

Pima County
Department Of Transportation



Transit Guidelines
for
Roadway Design and Construction
January, 2009

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Introduction

The following guidelines detail the method of establishing bus stops on SunTran bus routes within the unincorporated areas of Pima County. The guidelines provide information on bus stop spacing, types of stops, location preferences, and lengths of bus stop zones. These guidelines are intended to expedite and provide consistency in the location and placement of bus stops within Pima County and the City of Tucson Metropolitan Area.

The designer should make a request to SunTran to provide a list of all existing or proposed bus stop locations within the project limits. The list should include route numbers, route names, stop description (i.e. far-side, mid-block, near-side), bench and shelter requirements, and information on exact location of bus stop signs (i.e. distance from adjacent intersection or existing bus stop). For additional information on routes and services provided by SunTran, also refer to the regional SunTran route map at <http://www.suntran.com/routes.php>, or contact the City of Tucson's Transit Services Administration at (520) 791-5883.

Pima County's Public Transportation Program Manager can be reached at (520) 740-6731.

Bus Stop Spacing

Bus stop spacing is a major determinant in transit system availability and reliability. To make the transit system accessible and useable, stops should preferably be spaced no more than one-quarter mile apart to minimize walking distance. A minimum spacing of 450 feet may be used in special cases based on adjacent development such as educational institutions, senior citizen housing, hospitals and other medical facilities. Further, the spacing of stops has a significant impact on bus operating speeds, passenger travel time and smooth flow of vehicular traffic. Therefore, to ensure passenger convenience and desirable bus operating speeds, the following guidelines have been established:

Location priorities

Bus stops should be located as close to intersections as possible. The proximity to intersections provides convenience and increased safety to transit patrons, minimizes mid-block pedestrian crossings, and reduces walking distance at transfer locations. Other factors such as type and density of adjacent development and lane usage may dictate placement away from intersections.

There are three main types of bus stop locations: far-side stops, mid-block stops and near-side stops. Far-side stops are located immediately after intersections, in the direction of bus travel. Near-side stops are located prior to intersections in the direction of bus travel, and mid-block stops are located at least 400 feet away from intersections.

The primary criteria in locating bus stops are based on route network (grid, radial, etc.), number of transfer points, safety and traffic operations. Consistency in stop locations minimizes confusion to transit patrons, bus operators and other vehicular traffic.

Far-side stops are preferable because they typically pose fewer potential conflicts with other vehicular traffic and pedestrians. Mid-block stops should be used to minimize walking distance where long block lengths exist, or in locations adjacent to special or heavy passenger generators. Near-side stops are the least preferable, and should only be used where certain site constraints preclude far-side and mid-block stops. Major advantages of far-side stops are listed below:

- Buses can safely enter traffic stream with minimum delay at signalized intersections by taking advantage of gaps created by the traffic signal.
- Passengers boarding and alighting are less likely to cross in front of the bus.
- Less interference with traffic at intersections where there are heavier traffic volumes on the approach than on the departure leg.
- Stopped buses do not obstruct sight lines to the left for vehicles entering the intersection from a side street.
- Sight distance is improved for pedestrians.

Mid-block stops are desirable in situations such as adjacent to major passenger generators or special developments such as educational facilities, senior citizen housing, and medical facilities. However, mid-block stops encourage pedestrian jay-walking, and may result in the removal of considerable number of curb parking spaces.

Near-side stops should be avoided, but may be desirable in special cases such as proximity to major transit generators, and at high volume transfer locations where it may require pedestrians to cross fewer legs of busy intersections. They may also be desirable at a busy intersection where heavy dual left-turn volumes from a side street turn onto a bus route having only two through lanes with no shoulders in the direction of bus travel. Buses at near-side stops tend to obscure traffic signals, and encourage pedestrian crossings in front of buses, thus posing safety problems. Buses also block right-turn traffic, thus deteriorating traffic operations at busy intersections with heavy right-turn volumes.

Placement of stops

Placement of bus stops shall be in accordance with the standards set below, and as depicted in Figures 1 through 5.

Far-side stops: should be placed 70 to 200 feet from the intersection curb return. A minimum of 30 feet clearance should be provided between the rear of the bus and the curb return. If a bus makes a left turn from a cross street onto a street with a far-side bus stop, the far-side stop shall be placed according to Figures 2, 3 and 4. If a bus makes a right turn from a cross street onto a street with a far-side bus stop, the far-side stop shall be placed according to Figure 5. If there are free or continuous right-turn movements from a side street onto the street where the far-side stop is located, the far-side stop shall be placed 150 to 200 feet from the curb return (see Figure 5). If more than one bus uses a bus stop concurrently, 40 feet shall be added for each additional standard bus, and 60 feet for each additional articulated bus.

Mid-block stops: a bus zone of 110 feet should be provided. If more than one bus uses a bus stop concurrently, 40 feet shall be added for each additional standard bus and 60 feet for each additional articulated bus. Crosswalks can be constructed at mid-block bus stops if it is approved by the entity having jurisdiction over that bus stop location. The entity may further perform additional analysis to determine if a pedestrian signal is warranted.

Near-side stops: should be placed 30 to 100 feet from the curb return. If more than one bus uses a bus stop concurrently, 40 feet shall be added for each additional standard bus and 60 feet for each additional articulated bus.

At railroad crossings, bus stops shall be placed on the nearside of the tracks. An exception is if the bus stop serves an industry, shopping center, mall or other facility that is on the far side of the railroad tracks. In this case, if the bus stop is placed on the nearside of the railroad crossing, the disembarking passengers may cross the tracks on foot, thus putting the pedestrians at unnecessary risk. Under such circumstances, the bus stop shall be placed on the far side of the track, and shall be installed at least one block (400 feet minimum) past the crossing.

Parking shall be prohibited within the entire length of bus stop zones.

Where more than one driveway exists within a bus stop zone, the bus stop sign should be placed to allow access onto adjacent property from one of the driveways. Desirable and undesirable bus stop locations along roadway segments with multiple driveways are depicted in Figure 6.

Bus Pullouts:

Bus pullouts should generally be placed on the far-side of intersections to provide safe boarding and unloading of bus passengers, to take advantage of gaps created at signalized intersections which allow buses to re-enter the traffic stream with minimum delay, and to limit impact to right-turn traffic and traffic through the intersection. Near-side pullouts should be avoided because of conflicts with right-turn traffic, delays to transit service as buses attempt to re-enter the traffic stream, and obstruction of traffic control devices and pedestrian activity. However, some areas may require mid-block installation.

Bus Pullout Guidelines:

Bus pullouts should be considered where one or more of the following conditions are satisfied;

- Traffic in the curb lane exceeds 250 vehicles during the peak hour.
- Traffic speed is greater than 35 mph.
- Consider the current and future traffic volumes and Level of Service (LOS) on the roadway segment. A LOS of C or less will generally warrant a pullout.
- Potential for auto/bus conflicts warrants separation of transit and passenger vehicles.
- Transfer point between existing or future bus routes.
- Average peak period boarding exceeds or is projected to exceed 10 passengers per bus.
- Three or more buses use or are planned to use the bus stop within an hour.
- Peak hour volume-to-capacity (V/C) ratio of 0.8 or higher (existing or projected)
- Where the number of single occupancy vehicles queued behind the bus will cause recurring blockage of side street traffic at the intersection.

- Where vehicles from dual left-turn lanes from a side street turn onto a bus route having only two through lanes with no paved shoulder or emergency breakdown lane.
- Right-of-way width is adequate to construct the bay without adversely affecting sidewalk pedestrian movement or adjacent business operations.

In order to facilitate the construction of bus pullouts to accommodate future routes, they should be considered on:

- All section-line or arterial streets at intersections of another section-line or arterial street, quarter-section-line or collector street, or other street on which a future route has been identified.
- All other streets on which a route exists or a future route is proposed at intersections of a section-line or arterial street, quarter-section-line or collector street, or other street on which a future route has been identified.

Additional traffic operational analysis may be required of a developer by the Traffic Engineering Division of the agency having jurisdiction over the bus stop, whether existing or future, to evaluate the impact of a curbside bus stop versus a bus pullout. If the Traffic Engineering Division determines that a curbside bus stop will increase traffic delay or degrade intersection level-of-service, a bus pullout may be required. Bus pullouts may also be desirable where buses are expected to layover at the end of the routes. Entities should include the installation of bus pullouts as part of the conditions of approval for new developments.

The standards for bus pullouts are shown on Figures 7 and 8. Either Figure 7 or Figure 8 may be used for far-side bus pullouts, with Figure 7 being the preferred option. If Figure 8 is used, traffic signal timing modification may be required to increase the pedestrian crossing time due to the added walking distance. Figure 8 shall be permitted only when approved by the Traffic Engineer of the governing local entity. Design details for constructing bus pullouts are shown in Figures 7 and 11, and the *Arizona Department of Transportation's (ADOT) Standard Drawing No. C-05.05 - Concrete Bus Bay* is included as Figure 13. Copies of these drawings are included in the Appendix. Driveways should not be permitted within bus pullouts.

Figure 9 indicates bus stop placement within dedicated right-turn lanes into commercial developments. Bus stops installed under these conditions should be placed on the far side of the commercial driveway. This case should only be allowed where site constraints preclude installing the bus turnout as depicted in Figure 7. Agency review and approval shall be required prior to installation.

