Session 35

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FDOT, Public Transit Office

PPM & Greenbook Revisions for Transit Design

Topic Description

This presentation will primarily focus on design criteria that was recently incorporated into FDOT Manuals and which are included on the Transit Office website. At the presentation, 100 hardcover copies of Accessing Transit will be distributed to attendees.

Speaker Biography

Ms. Datz has a bachelor's degree in Environmental Science from the Florida Institute of Technology; she has worked at FDOT since 1990 and within the Public Transit Office since 1999. For the past 5 years, she has coordinated with the Design Office to include more transit-specific design criteria into the department and national-level manuals. Ms. Datz is also working with Florida State University on the development and distribution of "Accessing Transit: Design Handbook for Florida Bus Passenger Facilities," presently incorporated as a reference in the PPM, Florida Greenbook, and the AASHTO Greenbook for Transit Design to be released this fall.

2006 FICE/FDOT Design Conference

Designing for Transit:

Greenbook & PPM Revisions
for Transit Design

Presented by:
Amy W. Datz
Transit Planner
Florida Department of Transportation:
Public Transit Office

A. Introduction

Coordination with the appropriate public transit provider(s) will help determine the need for and justification of **bus bays** on a project-by-project basis. With the recent passing of various legislation, **multimodalism is the ultimate goal**. The integration of public transit street side facilities along with pedestrian and bicycle facilities furthers the implementation of this goal.

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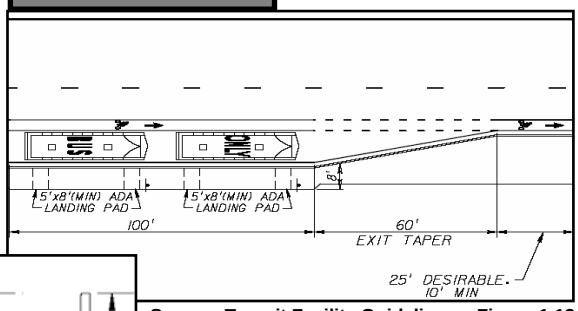
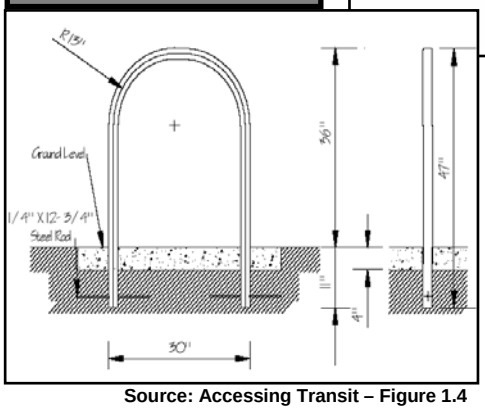
NEAR SIDE BUS BAY



Source: Transit Facility Guidelines – Figure 1.13

INVERTED "U" BIKE RACK



Source: Accessing Transit – Figure 1.4

C.2 Shelters in the Clear Zone

Shelters should be installed at locations where demand warrants installation and in accordance with **clear zone** criteria in CHAPTER 3 – GEOMETRIC DESIGN (C.10.e and Table 3-12) of this Manual.

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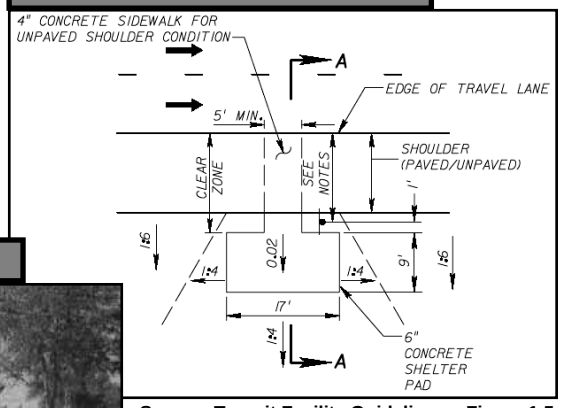
CURBSIDE BUS STOP LANDING PAD



Source: Transit Facility Guidelines – Figure 1.5

WELL-POSITIONED SHELTER

Source: Accessing Transit – Figure 1.24

C.10.e Bus Benches and Transit Shelters

Benches – 10 feet back from curb outside clear zone – non-curbed. Bench or shelter adjacent to sidewalk 36 inches ADA clearance perpendicular to roadway centerline. **Shelter's set back not eliminated during roadway widening**.

