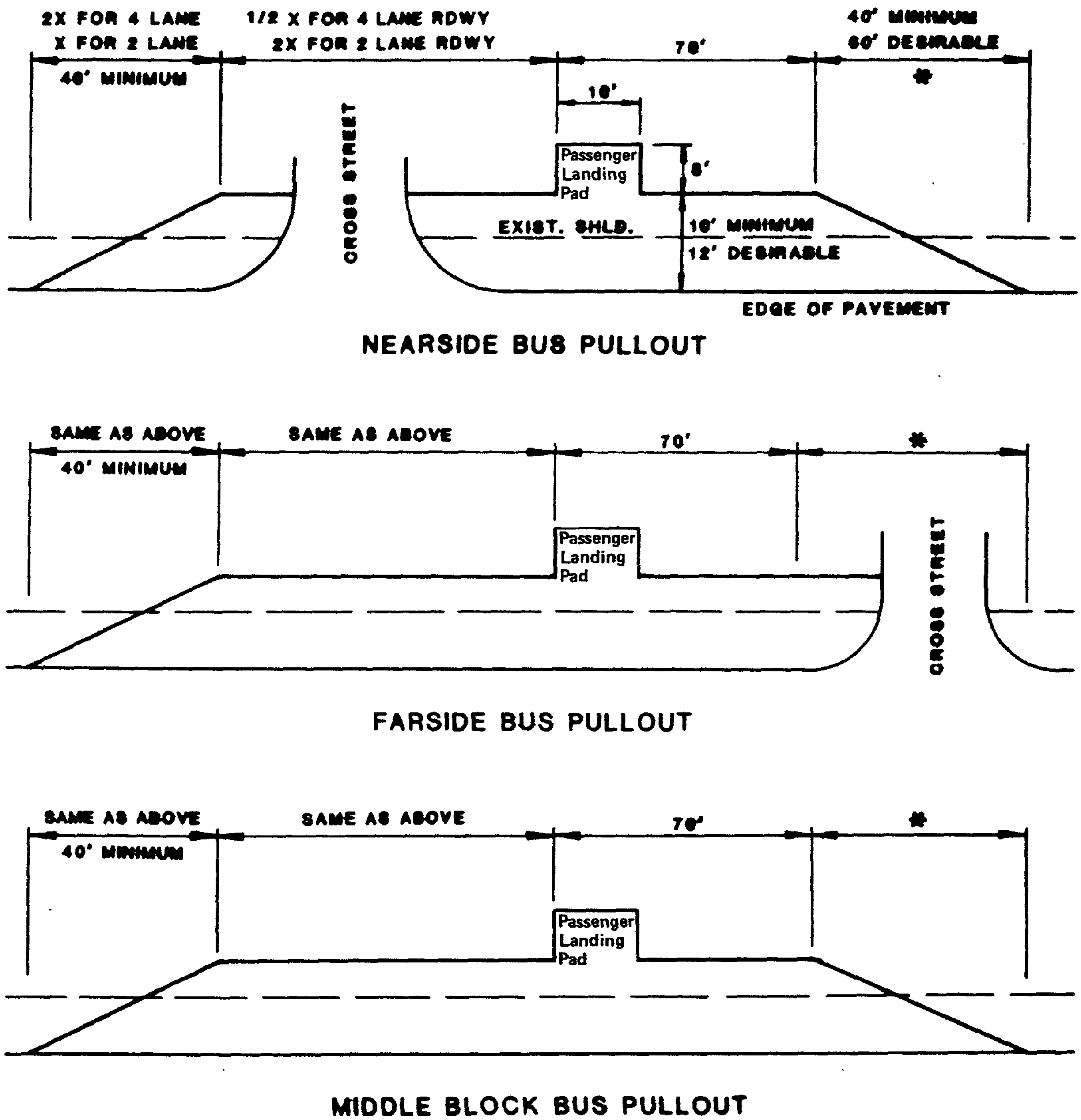
STD NEARSIDE BUS PULLOUT



* If shoulder is unimproved ingress taper should be 60' instead of 40'.

STD MIDDLE BLOCK BUS PULLOUT

FIGURE 5-3
Bus Pullout Designs for Streets with Speed Limits of Less than 40 mph

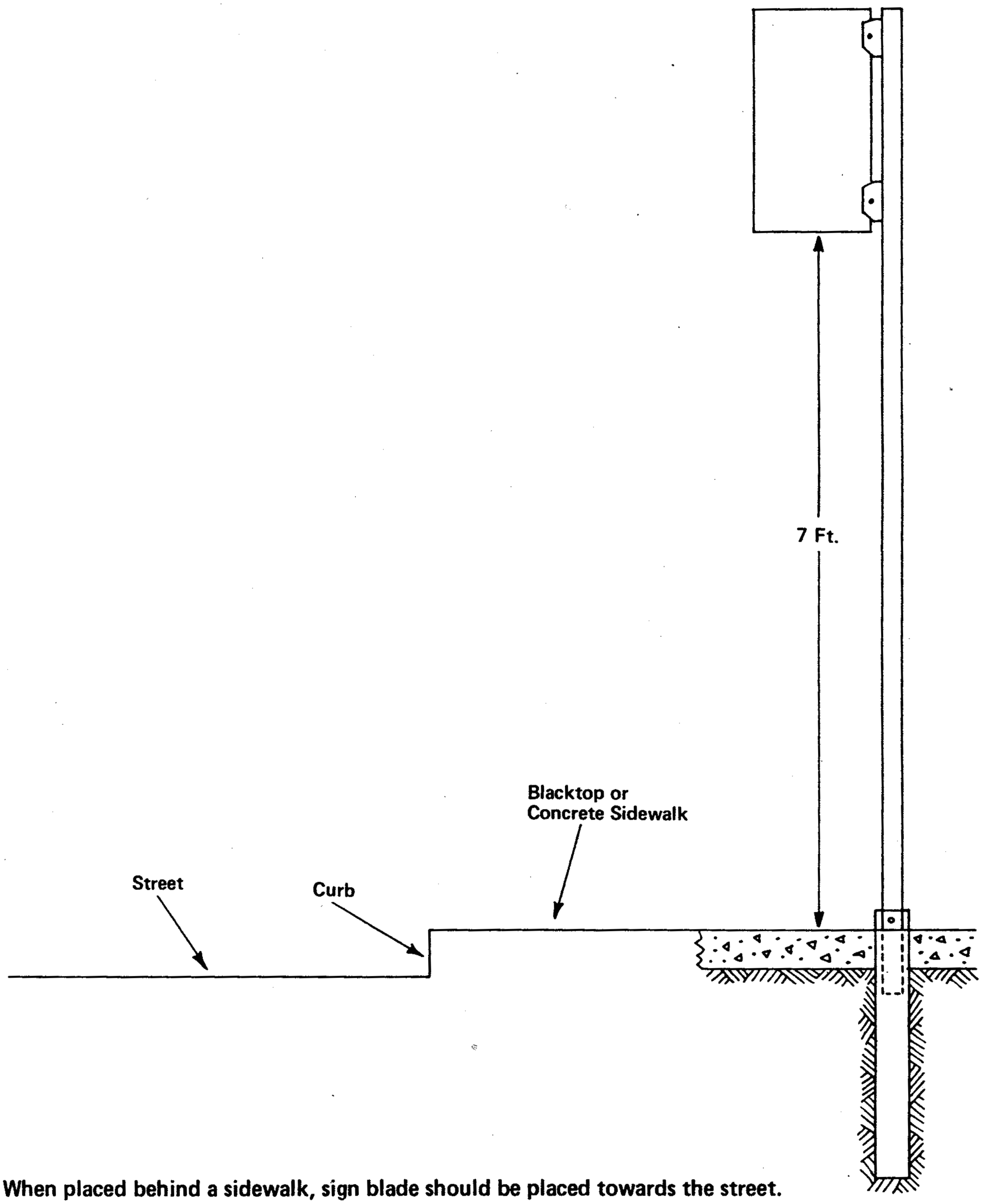


X = SIGNED SPEED LIMIT

X = 0 FOR SIGNED SPEED LIMIT LESS THAN 40 MPH

*FOR WIDTH LESS THAN 12' ADD 30'