Pedestrian Facilities

Sidewalks, multi-use paths, and roadway crossings in the area around transit access points, and amenities such as benches, shelters, and lighting at bus stops are important for pedestrian comfort and safety. Bus shelters and amenities should be provided at all bus stops located along major roadway projects whenever feasible, in order to provide for passenger comfort and safety.

When a bus stop is constructed on projects that do not include basic pedestrian facilities, such as sidewalks or multi-use pathways, sidewalks with interconnecting access ramps, consistent with the transportation and public accommodation provisions of the ADA, should be constructed

to connect the bus stop to the nearest intersection, local commercial development or other passenger destination, such as educational facilities, senior citizen housing, or medical facilities.

When a bus stop is constructed on projects that do not include outside curbed sections, the bus stop and pedestrian facilities, including sidewalks or multiuse pathways, should be placed as far as possible from the edge of pavement, in accordance with applicable AASHTO guidelines.

Bus Stop Loading Pads:

Bus stop loading pads should be constructed at all bus stop locations where feasible. The standard size of loading pads shall be a minimum of 8 feet in width (measured from the back of curb), or 4'-8" from back of sidewalk, by a variable length (22 feet for a single shelter or 34 feet for a double shelter), depending upon passenger volume and available right-of-way or easement. The slope of the loading pad shall be a maximum of 2% per the Americans with Disabilities Act of 1990 (ADA), should match the slope of the adjacent sidewalk, and allow for drainage of the pad. Construction of a sidewalk access ramp may also be required at locations where the bus stop would otherwise be inaccessible as defined by the ADA. Design details of a typical bus stop loading pad and an optional mid-block sidewalk ramp are contained in the City of Tucson's *Attention Transit Advertising's (ATA)* bus shelter design standards, and are depicted on Figure 11 - *Bus Stop Loading Pad and Optional Sidewalk Ramp*. The mid-block sidewalk access ramp is shown on Figure 12 - *Arizona Department of Transportation's (ADOT)* Standard Drawing No. C-05.30, Sheet 5 of 7.

When a new development is constructed adjacent to an existing or proposed bus stop, the entity should require the developer to construct the bus loading pad as part of offsite improvements. In addition, bus stop loading pads should be included at all bus stops where street improvements are planned.

Bus Shelters:

Bus shelters provide transit riders with a safe and comfortable environment, which is necessary in a harsh desert climate. Shelters are very durable metal structures that have amenities such as shade, seating, lighting, trash receptacles, and route information. All new shelters must be made ADA-accessible as well. Both the City of Tucson and Pima County have a contract with Attention Transit Advertising (ATA) to install advertising bus shelters and refurbished non-ad shelters.

Bus shelters should be placed at all bus stops where feasible. Characteristics that may render a site not suitable include sidewalks with widths less than 5 feet, locations with no possibility of obtaining an easement for placement of the shelters, and locations with no curb and gutter. For the locations where shelter placement is not suitable, bus benches should be provided. If the daily number of passengers using the bus stop is greater than 100, then a double shelter will be required. Bus shelters should be located beyond side street sight visibility triangles, and outside of the roadway clear zone. Passengers in the shelter should also be visible to bus drivers. ATA's ad shelters are designed to have open visibility from the front, but it is important that landscaping and other vertical obstacles not block the front view of the shelter. Electrical or solar energy requirements for site lighting will typically be determined by Attention Transit Advertising (ATA), or their designated contractor.

Bus Benches

Bus benches will be provided at every bus shelter, and may be provided as stand alone fixtures

where placement of bus shelters are not be feasible. Bus benches will be limited to placement where they do not interfere with pedestrian circulation or roadway sight distance requirements. Damaged furniture or trash receptacles should be tended to within twenty four hours to create a positive impression for transit patrons and the general public.

Trash Receptacles

Well maintained bus stops are crucial to the image of the transit system. Trash build-up should be tended to within twenty four hours to create a positive impression for transit patrons and the general public. Trash receptacles should be designed to be compatible with other bus stop components and with removable plastic garbage bags of 30 gallon minimum capacity. Ideally, every bus stop location approved for a bus shelter or bench shall have a trash can.

Signs

Bus stop signs shall be mounted in accordance with the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD) and in accordance with the following conditions:

- Bus stop signs shall be placed at all designated bus stops, and shall be oriented to provide maximum visibility.
- Bus stop signs shall visibly display bus route number(s) using the bus stop. At major transfer points, additional information on schedules may be provided.
- The signs shall be erected independently on their own posts or on the leading face of the shelter. However, if a bus stop sign is to be located within 10 feet of a street light pole or another sign post, then the bus stop sign should be located on the street light pole or sign post.
- A minimum of 2 feet clearance shall be provided between the outside edge of the sign and face-of-curb. Where sidewalks exist, post mounted signs shall either be placed to provide a minimum of 1 foot clearance between the back of curb and the sign post, or to provide a minimum of 1 foot clearance between the back of sidewalk farthest from the curb and the sign post, if the sidewalk is less than 3 feet from the curb, and must satisfy any minimum clearances specified by the Americans with Disabilities Act of 1990 (ADA). Where no curbs and sidewalks exist, a minimum clearance of 15 feet shall be provided between the sign and edge of travel lane.
- Bus stop signs and any other bus stop related signs required may be installed by the entity in whose jurisdiction the bus stop is located, or by an ATA Contractor. If a sign is installed by an entity, the entity shall be reimbursed by the ATA for each sign installed based on the intergovernmental agreement between the ATA and the entity. The ATA shall be responsible for incorrect installation of any sign by an ATA contractor.
- The size of sign panels, background color, and size of text shall be as specified by the entity's Traffic Engineering Division and in accordance with the MUTCD. Sheeting for all signs shall be high intensity Class 4 in accordance with the standard specifications.

Mitigation of Impacts on Bus Stops during Roadway Construction

Due to the impact of road construction on *SunTran* bus stops, the procedures listed below shall be followed in order to minimize or mitigate construction impacts on bus stops:

1. Temporary closure of bus stops shall comply with the requirements of Subsection 107-8 - Public Convenience and Safety of the Pima County/City of Tucson Standard Specifications.
2. Determine where the stop will be located during construction and how passengers will access the stop. Consult with *SunTran* for temporary sign placement.

When the mitigation of construction impacts is to be included in the project Special Provisions, Transit Agency staff should be notified and given the opportunity to provide comments on the draft Special Provisions.

New Development

When a project is constructed adjacent to a bus stop location, whether existing or proposed, the driveways should be designed and located to avoid relocation of the bus stop, where practical. However, bus stops relocated as result of the project shall conform to the requirements of these Transit Guidelines.

Developers shall develop site plans to accommodate bus stop loading pads and bus shelters, and when determined, bus pullouts.

The Development Services Department should require all new development site plans to show existing bus stops or future bus stops as determined by SunTran and require the developers' site plans to be designed to avoid the relocation of existing bus stops and placement of future bus stops where practical. If the site plan does not meet this requirement and the developer cannot reach an agreement with SunTran on the bus stop location, the Traffic Engineering Division or the entity having jurisdiction over that location shall review the site plan and render a decision on the location of the bus stop. If a bus stop is relocated as a result of a new development, the developer shall be responsible for the cost of removing and relocating the bus stop. Relocation costs shall include, but not limited to, the cost of relocating an existing bus shelter, design costs, and may also include costs for construction of a bus shelter pad, a bus passenger loading pad and bus stop signing and pavement marking. The developer shall be responsible for all costs related to the provision of new bus stops and pullouts, complete in place, including design costs.

GLOSSARY - TERMS AND DEFINITIONS

1. Accessway - a paved connection, preferably non-slip concrete or asphalt, that connects the bus stop waiting pad with the back face of the curb.
2. Adaptive Use - an individual's spontaneous, creative use of a facility or structure in ways that differ from or go beyond the intended use or the formal design.
3. Advertising Shelter - a bus shelter that is installed by an advertising agency for the purpose of obtaining a high-visibility location for advertisements. By agreement, the bus shelter conforms to the transit agency specifications but is maintained by the advertising company.
4. ADA - American's with Disabilities Act of 1990. The Act supplants a patchwork of previous accessibility and barrier-free legislation with a comprehensive set of requirements and guidelines for providing *reasonable* access to and use of building, facilities, and transportation.
5. Amenities - things that provide or increase comfort or convenience.
6. Bollards - a concrete or metal post placed into the ground behind a bus shelter to protect the bus shelter from vehicular damage.
7. Bus bay - a specially constructed area off the normal roadway section for bus loading and unloading.
8. Bus stop loading pad - a paved area that is provided for bus patrons and may contain a bench or shelter.
9. Bus stop spacing - the distance between consecutive stops.
10. Bus stop zone length - the length of a roadway marked or signed as available for use by a bus loading or unloading passengers.
11. Curb-side factors - factors that are located off the roadway that affect patron comfort, convenience, and safety.
12. Curb-side stop - a bus stop in the travel lane immediately adjacent to the curb.
13. Detector - a device that measures the presence of vehicles on a roadway.
14. Discontinuous sidewalk - a sidewalk that is constructed to connect the bus stop with the nearest intersection. The sidewalk does not extend beyond the bus stop.
15. Downstream - in the direction of traffic.
16. Dwell time - the time a bus spends at a stop, measured as the interval between its stopping and starting.
17. Far-side stop - a bus stop located immediately after an intersection.