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BENCH MADE FROM RECYCLED PLASTIC

Source: Accessing Transit – Figure 1.20

D. Public Transit Facilities

When a project includes a public transit route, **curb-side and street-side transit facilities** for bus stops should be considered in the roadway design process. The “Accessing Transit: Design Handbook for Florida Bus Passenger Facilities” and “Transit Vehicle and Facilities on Streets and Highways” provide guidance relating to provisions for curb-side and street-side facilities.

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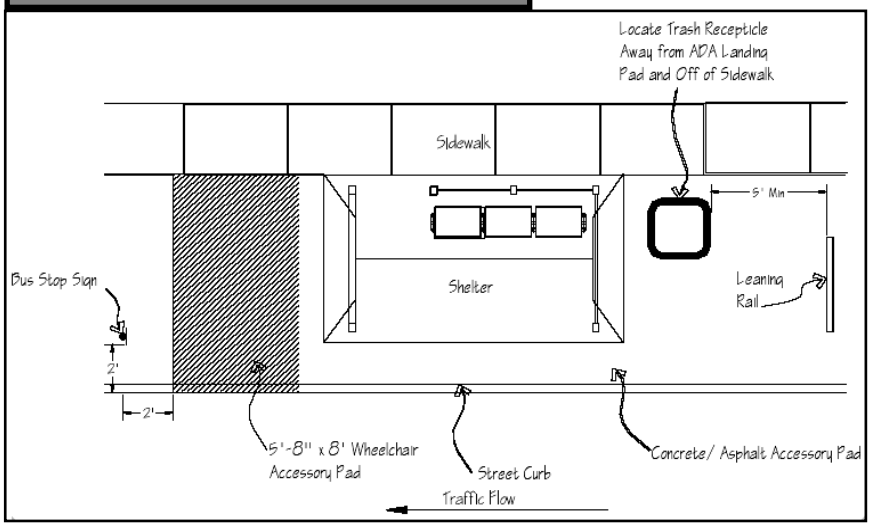
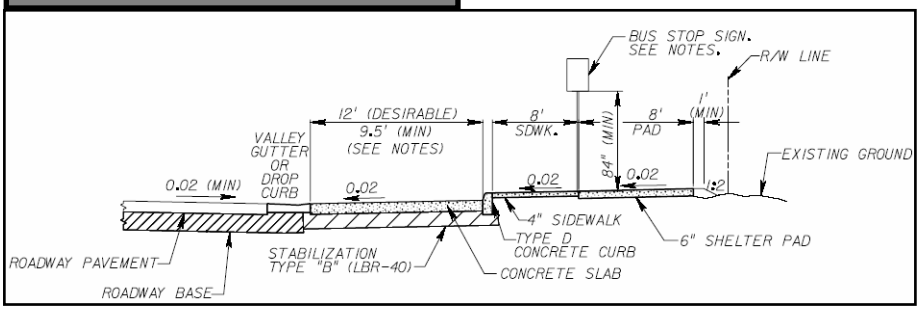
CORRECT LOCATION OF FACILITY AMENITIES



Source: Accessing Transit – Figure 1.22

SECTION: TYPICAL BUS BAY PAVEMENT



Source: Transit Facility Guidelines – Figure 1.8

D.1. Curbside Facilities

Curb-side facilities are the most common, simple and convenient form of facilities **at a bus stop**. These include bus stop signs, passenger waiting shelters, **bus stop wheelchair access pad**, benches, **leaning rails**, and shelter lighting. Chapter 1 of "Accessing Transit" provides additional details for each facility that may be considered as guidelines. Coordination with the appropriate public transit provider(s) may be necessary in developing the plans.