FIGURE 5-4
Highway Bus Pullouts for Speed Limits of 40 mph and Over



When placed behind a sidewalk, sign blade should be placed towards the street.

FIGURE 5-5

Typical Bus Stop Sign Installation when Placed behind Sidewalks

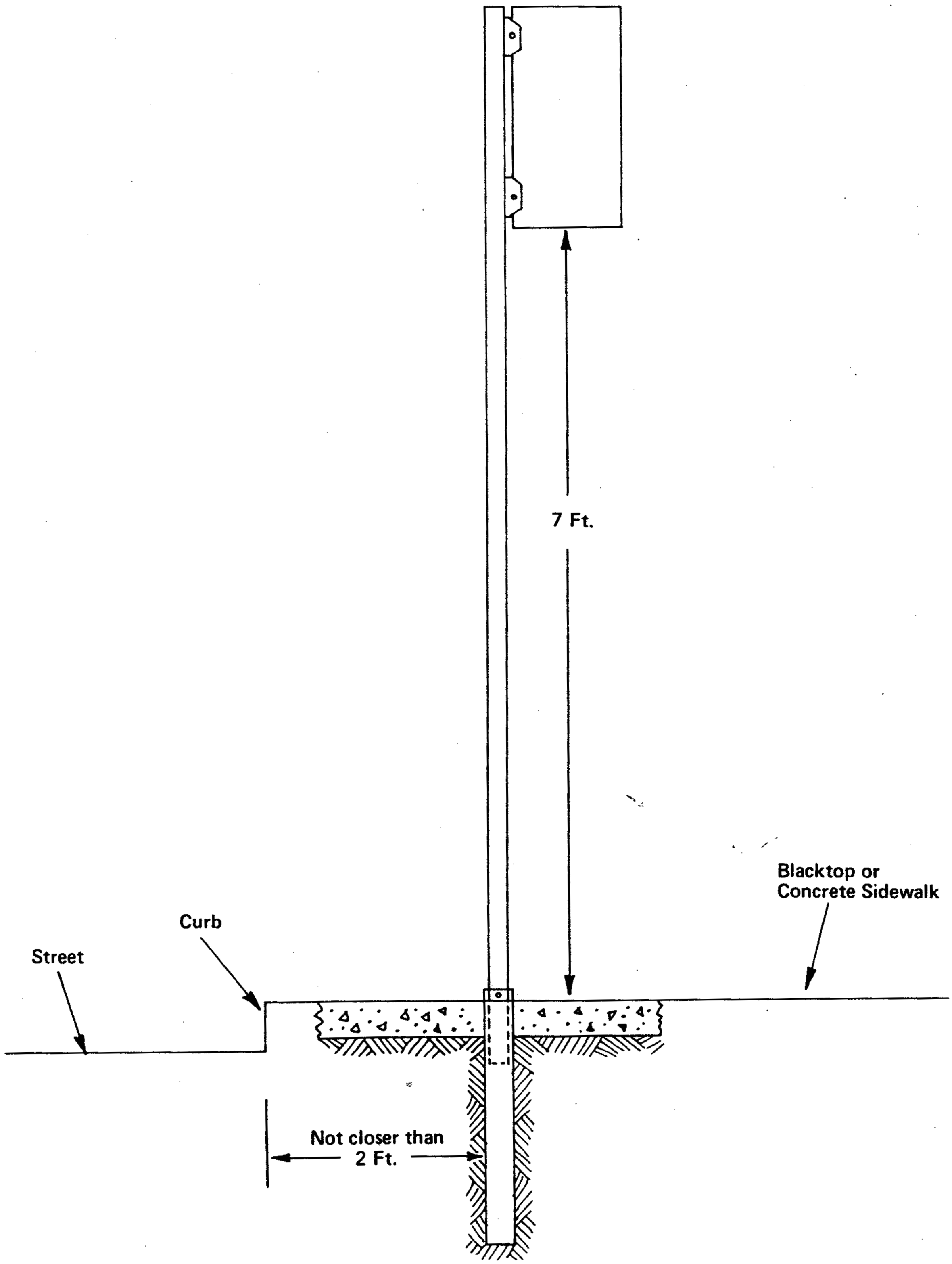


FIGURE 5-6
Typical Bus Stop Sign Installation when Placed between Curb and Sidewalk

TRANSIT PASSENGER SHELTER STANDARDS

A passenger shelter is a covered waiting area, often with benches, that provides protection from inclement weather. Priority is given to providing passenger shelters at locations which have no existing weather protection, and that meet the general site selection criteria included in these standards.

I. Shelter Development Options

There are two basic options for developing a shelter site. They are 1) the construction and installation of shelters within a Metro contract, covering numerous potential sites at one time, or 2) the development of sites on a cooperative basis with an adjacent property owner/developer during the development of the property. The standards and criteria listed below generally apply in either case.

A. <u>Option 1: Metro Provided Shelters</u>

Metro arranges for the site preparation, footing construction, shelter fabrication and installation for its standard designs. Metro also handles the ongoing maintenance and repair.

B. <u>Option 2: Developer Provided Shelters</u>

When a property owner is interested in providing a shelter, whether out of personal desire or out of a jurisdiction requirement designed to mitigate the potential traffic impacts of the development, Metro consults with the property owner/developer regarding the best way to achieve this goal.

When working with developers, Metro prefers that the developer construct and maintain the shelter. The intent is to have a shelter design which is compatible with the design of the development. This provides the developer with a vested interest in the general appearance and upkeep of the structure.

If the developer would rather use a shelter owned and maintained by Metro then Metro requests the developer to provide adequate space to locate a shelter and provide the concrete shelter anchor footing and any necessary access or retention paving. Metro provides the developer with specifications, details, and on-site inspection of the formed footing to ensure that it is consistent with local building codes. Metro then secures the permits for the shelter installation and follows through with ongoing maintenance based on its regular schedules.

II. Design Standards

Metro’s basic passenger shelter is a multi-frame and roof system that offers a variety of configuration options. The standard single unit coverage is 6 feet by 9 feet, with the basic frame configurations being a box or a cantilever. The roof can be either flat, small peaked (non-overhanging), or large peaked (overhanging). The panel configuration can be either all clear glass, all wood, or a combination of clear and wood. Installation typically includes either a 4-foot or 7-foot pedestal bench, or an 8-foot suspended bench. Most installations also include a Metro design litter receptacle.