18. Headway - the interval between the passing of the front ends of successive buses moving along the same lane in the same direction, usually expressed in minutes.
19. Layover - time built into a schedule between arrivals and departures, used for the recovery of delays and preparation for the return trip.
20. Midblock stop - a bus stop within the block between major intersections or side streets.
21. Near-side stop - a bus stop located immediately before an intersection.
22. Nub - a stop where the sidewalk is extended into the parking lane, which allows the bus to pick up passengers without leaving the travel lane, also known as bus bulbs or curb extensions.
23. Open bus bay - a bus bay designed with bay "open" to the upstream intersection.
24. Queue jumper bus bay - a bus bay designed to provide priority treatment for buses, allowing them to use right-turn lanes to bypass queued traffic at congested intersections and access a far-side open bus bay.
25. Queue jumper lane - right-turn lane upstream of an intersection that a bus can use to bypass queue traffic at a signal.
26. Roadway geometry - the proportioning of the physical elements of a roadway, such as vertical and horizontal curves, lane widths, cross sections, and bus bays.
27. Shelter - a curb-side amenity designed to provide protection and relief from the elements and a place to sit while patrons wait for the bus.
28. Sight distance - the portion of the highway environment visible to the driver.
29. Street-side factors - factors associated with the roadway that influence bus operations.
30. TCRP - Transit Cooperative Research Program of the Transportation Research Board.
31. Upstream - toward the source of traffic.

REFERENCES

1. Transportation Research Board - National Research Council, *Guidelines for the Location and Design of Bus Stops*, Transit Cooperative Research Program Report 19, Washington, D.C. 1966.
2. U.S. Department of Transportation - Federal Highway Administration, *Pedestrian Safety Guide for Transit Agencies*, Washington, D.C. February, 2008.
3. U.S. Department of Transportation - Federal Highway Administration, *Access Management, Location and Design* - National Highway Institute Course No. 133078, Participant Workbook, February 2007.
4. City of Tucson - *Transportation Access Management Guidelines for the City of Tucson, Arizona*, March, 2003.
5. City of Tucson Department of Transportation - *Roadway Development Policies, Update to Ordinance 6593*, April, 1998.
6. City of Tucson Department of Transportation, Transit Services Division - *Transit Checklist for Roadway Design and Construction, Draft Edition*, January, 2008.
7. Regional Transportation Commission of Clark County, Nevada, Metropolitan Planning organization Division, *Citizens Area Transit Bus Stop Guidelines*, July. 1999.
8. Pima County Department of Transportation - *Roadway Design Manual*, 2nd Edition, December, 2003.

APPENDIX

Figure 1: Standard Bus Stop Locations

Figure 2: Standard Bus Stop Locations, Far Side Location Case 1
(Dual lefts turning into two through lanes)

Figure 3: Standard Bus Stop Locations, Far Side Location Case 2
(Single left turning into two through lanes)

Figure 4: Standard Bus Stop Locations, Far Side Location Case 3
(Dual lefts turning into three through lanes or two lanes and paved shoulder/break-down lane)

Figure 5: Standard Bus Stop Locations, Far Side Location Case 4
(After a right-turn from an intersecting street)

Figure 6: Bus Stop Locations near parcels with Multiple Driveways

Figure 7: Typical Bus Pull-out Detail

Figure 8: Far Side Bus Pull-out (Without Adequate Space for Approach Taper)
(Also known as a pull-through bus pull-out)

Figure 9: Bus Stop Placement within Exclusive Right Turn lanes for Commercial Properties
(Far side of the Commercial Driveway)

Figure 9A: Bus Stop Placement within Exclusive Right Turn lanes for Commercial Properties
(Alternate Location)

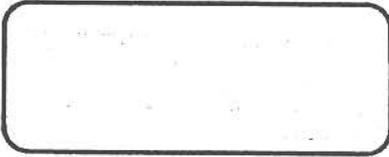
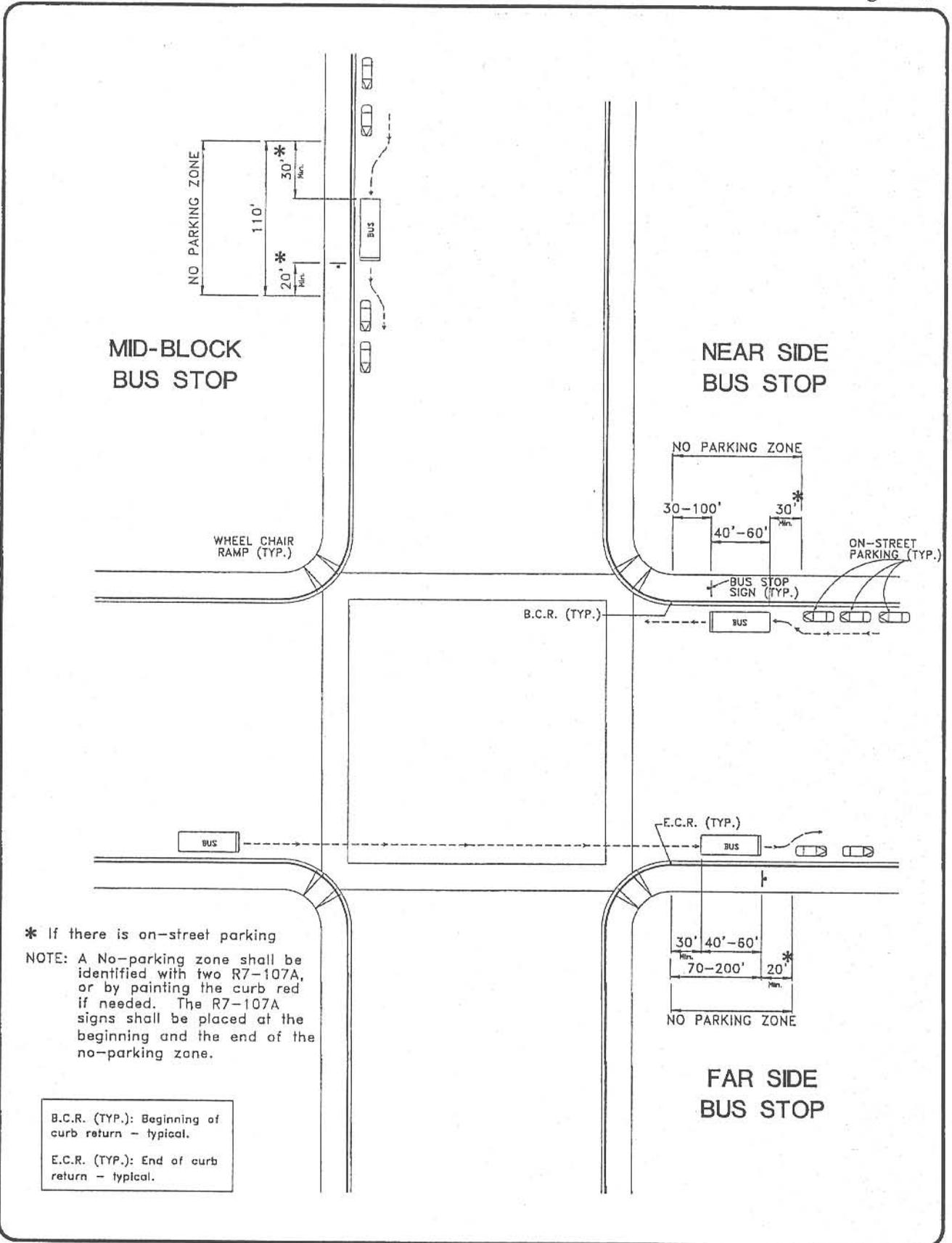
Figure 10: Bus Shelters

Figure 11: Bus Stop Loading Pad and Optional Sidewalk Ramp

Figure 12: *Arizona Department of Transportation's (ADOT) Standard Drawing No. C-5.30, Sheet 5 of 7, Mid-Block Sidewalk Access Ramp*