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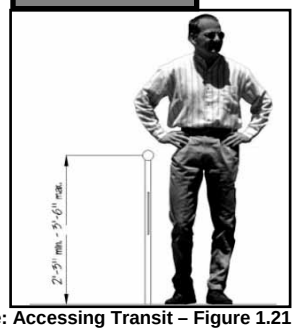
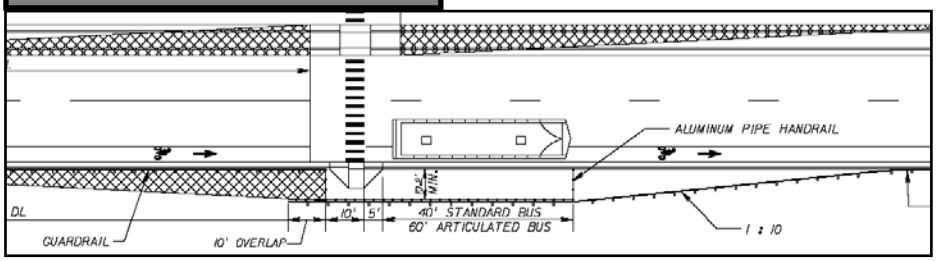
LEANING RAIL



Source: Accessing Transit – Figure 1.21

MID-BLOCK ISOLATED BUS STOP



Source: Transit Facility Guidelines – Figure 1.33

D.2 Streetside Facilities

Slide 1

Bus stop locations can be categorized as far side, near side and mid-block stops. Bus stops may be designed with a **bus bay or pullout** to allow buses to pick up and discharge passengers in an area outside of the travel lane. This design feature allows traffic to flow freely without the obstruction of stopped buses. Chapter 2 of "Accessing Transit" provides additional details that may be considered as guidelines. ***Continued →***

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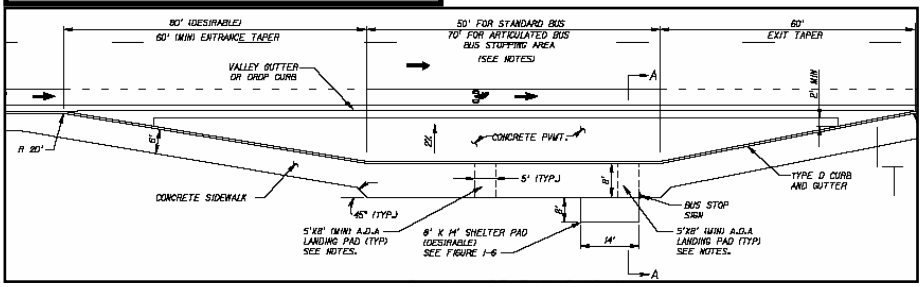
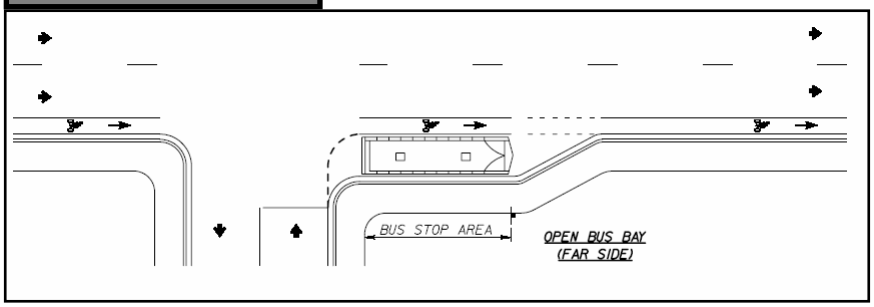
PLAN VIEW: CONCRETE SLAB OPTION



Source: Transit Facility Guidelines – Figure 1.8

OPEN BUS BAY (FAR SIDE)



Source: Transit Facility Guidelines – Figure 1.1

D.2 Streetside Facilities

Slide 2

The greater distance placed between waiting passengers and the travel lane increases safety at a stop. **Bus bays are classified as closed, open or bulbs.** Detailed standard drawings that may be considered for various **bus bay configurations** are provided in "Transit Facilities Guidelines." ***Continued →***