The CBD or downtown design shelter is a modified version of the standard shelter that better meets the limited spatial characteristics of central business districts. Its basic frame configurations are a single and a double cantilever. Its only roof style is flat, and it always uses clear panels for maximum visibility of adjacent businesses. Each installation utilizes only one or two small wood benches, relying primarily on the use of leaning rails; although standard benches could be used as the situation demands. Each installation also includes a litter receptacle.

III. Site Selection Criteria

Potential locations for shelter installations are identified through analysis of ridership at bus zones against the ridership criteria. Consideration is also given to suggestions received from patrons, drivers, staff, and/or local jurisdictions. The potential locations are evaluated using the following criteria:

A. <u>Passenger Volume</u>

The number of persons known or projected to be using the bus stop is the most important factor in determining where shelters should be located.

Metro’s general ridership criteria for selecting a site is 25 or more riders per day in the suburban areas, and 50 or more riders per day within the city of Seattle.

B. <u>Frequency of Service</u>

High service frequency levels are often consistent with high ridership volumes. Stops served by all-day local and express service are given the highest priority in shelter placements.

C. <u>Transfer Points</u>

Providing a passenger shelter at bus route transfer points is an important siting consideration, because timed transfers are not always available.

D. Concentrations of Riders Who Are Elderly, Disabled or Low Income

Strong consideration is given to placing passenger shelters at locations that will provide service and protection to people who are elderly, disabled, or low income, and other “transit dependent” groups. Certain sites are given a higher priority if located in areas likely to serve these groups, such as near hospitals, residences for elderly or disabled people, senior citizen activity centers, social service outlets, and similar facilities.

E. Land Use Compatibility

Shelters need to blend in with their surroundings and be compatible with the prevailing land use. A shelter should not severely impact either an adjacent residence or business. Every effort should be made to minimize potential impacts before proceeding with an installation. If it is determined that only a minimal amount of impact is likely, and that a substantial degree of need exists for the shelter, Metro will generally put the shelter in, even if there are objections to the installation.

F. Available Space in Which to Locate a Shelter

Passenger shelters are generally located within the available public right-of-way, on sites that allow for clear and open pedestrian movements. Locations at or near existing street lighting are also preferred. The site must be large enough to accommodate the passenger shelter and provide additional standing and waiting space around the shelter.

G. Property Owner Concurrence

No specific written agreement is required for Metro to install a shelter on the public right-of-way adjacent to private property. Metro does, however, seek the adjacent property owner’s concurrence and comments on its proposal.

When it is necessary for Metro to locate on private property, a private property use permit agreement is secured with the adjacent property owner. The use permit allows Metro to use a specified amount of space for the shelter, requires Metro~to maintain the unit in a reasonable condition, includes a “hold harmless” clause to protect Metro, and is effective for at least a 4-year period. The permit remains in force, after the 4-year period, on a 60-day removal clause. This requires that within 60 days of a written notice by either party, Metro must remove the shelter and restore the area equal to or better than its original condition.

H. Jurisdictional Review and Approval

After all of the above has been considered, the next step is the local jurisdiction review and approval process. Each site is reviewed by traffic engineers and planners of the appropriate jurisdiction. Before taking the proposal to a jurisdiction, a site plan is prepared showing where the shelter is proposed, and what shelter configuration and components are planned. Based upon the jurisdiction's review and evaluation, appropriate adjustments are made to the plan before proceeding with the street use/building permits process.

IV. Internal Placement Guidelines

Once a suitable site has been selected, Metro uses the following guidelines to place both standard and CBD shelter installations within each bus stop. These guidelines generally include passenger and driver visibility, passenger access in and out of the shelter, passenger convenience and safety, and pedestrian/traffic safety. They are generally considered in that order asthe shelter's specific location is being determined.

A. Safety Clearance

- A minimum vertical clearance of 7 feet is maintained between the underside of the roof and the surface of the shelter footing.

- The horizontal clearances include: 3 feet minimum from curbface to face of shelter within the general Seattle/suburban area; and, as much as 4 feet curbface clearance within Seattle's central business district.

- Metro maintai'ns a 10-foot minimum clearance from driveways and a 5 foot minimum clearance from utility poles, hydrants, trees and other street furniture.

- Metro attempts to maintain a 5-foot minimum clear pedestrian pathway in the area of the shelter.

B. Shelter Configuration and Layout Criteria

- The size of shelter for a site is determined by the estimated number of passengers boarding at that zone, the available space upon which to build, and the potential impact upon the surrounding environment.

- If the available public right-of-way is narrow, it would be appropriate to use a cantilever shelter with either a flat or small peaked roof. A wide right-of-way allows for a variety of possible frame and roof types, including the large peaked roof.

- Placement within the site should avoid creating visual obstructions for vehicular traffic, therefore, reasonable sight distances from adjacent intersecting streets and driveways should be observed. The siting aid shown in Figure 4-7 serves as a guide to the placement of a shelter within any particular site. The use of clear panels has, however, allowed Metro to place shelters within the critical areas because of their minimal effect on traffic visibility. All placements are also reviewed by local jurisdiction traffic engineers.

- A minimum 3-foot clearance between the curbface and the shelter roof is maintained to prevent the possibility of the shelter being hit by a moving vehicle. While the roof styles available can be used within almost any setting, it is important to be sure the one used is appropriate for the prevalent surrounding land use patterns and results in the least amount of impact to the adjacent property. Generally, the flat roof is used in business/commercial areas while the peaked roofs are used in residential areas.

- The shelter panels are located to ensure maximum protection from prevailing winds and weather. Clear panels or no panels are used on the sides of the shelter where visibility is critical. When privacy is required for the adjacent property, or maintenance will be difficult, solid back panels are used.

- An effort is generally made to place the shelter within 10 to 15 feet of the head of the bus zone to minimize the walking distance from the shelter to the bus loading area. However, the first priority is to place the shelter where it will have the least amount of adverse impact on the adjacent property, and on traffic safety, while still providing good service to patrons.

- When open to the street, the shelter is set back sufficiently from the curb to give maximum protection from splashing. In some instances, the shelter layout is reversed at the curb for increased weather protection. Again, a minimum set-back distance of 3-4 feet off the curb is maintained.

- An effort is made to insure that a waiting passenger will have a good view of oncoming traffic and that the transit operator can easily see the intending passengers. The waiting passenger should also be able to see and be seen by people in the immediate vicinity, thereby promoting security, safety, and personal comfort.

- Whenever possible, Metro avoids placing shelters where they will require expensive retaining walls or other special structures; however, good service may be placed ahead of a “reasonable” extra cost. Metro generally avoids placing shelters in planted areas if there is sufficient space available within existing paved areas, although such locations are often the preferred space for shelter placement from both the adjacent property owner’s and the jurisdiction’s point of view.

- Consideration is given to the needs of people with disabilities, in the placement of shelters, so that minimum accessibility needs are met, including the space required for loading and unloading (see Section 5, II, C, page 5-6), and the space required for general mobility of wheelchairs. Space is also provided within the shelter, via the placement and size of the benches for wheelchair users to get in out of the weather.