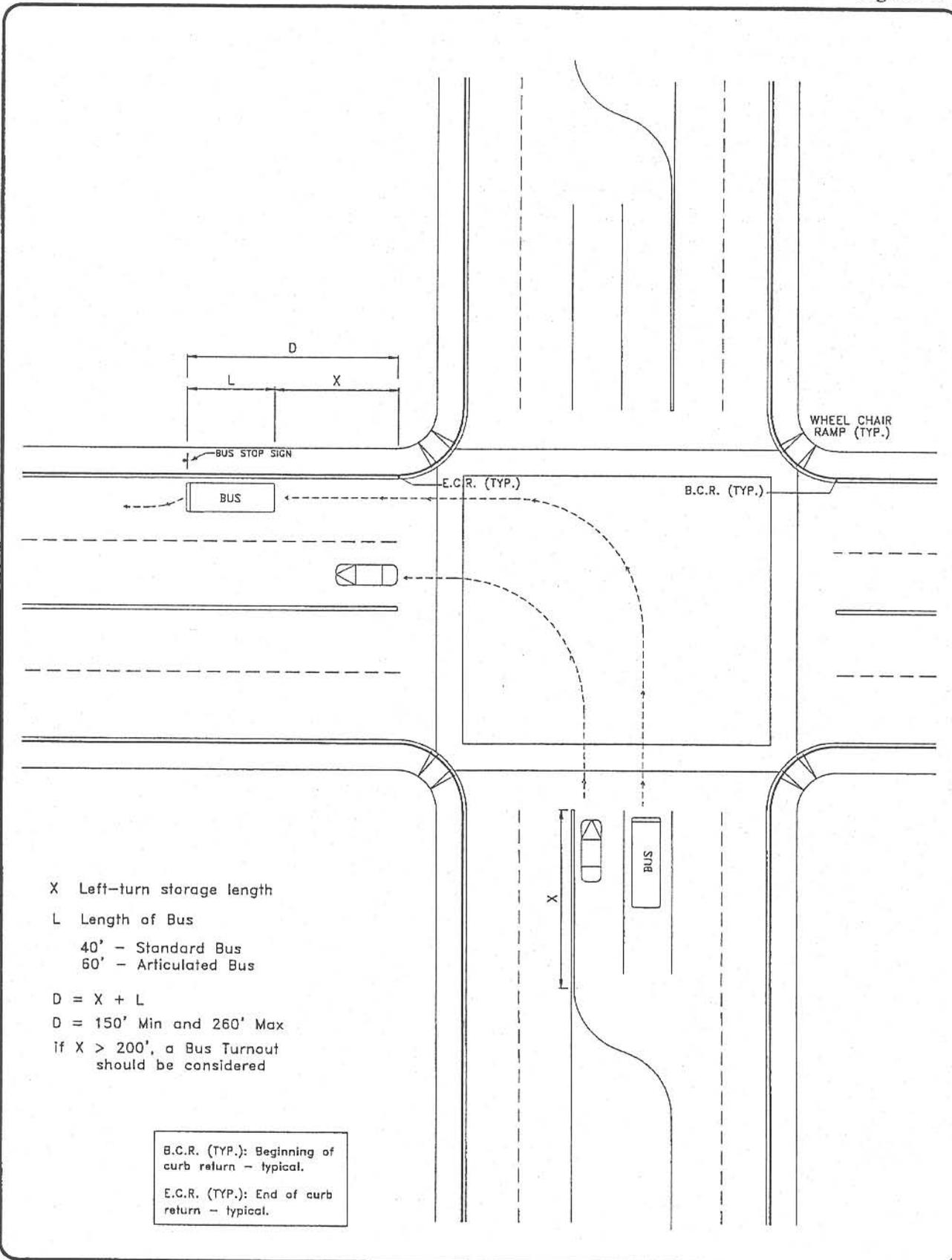
Figure 13: *Arizona Department of Transportation's (ADOT) Standard Drawing No. C-5.50, Concrete Bus Bay*

Figure 1



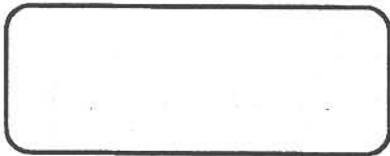
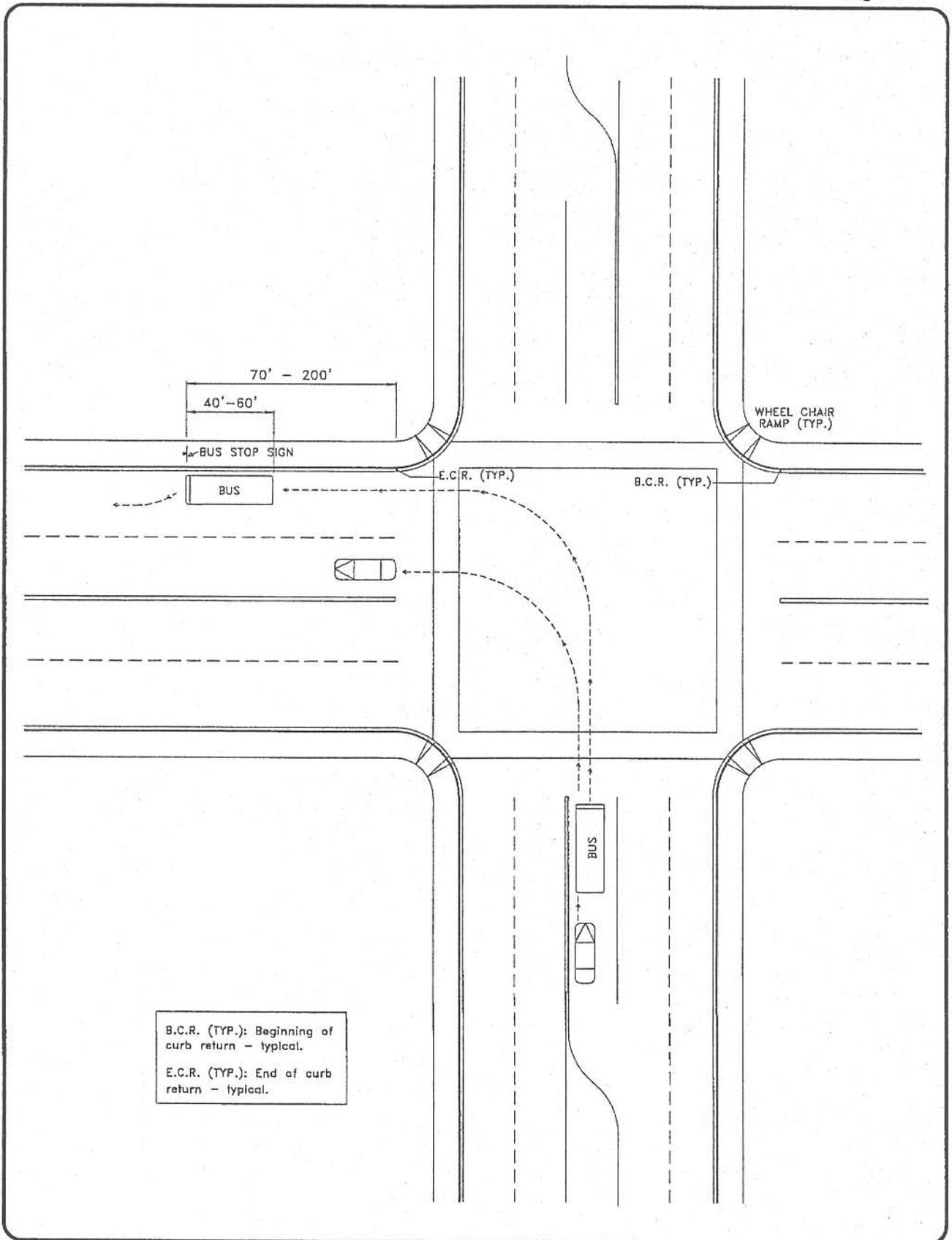
STANDARD BUS STOP LOCATIONS

Figure 2



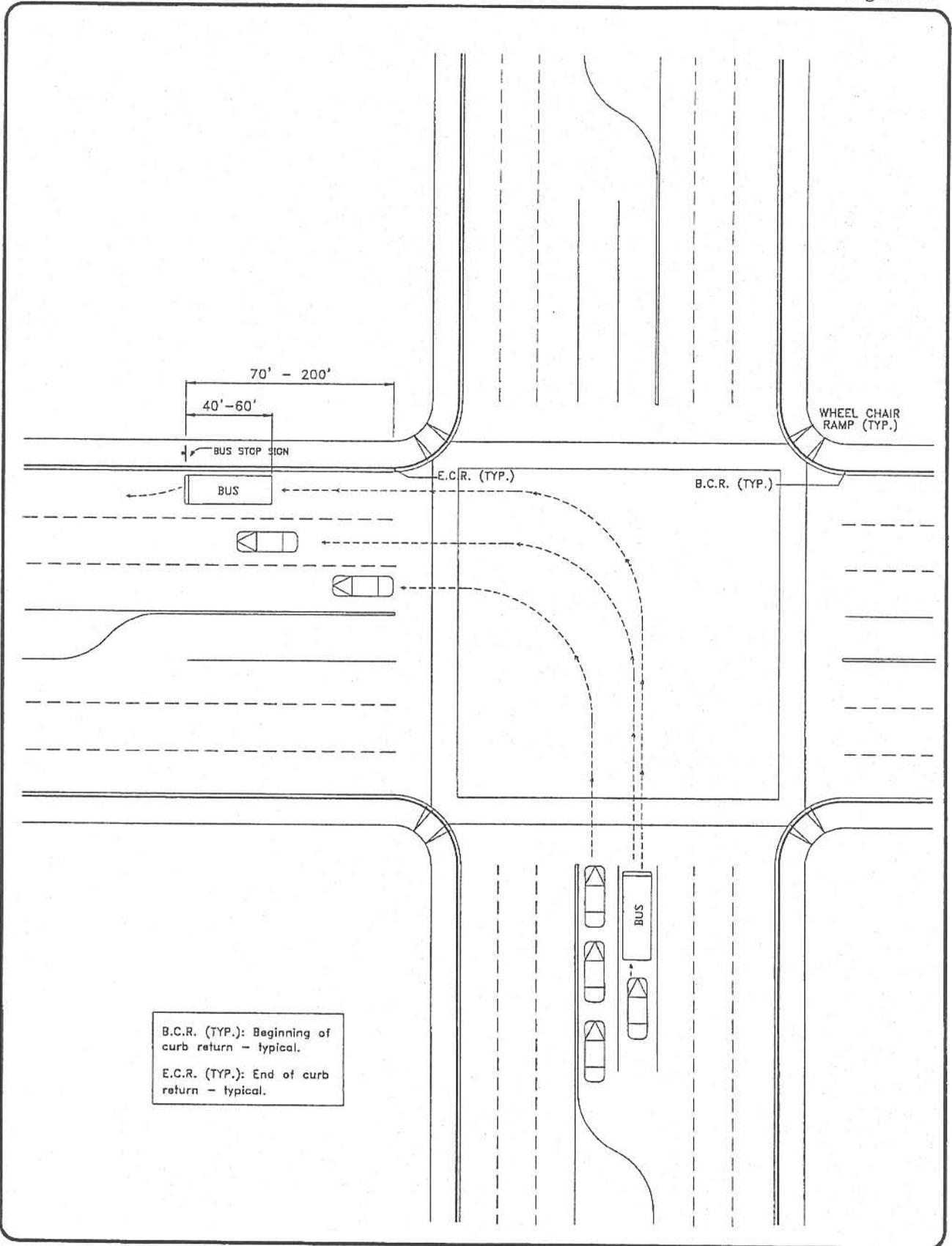
STANDARD BUS STOP LOCATIONS
 FAR SIDE BUS STOP LOCATION - CASE 1
 (Dual lefts turning into 2 through lanes)