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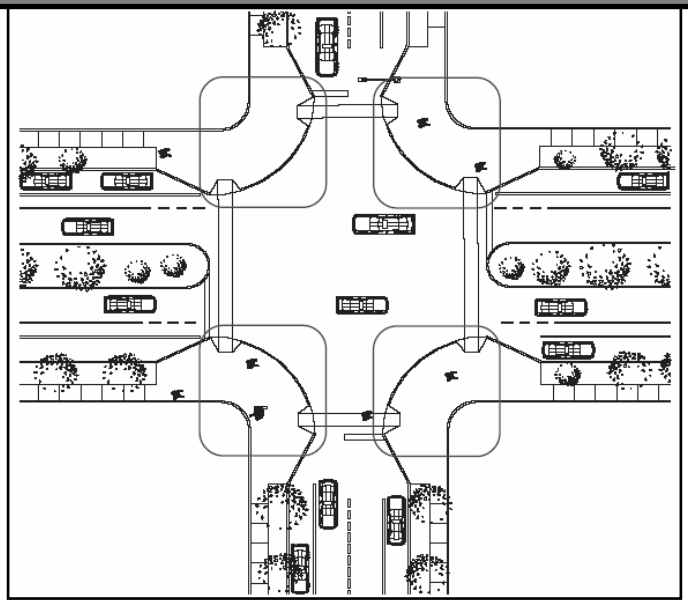
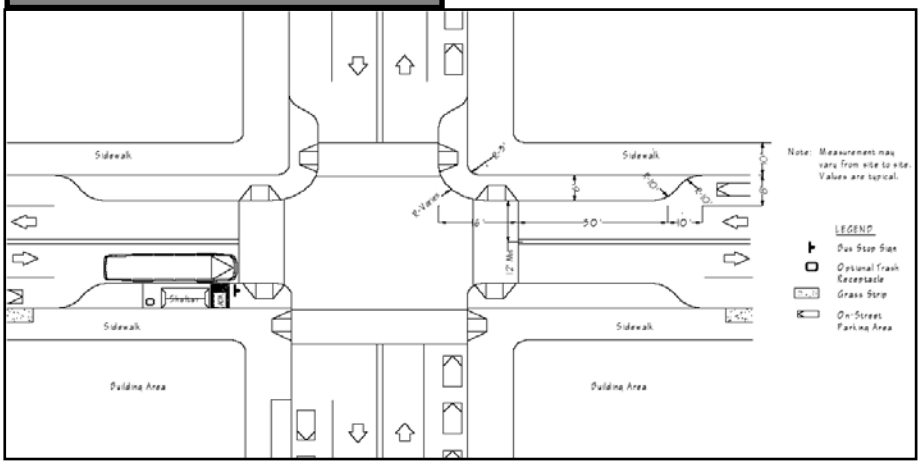
INTERSECTION AND BUS BAYS WITH PEDESTRIAN NUBS/BULBS



Source: Accessing Transit – Figure 2.15

DIMENSIONS OF A BUS BULB



Source: Accessing Transit – Figure 2.11

D.2 Street-Side Facilities

Slide 3

The total length of the bus bay should allow room for an **entrance taper, a stopping area, and an exit taper as a minimum**. However, in some cases it may be appropriate to consider providing **acceleration and deceleration lanes depending on the volume and speed** of the through traffic. This decision should be based upon site specific conditions. "Accessing Transit" provides detailed bus bay dimensions for consideration when right of way is unlimited and access points are limited.