C. Shelter Accessories Placement Criteria

- No accessories are placed inside the shelter except benches and leaning rails. Route and schedule information holders may be mounted on the shelter leg when necessary. Any business advertisements, social notices, or information leaflets placed in or on the shelters are prohibited and will be removed by the Facility Maintenance Division of Metro.

- Litter receptacles, when used, are located in close proximity to the shelter, but far enough away to avoid maintenance difficulties. They are generally placed within 5 feet of the far side of the shelter. They should not obstruct the pedestrian pathway and should be located to promote convenient access for litter pick-up and disposal by maintenance personnel.

V. Shelter Retention/Removal Guidelines

A. Rating System

An evaluation rating system based on weighted factors is used to determine when it is appropriate to remove a shelter because of vandalism or community problems, or whether to retain the shelter. Rating factors include:

1. Ridership

   Whether ridership falls within the criteria for the geographic area in which the shelter is located (Metro's ridership criteria for siting a shelter is 25 or more riders per day in the suburban areas and 50 or more riders per day within the city of Seattle).

2. Transit service levels

   - number of routes serving the stop

   - express vs. local routes
   - headways
   - whether bus stop serves a transfer point, park-and-ride lot, express stop, transit center, or activity center.

3. Demographics

   Whether the stop is in a transit dependent population area or a high density residential or commercial area.

4. Vandalism

   Number of broken glass panels on an annual basis and occurrences of vandalism to clear panels, wood panels, frames, and benches.

B. <u>Less Quantifiable Factors</u>

The community problems, concerns, and requests associated with a passenger shelter cannot easily be quantified into a rating scale to determine whether or not to remove a shelter. Factors which should be considered in making the final determination of appropriate action include:

1. Installation Request Sources

   Whether the source of the request was a neighborhood/community group or neighborhood business group, representing a substantial number of people or one individual.

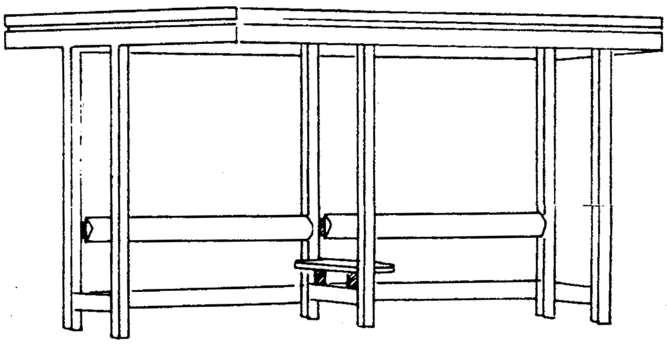
2. Private Property Owner Removal Requests

   Extent of the problem the shelter is causing private property owners.

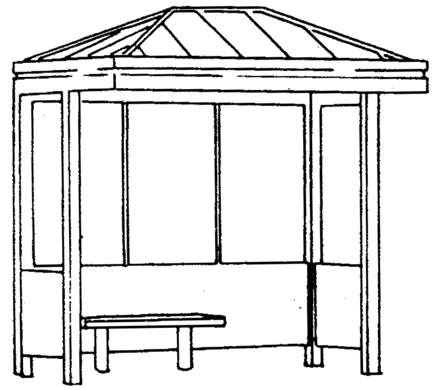
3. Community Concerns

   Whether the shelter is posing a pedestrian or traffic problem. Change in nature of the adjacent private property. Whether use of the shelter is associated with vandalism, noise, or loitering.

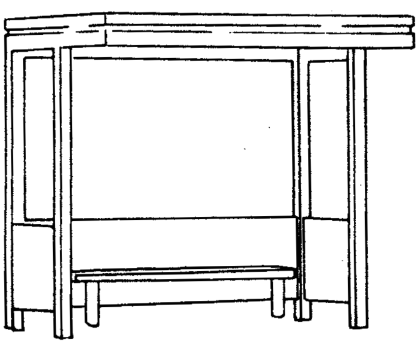
The initial evaluation of whether or not to remove a shelter is made by a Metro transit planner in charge of the shelter project. The results are then reviewed by Metro’s Chief of Facilities Maintenance. They will mutually agree on the action to be taken, i.e., either to retain or remove.



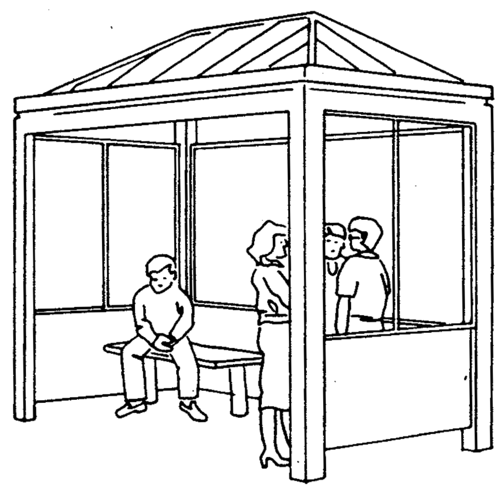
Double-unit CBD shelter



Single-unit cantilevered shelter with peaked roof



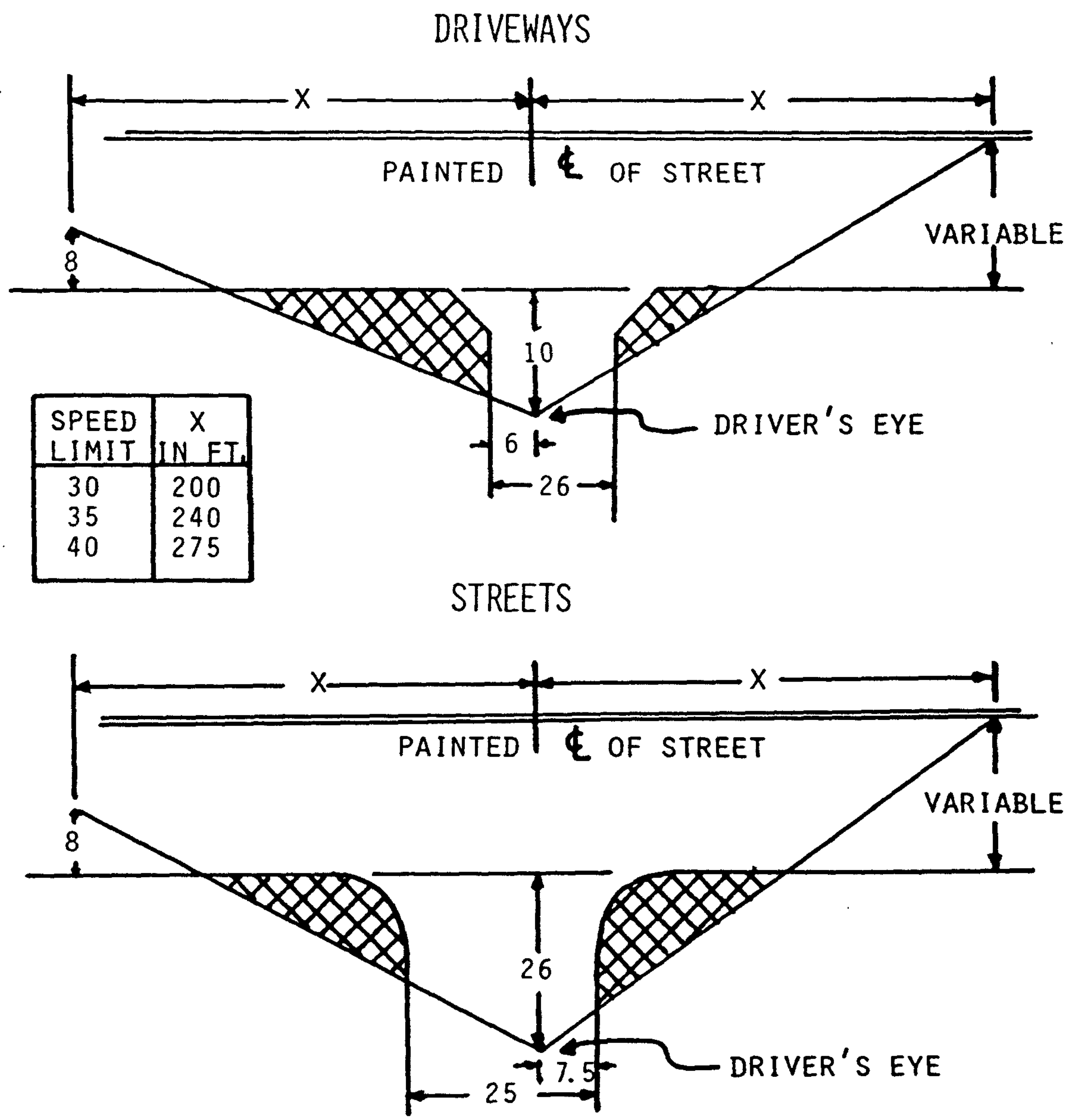
Single-unit cantilevered shelter with flat roof