Figure 3

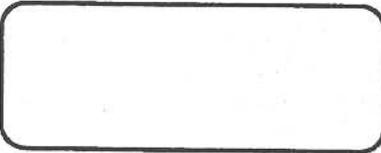


STANDARD BUS STOP LOCATIONS
FAR SIDE BUS STOP LOCATION - CASE 2
(Single left turning into 2 through lanes)

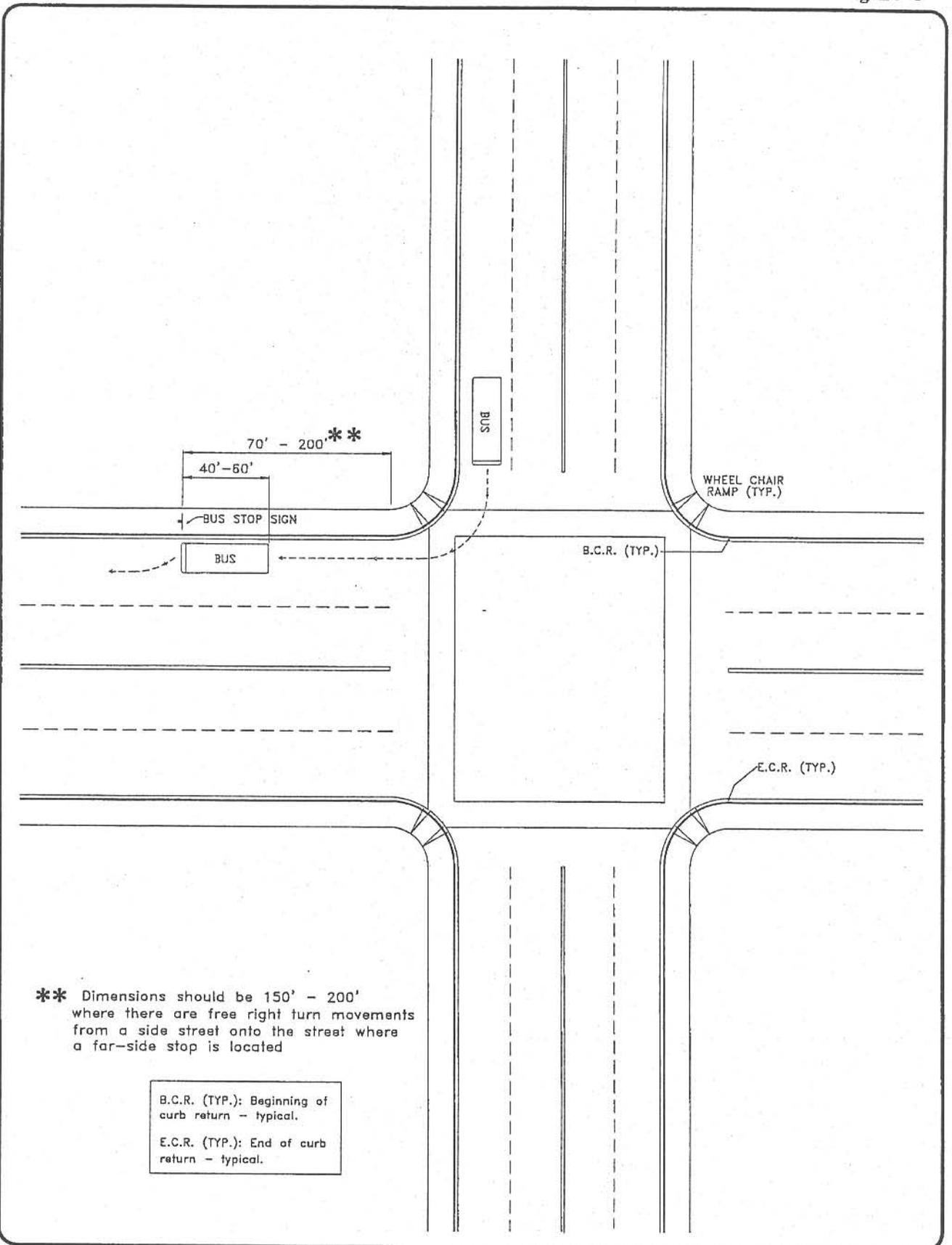
Figure 4



B.C.R. (TYP.): Beginning of curb return - typical.
E.C.R. (TYP.): End of curb return - typical.



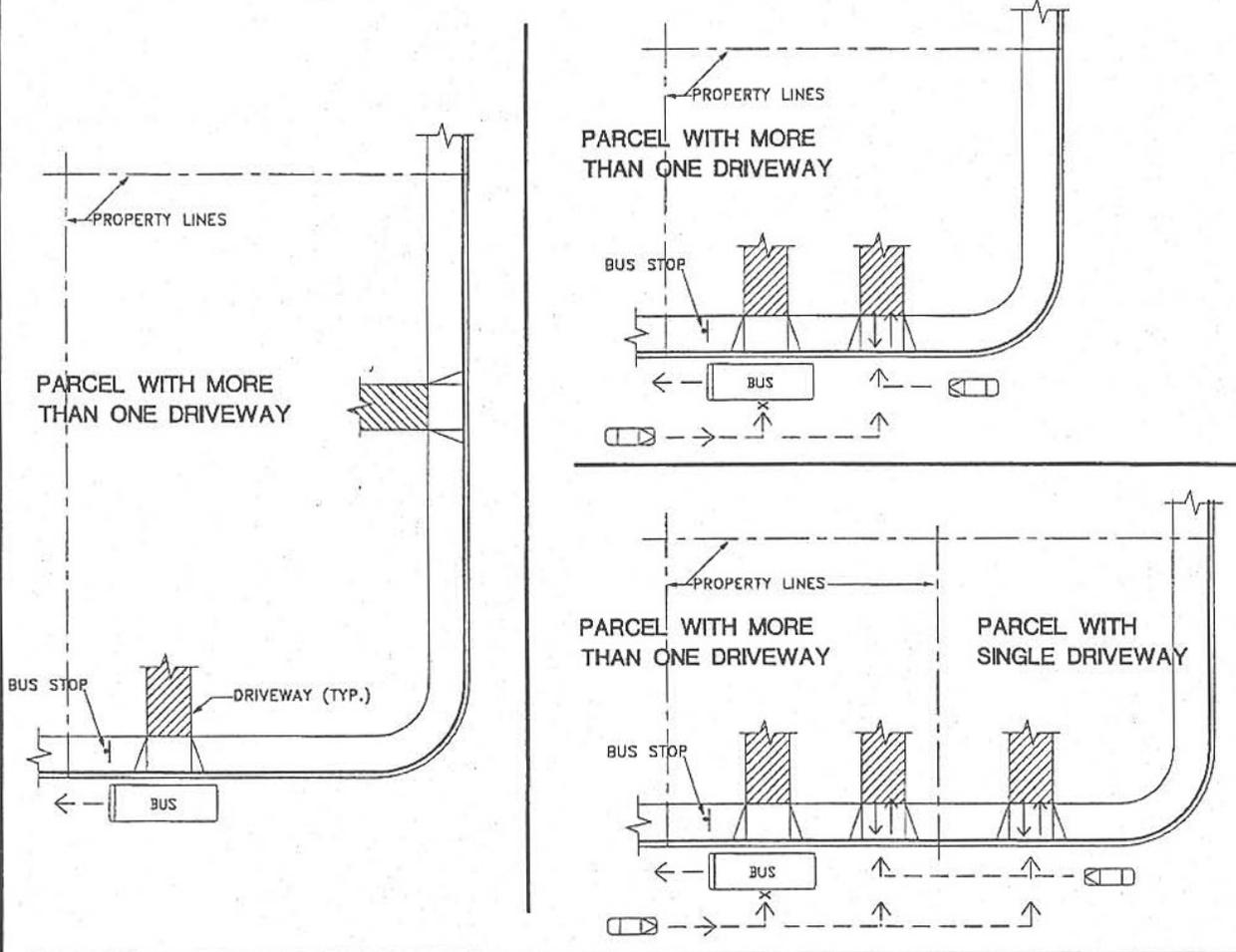
STANDARD BUS STOP LOCATIONS
FAR SIDE BUS STOP LOCATION - CASE 3
(Dual lefts turning into 3 through lanes or 2 through lanes and parking/break down lane)