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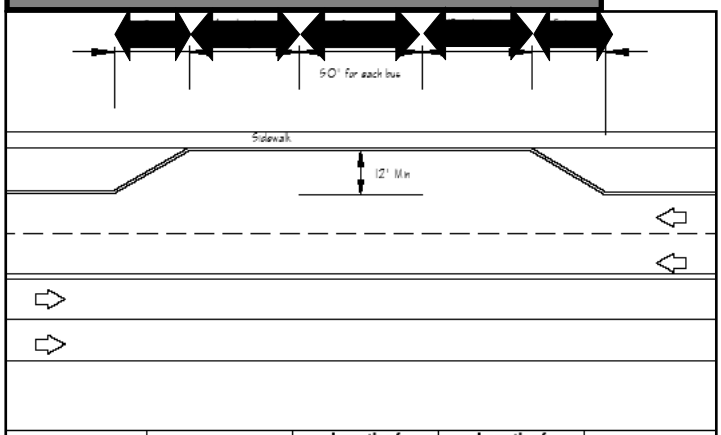
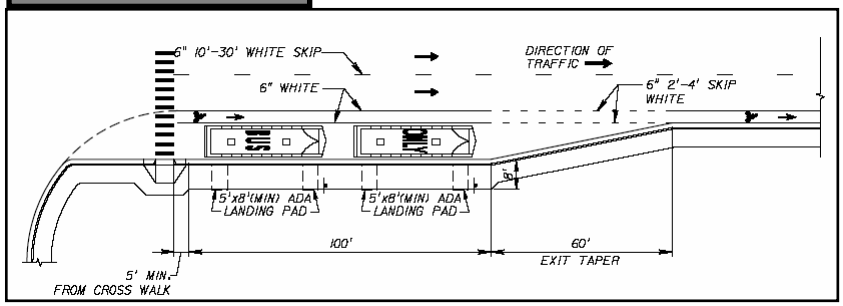
CRITICAL DIMENSIONS RELATED TO BUS BAYS



Through Speed (mph)	Entering Speed (mph)	Length of Acceleration Lane (feet)	Length of Deceleration Lane (feet)	Length of Taper (feet)
25 or less (urban)	15 or less (urban)	80 (desired) 60 (minimum)	80 (desired) 60 (minimum)	-
35	25	250	184	170
40	30	400	265	190
45	35	700	360	210
50	40	975	470	230
55	45	1,400	595	250
60	50	1,900	735	270

Source: Accessing Transit – Figure 2.9

FAR SIDE OPEN BUS BAY



Source: Transit Facility Guidelines – Figure 1.22

D.3 Bus Bay Lighting

Lighting design for bus bay pavement areas should meet the same criteria for minimum illumination levels, uniformity ratios and max-to-min ratios that are being applied to the adjoining roadway based on **Chapter 6 – Roadway Lighting of this Manual**. If lighting is not provided for the adjoining roadway, coordination with the transit agency may be considered to determine if lighting is to be provided for the bus stop area. A decision to install lighting for the adjoining bus stop area may include illumination of the bus bay pavement area. **The use of solar panel lighting for bus bays is another option that should be considered.**

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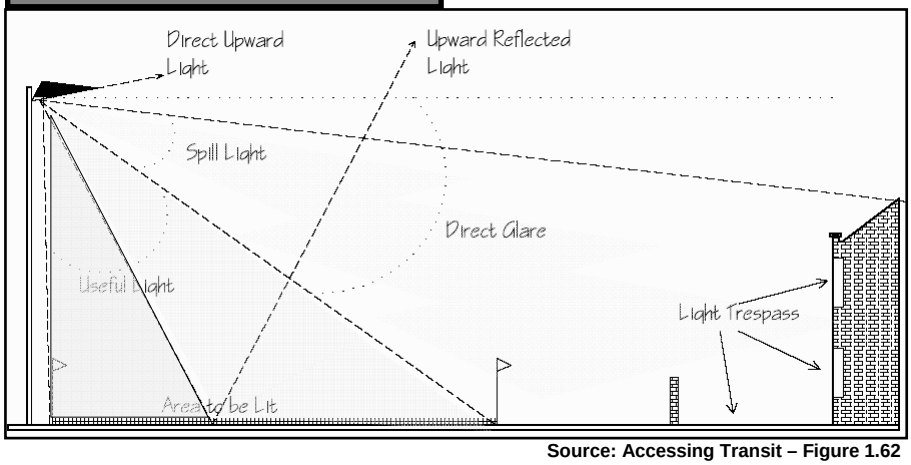
Bus Bay Lighting Options

ADVANCED BUS SHELTER

A solar powered bus shelter illuminates its information systems and advertising panels.