Single-unit box shelter with peaked roof

FIGURE 5-7
Passenger Shelter Configurations

NOTE: This drawing represents some of the typical shelter styles, but does not include all models.



SPEED LIMIT	X IN FT.
30	200
35	240
40	275

BUS SHELTERS SHOULD NOT BE LOCATED WITHIN THE CROSSHATCHED AREAS.

NOTE: ABOVE DRAWINGS ARE FOR TWO WAY STREETS ONLY, FOR ONE WAY STREETS, USE 8 FEET FROM THE CURB AT 200 FEET FROM THE DRIVER'S EYE. ONE WAY STREET SHELTERS WOULD BE LOCATED FARSIDE WHENEVER POSSIBLE.

Provided by Seattle Traffic Engineering

FIGURE 5-8
Bus Shelter Sight Distance Standards

Shelter Location Sight Distance Standards

(As per Guidelines and Policies with a 40' arteral roadway; all distances given in feet)

NEARSIDE STOP								
	INTERSECTION Distance from near curb edge at:				DRIVEWAY Distance from near curb edge at:			
SHELTER SETBACK FROM CURB	25 mph	30 mph	35 mph	40 mph	25 mph	30 mph	35 mph	40 mph
2	89	122	148	174	61	80	99	116
3	84	116	142	167	53	69	86	100
4	80	110	135	160	45	58	73	85
5	75	105	127	151	37	47	59	70
6	70	100	121	142	26	35	45	54
7	66	94	113	133	16	24	30	40
8	61	87	105	124	8	13	16	25
9	57	81	99	116	-	5	5	5
10	52	75	91	108				
11	47	70	83	99				
12	42	64	77	91				
13	38	58	69	64				
14	33	53	62	76				
15	28	47	55	67				
16	24	41	49	59				
17	20	36	41	51				
18	-	30	34	42				
19	-	24	27	33				
20	-	20	20	24				

FARSIDE STOP								
	INTERSECTION Distance from near curb edge at:				DRIVEWAY Distance from near curb edge at:			
SHELTER SETBACK FORM CURB	25 mph	30 mph	35 mph	40 mph	25 mph	30 mph	35 mph	40 mph
2	57	82	98	115	28	35	49	57
3	54	78	94	109	23	30	41	48
4	51	75	39	104	19	25	34	40
5	48	71	84	99	14	20	27	33
6	43	67	79	94	10	15	20	23
7	39	63	74	89	5	10	13	14
8	36	60	69	83	-	5	5	8
9	32	56	64	78				
10	30	52	59	71				
11	-	48	54	65				
12	-	45	50	60				
13	-	41	45	55				
14	-	38	40	49				
15	-	34	35	43				
16	-	30	30	38				
17	-	-	-	33				
18								
19								
20								

FIGURE 5-9
Metro Passenger Shelter Program

Appendix

SCHEDULE INFORMATION AT BUS STOPS

Metro has two types of schedule information hardware at bus stops: information signs and schedule holders.

Information signs can display route schedules, promotional materials, miscellaneous customer information, and a map. Information signs are large displays bolted to sidewalks or special landing pads. They are available in three sizes: small information sign, large information sign, and three-sided information kiosk.

Schedule holders are mounted to bus stop sign posts and are available in two sizes: standard and mid-size.

A standard schedule holder can display one to five schedules and can be installed singly or paired. Mid-size schedule holders are equivalent to six standard schedule holders and are always installed as a pair back-to-back on bus stop sign posts.

I. Guidelines for Information Signs

A. Placement Criteria

- Placement is at bus stops with multiple routes, particularly in downtown areas, transfer points, and park-and-ride lots. There are approximately 250 information signs in the service area.

- Locations are determined by service frequency, passenger volumes and major transfer centers. The size of information sign is determined by the amount of information necessary at the bus stop.

- Installation is 900 to curb at the head of the bus zone, schedule side facing toward the oncoming bus.

B. Design Guidelines

- Schedule information is formatted in vertical columns reading in sequential order from left to right and top to bottom.

- Schedule information is copied onto a water-resistant paper which is installed in the sign.

- The frames are made of black anodized aluminum, the route and information panels are made of painted white aluminum, and the schedule information is protected with laminated glass.

- Dimensions:
  Small information sign -90” high x 22-3/4” wide

Large information sign - 98” high x 28-3/4” wide
Three-sided information kiosk -98” high x 31” wide (each side)

II. Guidelines for Schedule Holders

A. Placement Criteria

- Schedule holders are placed at the majority of inbound bus stops (stops where buses are headed toward major CBD areas), transfer points, and at key outbound stops.

- Approximately 4,800 zones have schedule holders mounted to bus stop sign posts or shelter frames. About 115 zones have mid-size schedule holders and 760 have two standard schedule holders.

- Installation is on bus stop posts 90° to curb, facing toward the oncoming bus. If this is not practical, the schedule holder may be placed facing toward the street.

B. Design Guidelines

- Schedule information is formatted in vertical columns reading in sequential order from left to right and top to bottom.

- Schedule information is copied onto a water-resistant paper which is installed in the sign.

- Schedule holders are made of sand cast aluminum, black anodized, with clear plexiglass protecting the schedule information.

- Dimensions:

  Standard schedule holder - 21-13/16” high x 3” wide
  Mid-size schedule holder - 22-3/16” high x 9-1/8” wide

III. General Guidelines

Schedule holders are used more extensively than information signs because they are much less expensive, more vandal-resistant, and easier to maintain. Bus stop schedules are produced and installed at each service change. Also, an on-site inspection and minor cleaning of the information signs occurs at service change. Signs and information that have been vandalized between service changes are replaced as those reports are received.