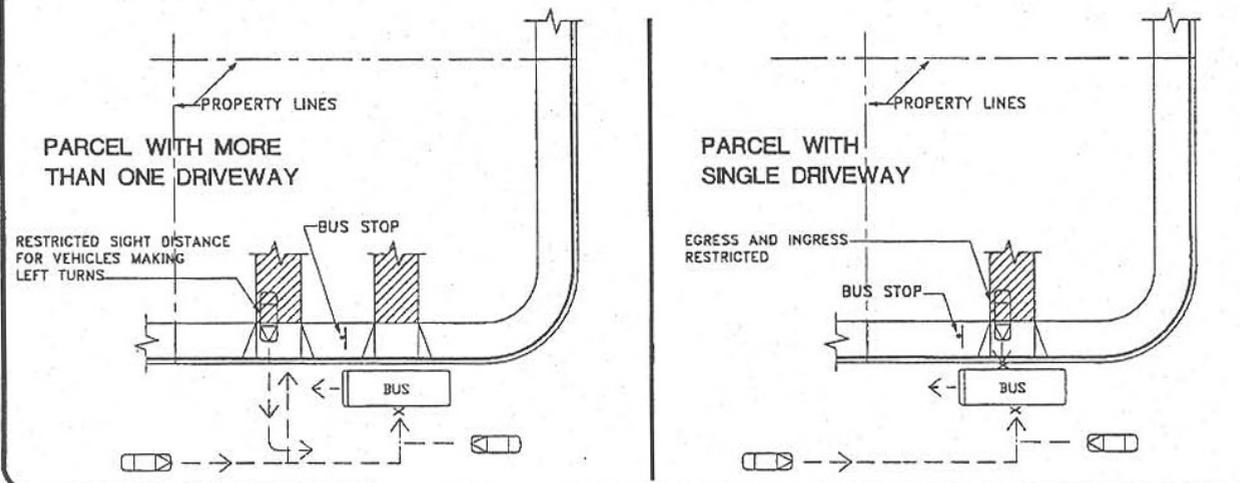
STANDARD BUS STOP LOCATIONS
 FAR SIDE BUS STOP LOCATION - CASE 4
 (After a right turn)

REGIONAL TRANSPORTATION COMMISSION

DESIRABLE BUS STOP LOCATIONS NEAR PARCELS WITH MULTIPLE DRIVEWAYS

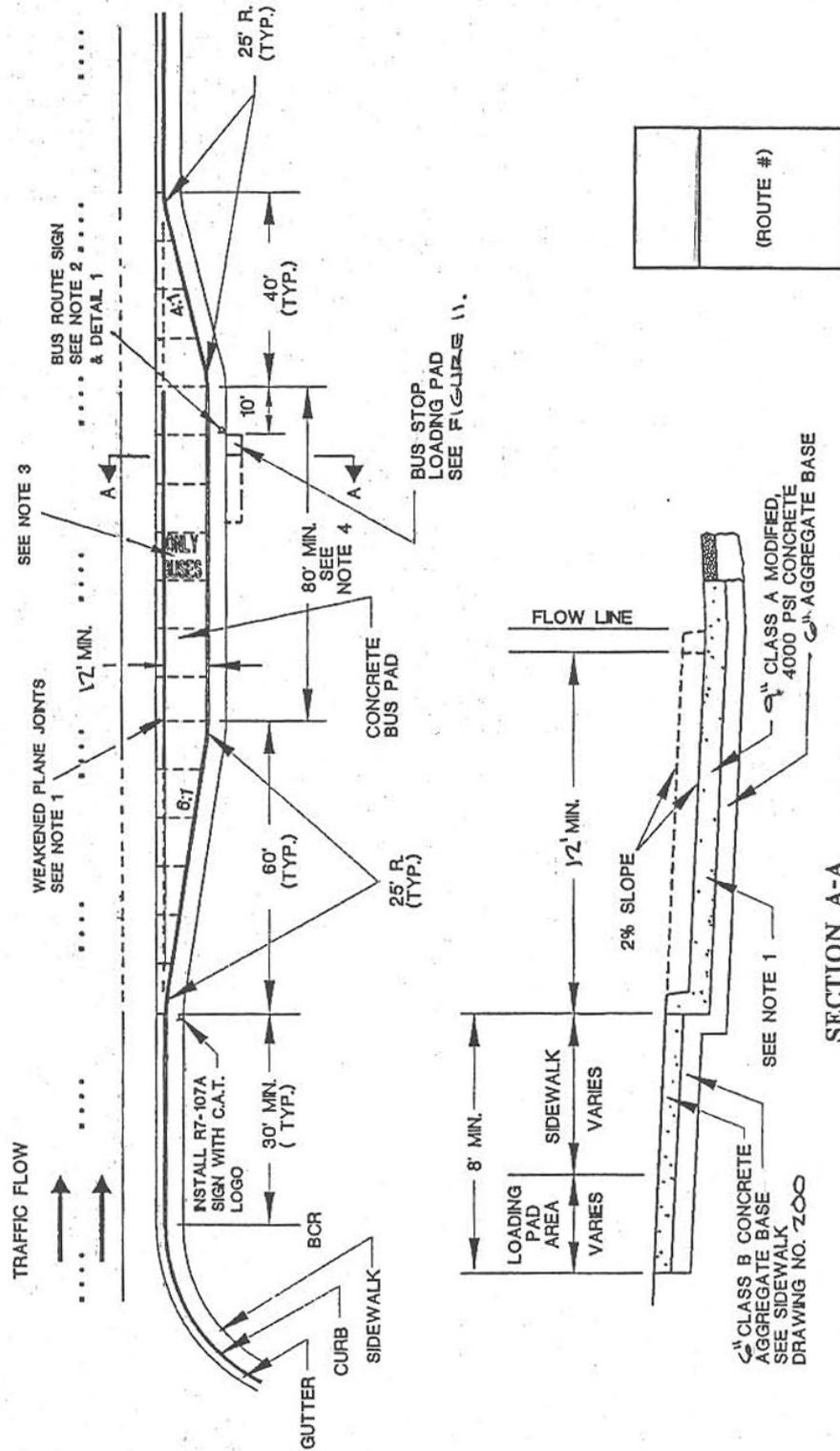


UNDESIRABLE BUS STOP LOCATIONS NEAR DRIVEWAYS



BUS STOP LOCATIONS NEAR PARCELS WITH MULTIPLE DRIVEWAYS

FIGURE 7



DETAIL 1
BUS ROUTE
SIGN

SECTION A-A

NOTES:

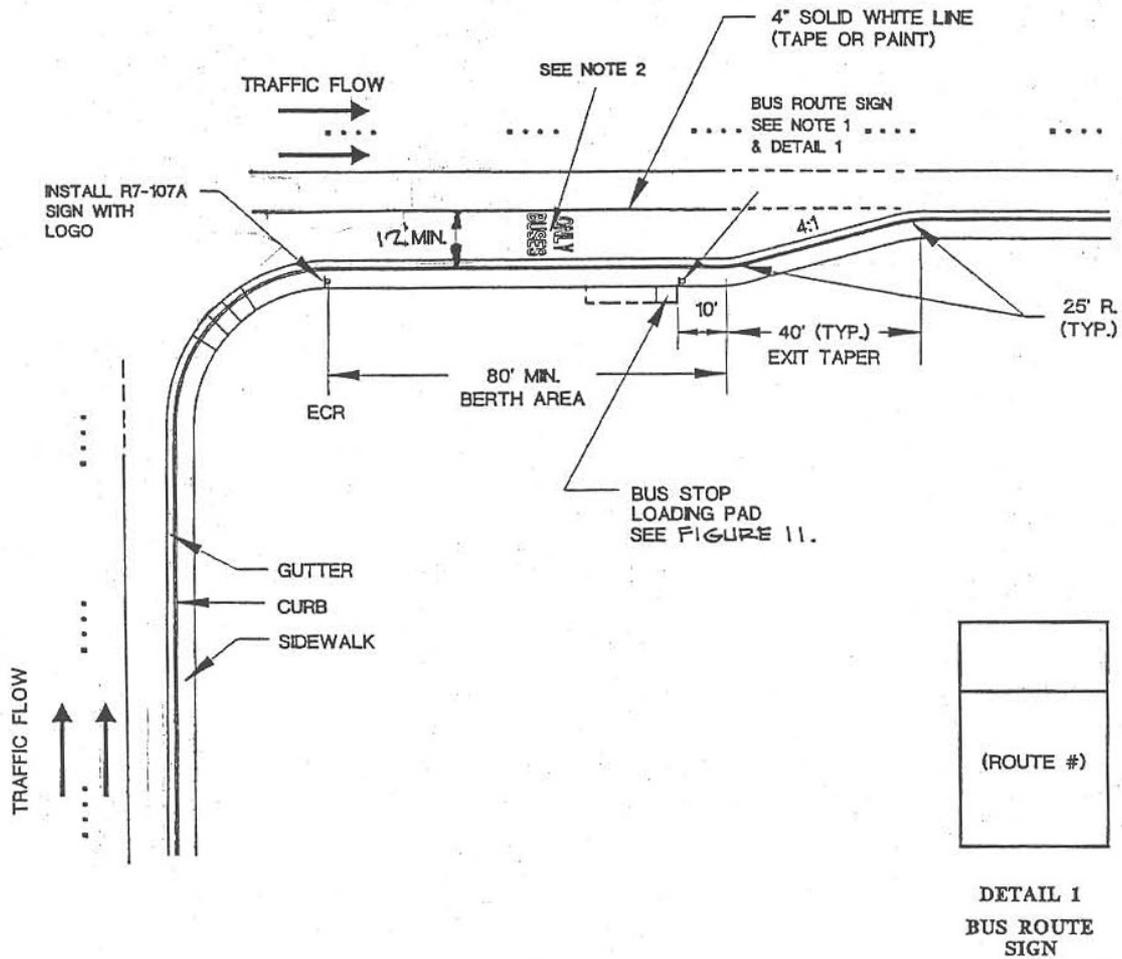
1. CONCRETE BUS PAD SHALL BE MONOLITHIC. TRANSVERSE WEAKENED PLANE JOINTS SHALL BE INSTALLED AT 15' INTERVALS AND AS DETAILED IN STANDARD DRAWING NO. C-05.50.
2. BUS ROUTE SIGN SHALL BE INSTALLED AT THE DOWNSTREAM END OF BUS STOP LOADING PAD.
3. A MINIMUM OF ONE SET OF PAVEMENT MARKINGS CONTAINING THE "BUSES ONLY" SYMBOL SHALL BE PLACED IN THE TURN-OUT AREA. EXACT LOCATION TO BE DETERMINED BY THE ENGINEER.
4. ADDITIONAL STORAGE AREA WILL BE REQUIRED WHEN MORE THAN ONE BUS IS EXPECTED TO OCCUPY THE TURN-OUT AT THE SAME TIME.
5. ALTERNATE CONCRETE AND BASE THICKNESSES MAY BE SUBSTITUTED, BUT MUST BE SUPPORTED BY ENGINEERING ANALYSIS AND APPROVED BY THE ENGINEER.
6. TURN-OUT SURFACE SHALL BE TEXTURED IN ACCORDANCE WITH UNIFORM STANDARD SPECIFICATION NO. 401. FLOW LINE SHALL NOT BE TEXTURED, BUT SHALL BE A TROWELED SURFACE.