Source: Accessing Transit – Figure 1.60

SCHEMATIC OF LIGHT DISPURSION



Source: Accessing Transit – Figure 1.62

Note from Transit Facility Guidelines, page 1-24: "Clear area should be free of all fixed objects such as light/utility poles, signal equipment, trees, vegetation, street furniture, etc. that would obstruct the view of pedestrians. Crossing warning signs are excluded from the clear area requirements."

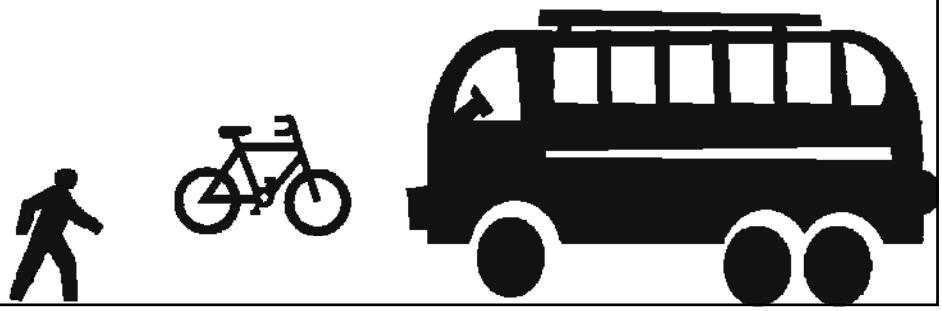
Greenbook References

- **Accessing Transit: Design Handbook for Florida Bus Passenger Facilities**
  - Available at:
    - www.dot.state.fl.us/transit/Pages/AccessingTransitHandbookLow.pdf
- **Transit Facility Guidelines**
  - Available at:
    - www.dot.state.fl.us/transit/Pages/TRANSIT%20FACILITIES%20GUIDELINES.PDF
- **Transit Vehicle and Facilities on Streets and Highways**
  - Available from:
    - Transit Cooperative Research Program (TCRP) of the Transportation Research Board of the National Research Council

Plans & Preparation Manual

Chapter 8

Pedestrian, Bicycle and Public Transit Facilities



8.1 General

Slide 1

Pedestrian, bicycle and **transit facilities** must be given full consideration on all proposed projects including **Resurfacing, Restoration and Rehabilitation (RRR),** safety, and traffic operation projects.

Continued →

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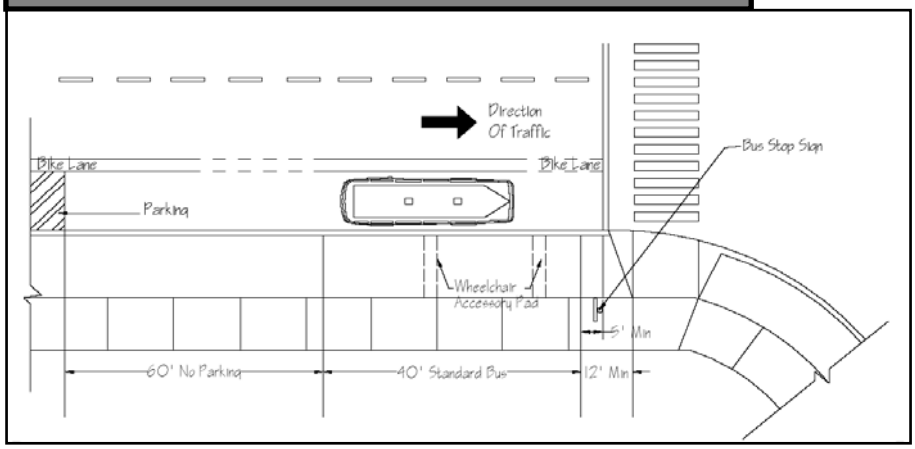
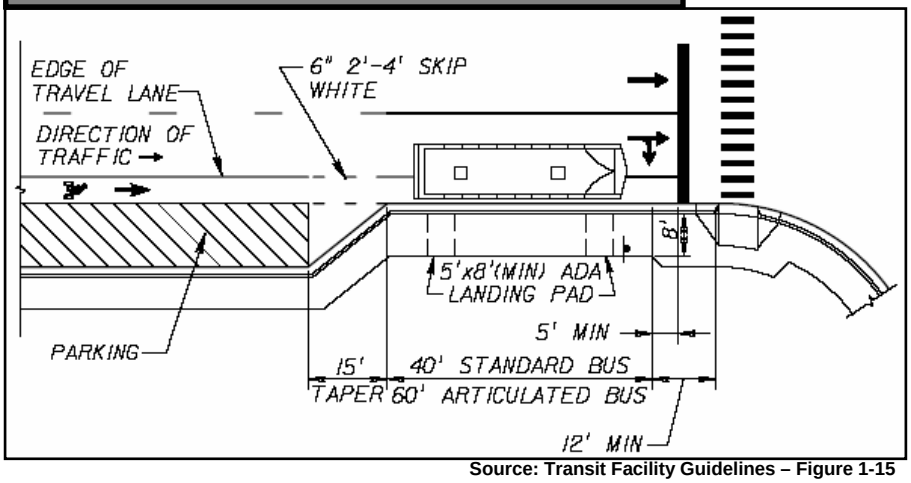
TYPICAL BIKE LANE AND CURB SIDE BUS STOP CONFIGUREATION