Bus Stop Information Sign and Schedule Holder

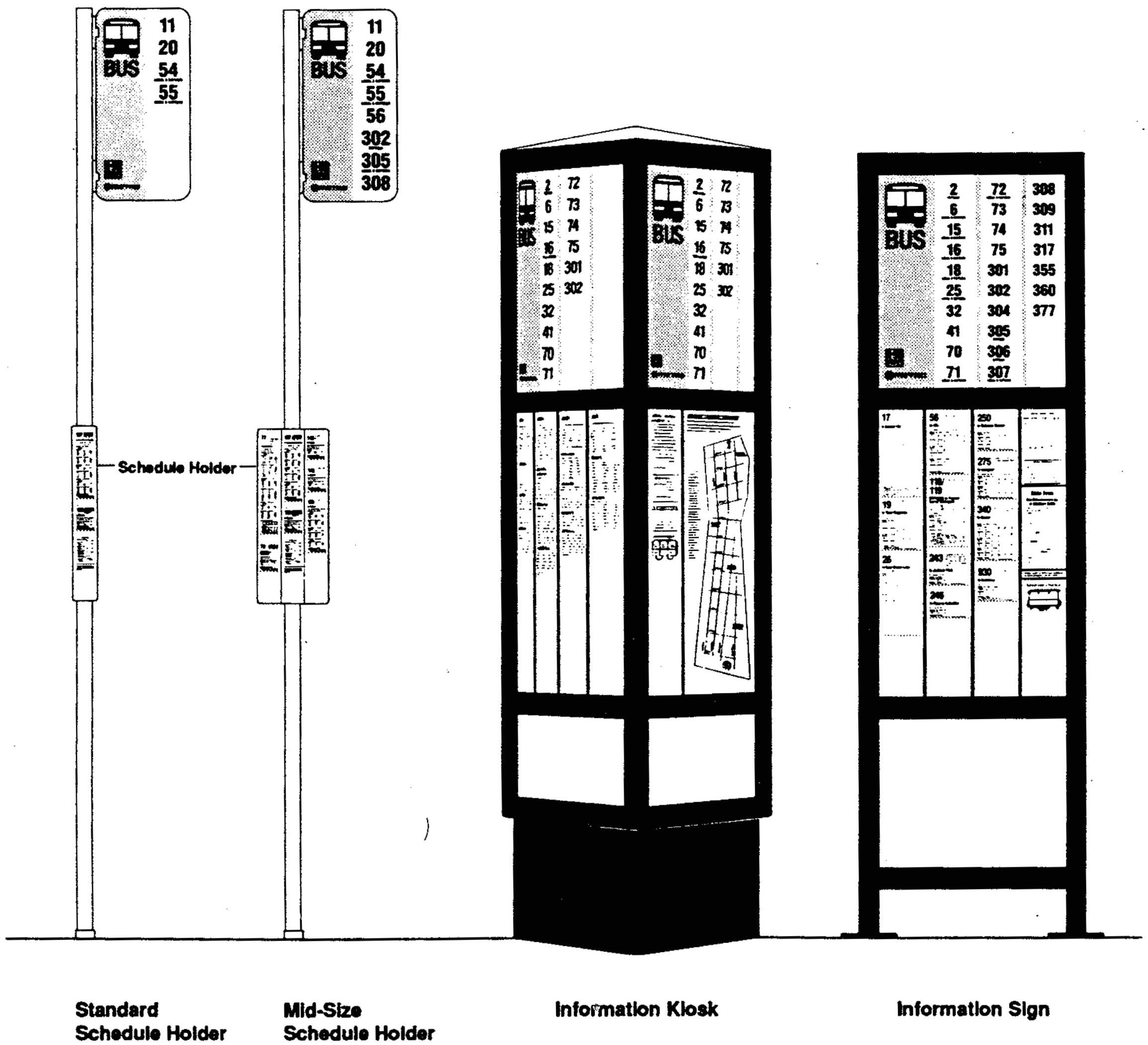


FIGURE 6-1

Bus Stop Information Sign and Schedule Holder

INFORMATION DISPLAYS

Metro information is displayed in Transportation Information Centers and Commuter Information Centers. Transportation Information Centers are designed for reaching the broad-based travelling market, including elderly, disabled and student markets and are owned and maintained by Metro. Commuter Information Centers provide Metro rideshare and transit service information targeted specifically to the commuter market and are built and maintained by the building owner. The two types of displays are never located together (although limited commuter information is normally available at a Transportation Information Center).

Transportation Information Centers are modular design displays that can be either freestanding or wall mounted. They can be arranged in a variety of configurations to accommodate space and/or needs for a particular location. Commuter Information Centers come in three configurations—freestanding wall mount, or kiosk. Both types of displays are designed to compliment building or mall decors.

I. Transportation Information Centers (TICs)

A. Function

Transportation Information Centers provide a transportation information resource for the general public, elderly, disabled, and students. These centers have three basic components:

- Map panels: for the display of Metro's bus system map, downtown Seattle map, downtown Bellevue map, promotional drop-ins (i.e., Longacres, Puyallup Fair, Pass Plus, Commuter Pool, community involvement, etc.) and Metro telephone information numbers (i.e., Metro's 24-hour rider information, Employment Hot Line, Lost and Found, Commendation/ Complaints, Custom Bus, Pass Sales, etc.).

- Brochure pocket panels: for display of promotional drop-ins, (i.e. Community Involvement, Service Change Rider Alert and brochures (i.e., Bike and Ride, Longacres, Waterfront Street car, snow brochures, Washington State Ferry schedules, Rider Alerts, and a variety of other transportation brochures).

- 35 pocket timetable panels: for display of route timetables.

B. Design Guidelines

1. Frames

Frames are fabricated out of channel aluminum, pre-drilled and ready for field assembly. The legs are attached to each frame so a separate base assembly will not be needed. The frames are coated in a dark color to go with the dark bronze plexiglass panels.

2. Connectors

The frames are bolted edge to edge for in-line assembly. To assemble the free standing displays, frame connectors are needed. The connectors are a length of channel aluminum tubing cut, pre-drilled, and coated to hold the frame together at different angles; the plexiglass panels are then attached with bolts to the frames.

3. Panels

Each panel is constructed of 24-inch by 63-inch dark bronze acrylite (plexiglass) which is 1/4-inch thick. All pockets and promotional drop-in inserts for each panel are glued or bonded to each panel.

C. Maintenance Considerations

- Transportation Information Centers are the sole responsibility of Metro and are installed and maintained at no cost to building management or the tenants, except in cases of negligence.

- Information distributors employed by Metro make regular visits to each of the installations to refill the racks. The frequency of these visits is based on foot traffic, stock demands, and usage.

II. Commuter Information Centers (CICs)

A. Reasons for Establishing a CIC

1. Mandatory (Memorandum of Agreement (MOA), Director's Rule)

Some CICs may be required by a local jurisdiction as one element of the transportation mitigation measures for a development.

2. Voluntary

CICs are a public service for employees, clients and visitors to the worksite.

B. Location Considerations

CICs are located in areas of high foot traffic and high visibility (e.g., lobbies, cafeterias).