SPECIFICATION REFERENCE

AGGREGATE BASE
CONCRETE
CONCRETE STRUCTURES

TYPICAL BUS TURN-OUT

FIGURE 8

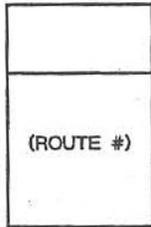
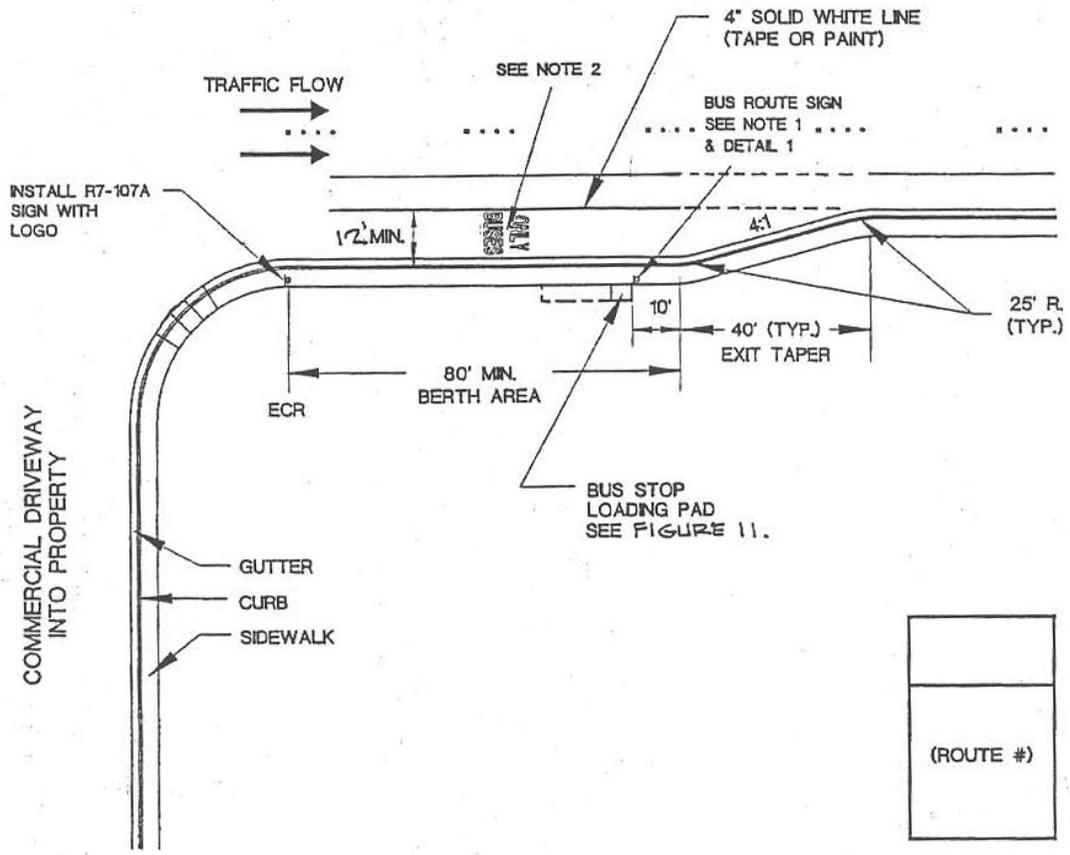


NOTES:

1. BUS ROUTE SIGN SHALL BE INSTALLED AT THE DOWNSTREAM END OF BUS STOP LOADING PAD.
2. A MINIMUM OF ONE SET OF PAVEMENT MARKINGS CONTAINING THE "BUSES ONLY" SYMBOL SHALL BE PLACED IN THE TURN-OUT AREA, EXACT LOCATION TO BE DETERMINED BY THE ENGINEER.

SPECIFICATION REFERENCE				
		FAR-SIDE BUS TURN-OUT (WITHOUT ADEQUATE SPACE FOR APPROACH TAPER)		
		DATE	DWG. NO.	PAGE

FIGURE 9



**DETAIL 1
BUS ROUTE
SIGN**

NOTES:

1. BUS ROUTE SIGN SHALL BE INSTALLED AT THE DOWNSTREAM END OF BUS STOP LOADING PAD.
2. WHERE ADDITIONAL MOTORIST GUIDANCE IS DEEMED NECESSARY BY THE ENGINEER, INSTALL ARROW AND "ONLY" SYMBOL PAVEMENT MARKINGS FOR THE LENGTH OF THE STORAGE LINE. SYMBOLS SHALL BE APPROVED TYPE I PAVEMENT MARKING FILM.
3. STORAGE LANE LINE SHALL BE APPROVED TYPE II PAVEMENT MARKING FILM, OR IF APPROVED BY THE ENGINEER, RAISED PAVEMENT MARKERS MAY BE USED.
4. REVERSE CURVE TRANSITION MAY BE USED SUBJECT TO THE APPROVAL OF THE ENGINEER.

SPECIFICATION REFERENCE			
	BUS STOP PLACEMENT WITHIN EXCLUSIVE RIGHT TURN LANE FOR COMMERCIAL PROPERTIES		
	DATE	DWG. NO.	PAGE

Figure 10 - Bus Shelters

Bus shelters provide transit riders with a safe and comfortable environment, which is necessary in a harsh desert climate. Shelters are very durable metal structures that have amenities such as shade, seating, lighting, trash receptacles, and route information. All new shelters must be made ADA-accessible as well.

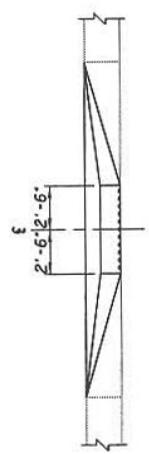
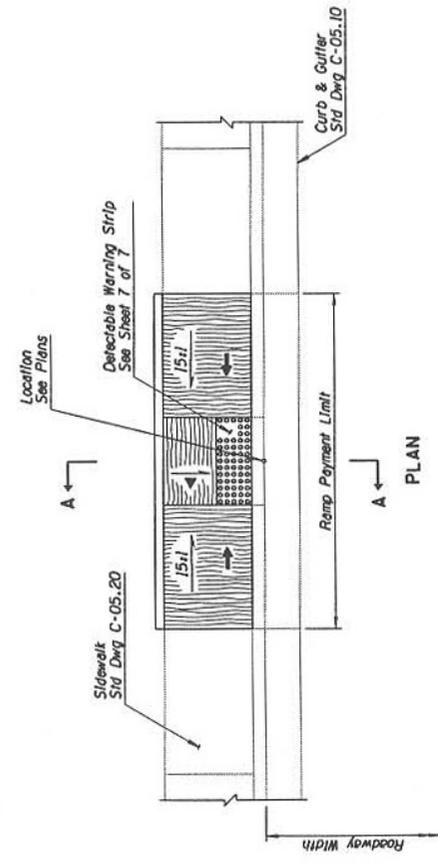


1. Is there enough right-of-way to install a bus shelter? Both the City of Tucson and Pima County have a contract with Attention Transit Advertising (ATA) to install advertising bus shelters and refurbished non-ad shelters. Concrete shelter pad dimensions can be acquired through the references listed below.
2. Will the shelter location have a negative impact on sight visibility for other transportation modes? If so, the shelter and stop may have to be relocated.
3. Will the shelter location have a negative impact on business signage or access? If so, the shelter and stop may be relocated to a more suitable location.
4. Will the shelter require electrical connections, or will it run on solar power? ATA will help determine what type of electrical power they need for each site.
5. Will the shelters meet all ADA-accessibility requirements? ADA requirements call for a wheelchair bay within the seating area, minimum height clearances, connections to adjacent sidewalks as well as the wheelchair loading pad. See references below for more information.
6. Will passengers in the shelter be visible to bus drivers? ATA's ad shelters are designed to have open visibility from the front. However, it is important that landscaping and other vertical obstacles not block the front view of the shelter.