C. Design Guidelines

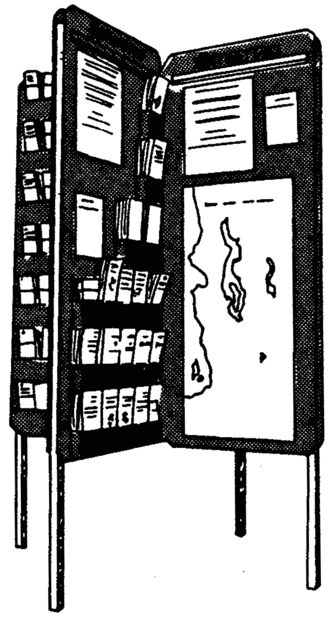
- Developers may construct their own CICs or may have a private builder construct the unit. (Metro can provide a list of private builders.).

- Metro must review and approve CICs designed by developers. The required number of timetable jackets, brochure pockets and map/poster panels will be determined by Metro based upon the number of employees and the transportation service available to the building site.

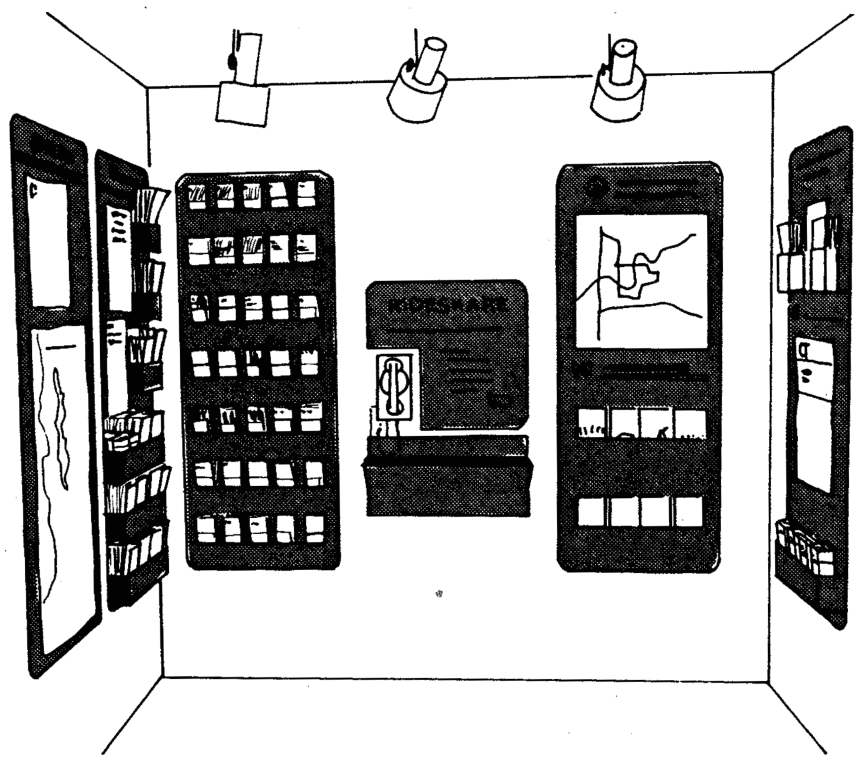
D. Maintenance Considerations

- Commuter Information Centers are owned and maintained by the building management or developer.

- Information distributors employed by Metro and/or Building Transportation Coordinators make regular visits to CICs to refill the racks. The frequency of these visits is based on foot traffic, stock demands and usage.



Free Standing Kiosk



Wall Mounted Display

FIGURE 6-2

Transportation Information Center -- Configuration Options

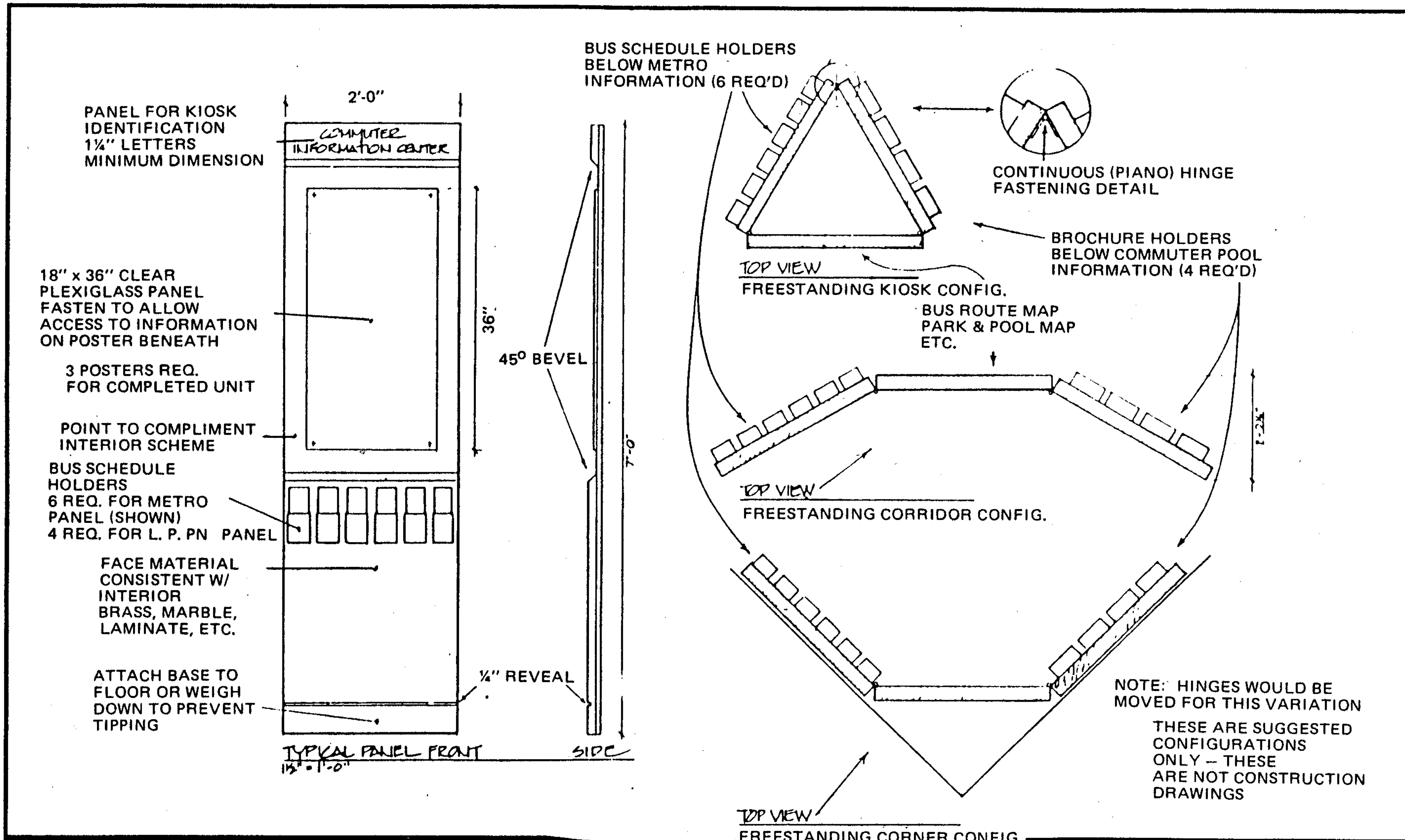


FIGURE 6-3

Commuter Information Center -- Configuration Options

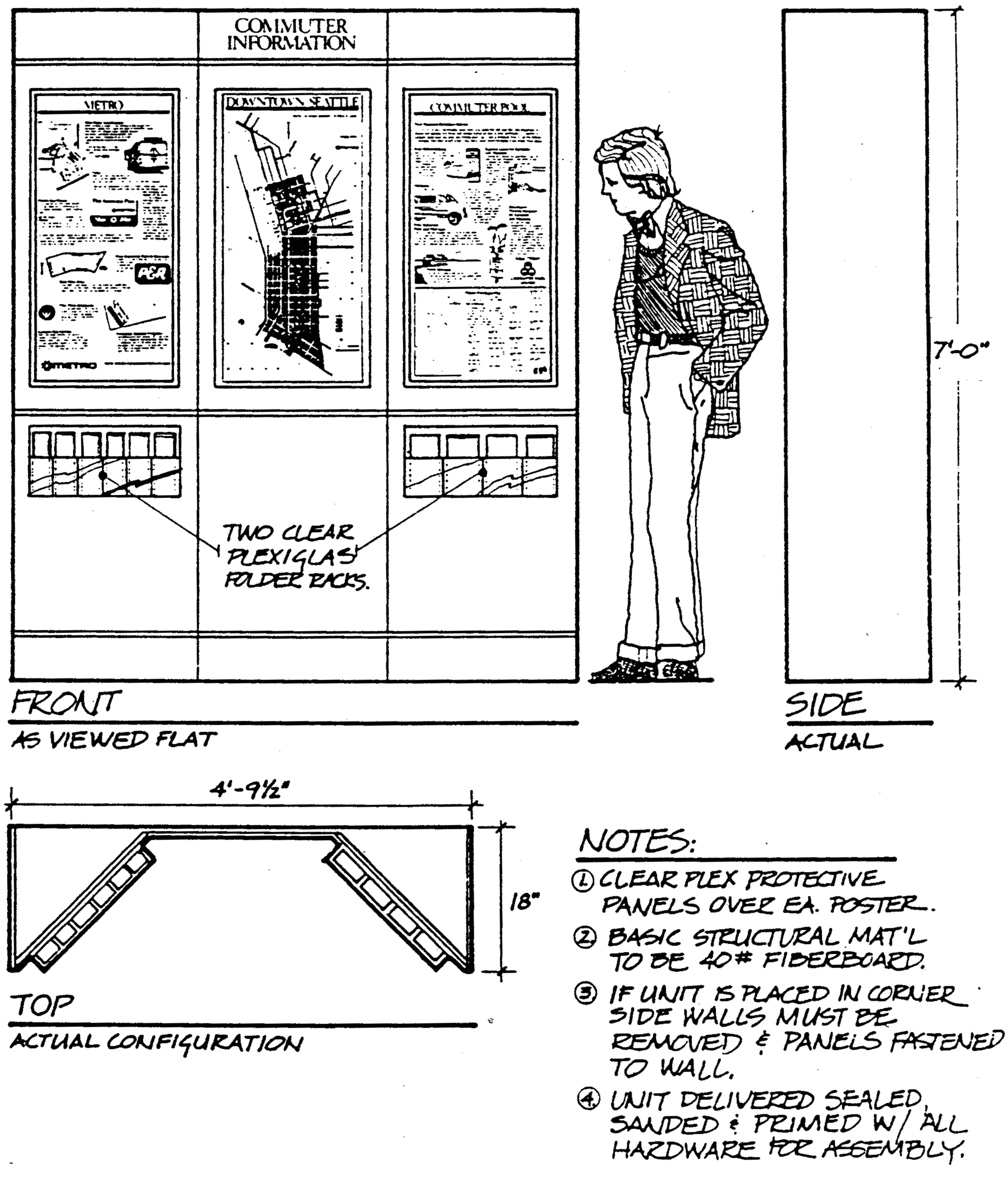


FIGURE 6-4

Commuter Information Center -- Detailed View

GLOSSARY

articulated bus - a two-sectio n bus that is permanently connected at a joint. An articulated bus is 50 percent longer than a standard bus, has three axles, and can bend around corners.

bus bay - a dedicated parking area for in-service coaches on specified routes, where coaches do not have independent pull-in and pull-out areas. Can be designed to accommodate one or more coaches, but within a given bay, the order of coaches may vary, depending on which coaches arrive first.

bypass lanes - a special lane for HOVs and/or buses that bypasses ramp control signals.

CBD shelter design - a passenger shelter designed specifically for bus stops in downtown Seattle. These shelters feature a flat roof and clear panels, and rely on leaning rails rather than benches to accommodate the maximum number of passengers.

chevrons - pavement markings which provide a buffer zone for contraflow HOV lanes.

concurrent flow HOV lane - lanes designated for HOVs in the normal or with flow direction.

contraflow HOV lane - lanes designated in the direction of opposite traffic flow for use by HOVs traveling in the normal or with flow direction.

drop-and-ride - when patrons of a park-and-ride lot are dropped off or picked up by private auto or taxi.

dual-powered bus - a bus with both diesel and electric propulsion, which can be used interchangeably.

far side stop - a bus stop located immediately following an intersection.

layover - when a bus is scheduled to be at a time point— a time listed at the head of a column in the route schedule — longer than the time needed to load and unload passengers.

light rail - a transit rail technology that can operate on a variety of rights-of-way, ranging from on-street to completely grade-separated. Light rail vehicles run on a fixed guideway, generally use overhead wire, and generally consist of shorter train units (two to four cars) than heavy rail.

mid-block stop - a bus stop located 300 feet or more beyond or before an intersection.

near-side stop - a bus stop located immediately before an intersection.

pulse scheduling - a form of scheduling that insures that all routes with coordinated schedules converge at a common point with a brief layover, to allow for transfers between any of the routes.

queue jump lane - a separate lane that allows HOVs to bypass a line of traffic and enter the flow of traffic just before the point of congestion (such as a signalized intersection, narrowing of roadway, or merging traffic.

ramp control - a method of controlling freeway access from entrance ramps by use of traffic signals to monitor flow.

sawtooth bays - a series of bays that are off-set from one another by connecting curblines. They are constructed at an angle from the bus bays. This configuration minimizes the amount of space needed for vehicle pull-in and pull-out.

schedule holders - units mounted to bus stop sign posts or shelter frames that display one to five schedules.

Shelter anchor footjngs - a concrete pad poured as a base for installation of a passenger shelter.

signal priority - traffic signal changes that give priority to HOVs, such as signal preemption, separate HOV phases, and signal offset adjustments.

stanchions - an upright post or support pole.

standard bus - a bus that is approximately 40 feet in length.

streetcar - an electrically powered rail transit vehicle with flanged metal wheels that run on tracks.

transit center - a location where groups of buses or other public transportation vehicles can be brought together at the same time, allowing patrons to transfer between the routes.

trolley bus - a bus that is electrically powered and draws its power from a pair of overhead trolley wires.

turning template - a guide for the layout of the turning radius for various design vehicles.

variable speed control signing - a device that is capable of displaying changing speed limits and/or traffic flow to motorists traveling along a highway.

REFERENCES

Local Standards

King County, Department of Public Works
Road Standards, May 1987

City of Bellevue, Department of Public Works
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