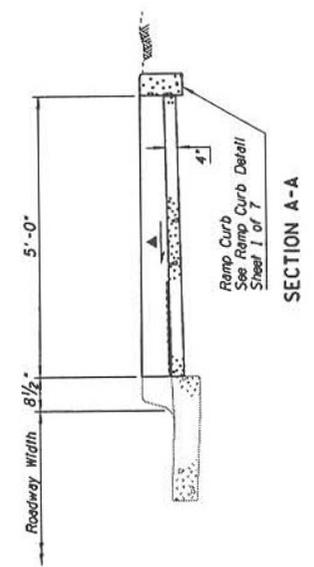
References

- Pima County Department of Transportation, Pat McGowan, 740-6731
- City of Tucson Department of Transportation, Tom Fisher, 791-5883
- Attention Transit Advertising (ATA) bus shelter design standards
- Americans with Disabilities Act (ADA) Draft Guidelines for Accessible Public Rights of Way, Sections R410.2. <http://www.access-board.gov/provac/draft.htm>

NO.	DESCRIPTION OF REVISIONS	MADE BY	DATE
1	ISSUED STD DWG	REF	4/06
2	REVISED GENERAL NOTE	REF	4/06
3	DELETED GENERAL NOTE 9	REF	5/07
4			



ELEVATION
DEPRESSED CURB AT SIDEWALK RAMP



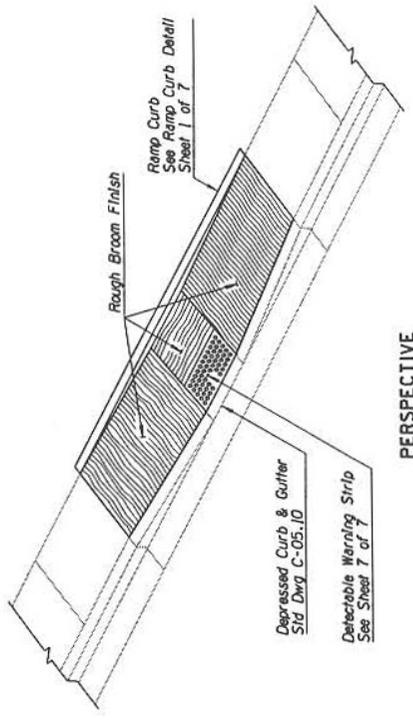
SECTION A-A

GENERAL NOTES

1. For use at mid-block locations.
2. Ramp centerline shall be perpendicular to the face of the curb at the Sidewalk Ramp Control Point.
3. For ramps 15-ft long or less, the 15:1 slope governs. If a 15:1 slope results in a ramp length longer than 15-ft, the 15:1 slope may be waived and the ramp length held at 15-ft, regardless of the slope.
4. For sidewalk widths greater than shown on C-05.20, the overall Sidewalk Ramp depth shall match the sidewalk width.
5. Ramp curb height to match elevation at back of adjacent sidewalk.
6. Drainage inlets should not be located within the marked crosswalks, or if crosswalks aren't marked, within the area a standard marked crosswalk would enclose.
7. Concrete shall receive a rough broom finish as shown.
8. See Std Dwgs C-05.10 and C-05.20 for joint details.

LEGEND

- ▲ Minimum slope = 100:1 (0.01 %)
- ▲ Maximum slope = 50:1 (0.02 %)

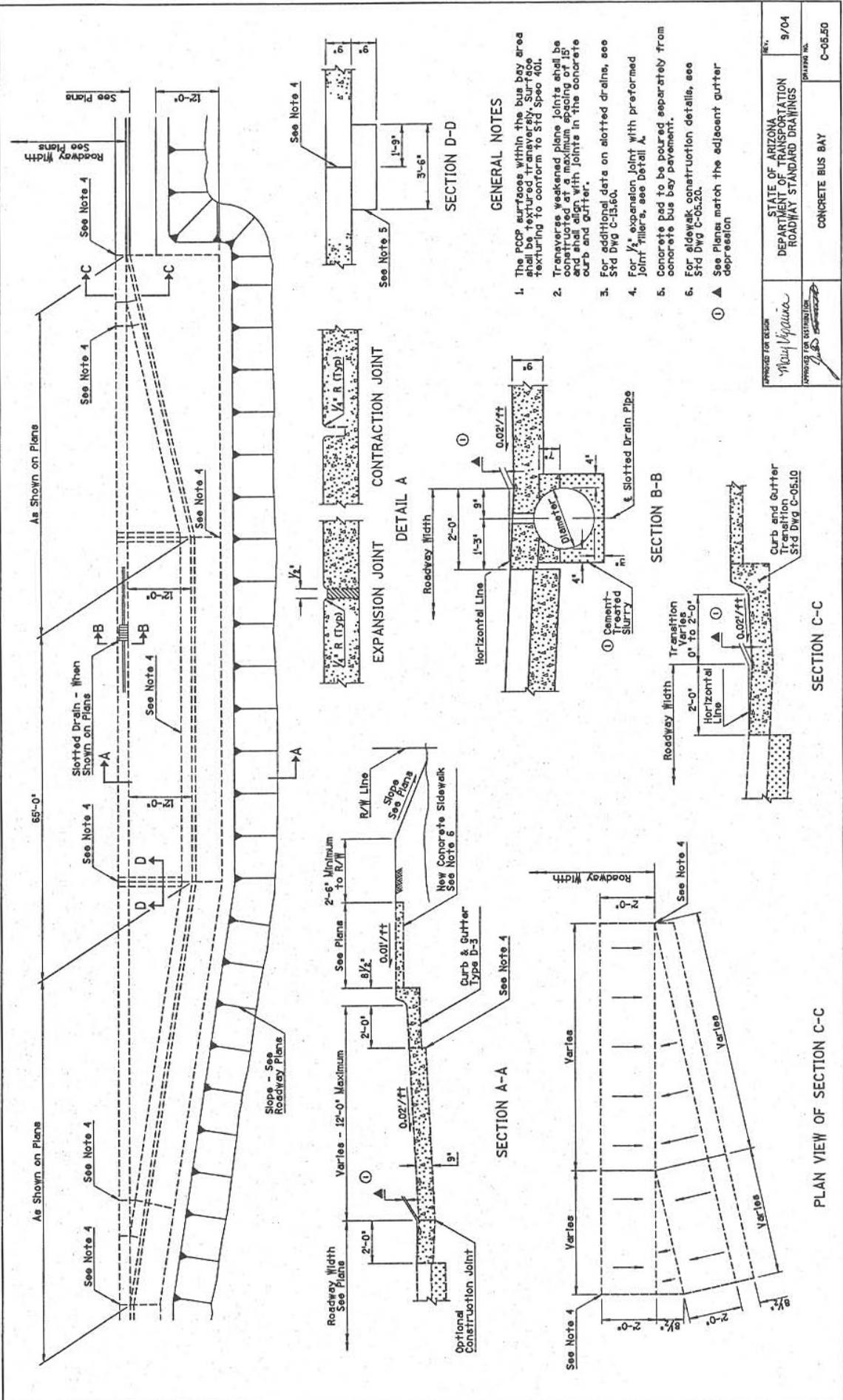


PERSPECTIVE

APPROVED FOR DESIGN <i>Michael...</i>	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION ROADWAY STANDARD DRAWINGS	REV. 5/07
APPROVED FOR CONSTRUCTION <i>J.P. Calderone</i>	SIDEWALK RAMP TYPE E	DRAWING NO. C-05.30 Sheet 5 of 7

FIGURE 17

NO.	DESCRIPTION OF REVISIONS	MADE BY	DATE
1	UNMODIFIED GUTTER DEPRESSION VALUE & ADDED NOTE	N.F.	9/04
2			
3			
4			



GENERAL NOTES

1. The PCP surface within the bus bay area shall be textured transversely. Surface texture to conform to STD Spec 401.
 2. Transverse weakened plane joints shall be constructed at a maximum spacing of 15' and shall align with joints in the concrete curb and gutter.
 3. For additional data on slotted drains, see STD DWG C-15.60.
 4. Joint fillers, see Detail A.
 5. Concrete pad to be poured separately from concrete bus bay pavement.
 6. For sidewalk construction details, see STD DWG C-05.20.
- ① See Plans match the adjacent gutter depression

APPROVED FOR DESIGN	DATE
<i>May Myaia</i>	9/04
APPROVED FOR CONSTRUCTION	PROJECT NO.
<i>[Signature]</i>	C-06.50

PLAN VIEW OF SECTION C-C