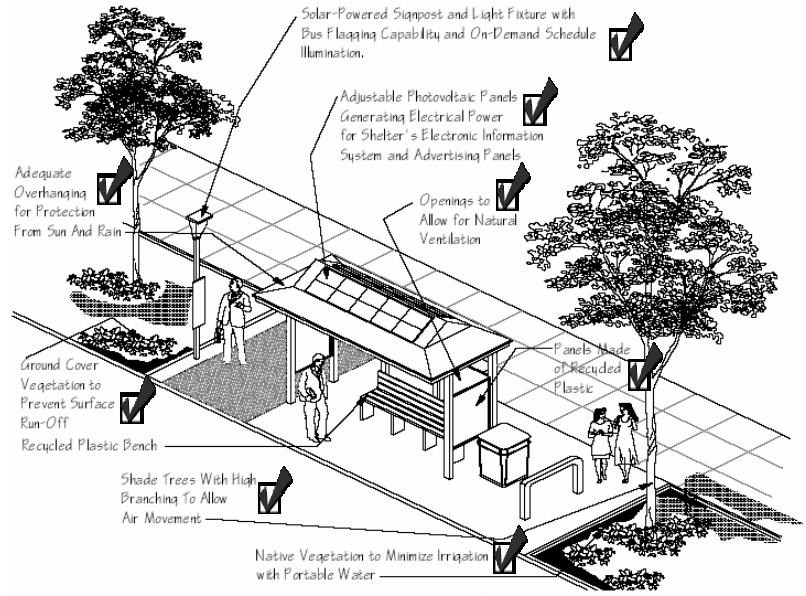
Source: Accessing Transit – Figure 2.13

NEAR SIDE NUB AND BUS BULB WITH ON-STREET PARKING



Source: Transit Facility Guidelines – Figure 1-15

BUS STOP DESIGNED WITH "GREEN BUILDING" DESIGN PRINCIPLES



Source: Accessing Transit – Figure 1.47

8.1 General

Slide 2

The **provision for bicycle accommodation** is an important element of passenger facilities, as it helps to reduce the need for parking of automobiles and facilitates another viable option for accessing the facility. Bicycles should be accommodated at all pedestrian bridges (i.e. provide an alternative to stairs). Bicycle access to station platforms transit facilities should be provided where the bus service has, or may have in the future, a because most bus service has bike-on-bus (bicycle rack) capability. Decisions on **appropriate pedestrian and bicycle facilities** shall be determined with input from the District Pedestrian/Bicycle Coordinators, District Modal Development Office Coordinators, District **Americans with Disabilities Act (ADA)** Coordinators, and the District Public Transportation staff. ***Continued →***

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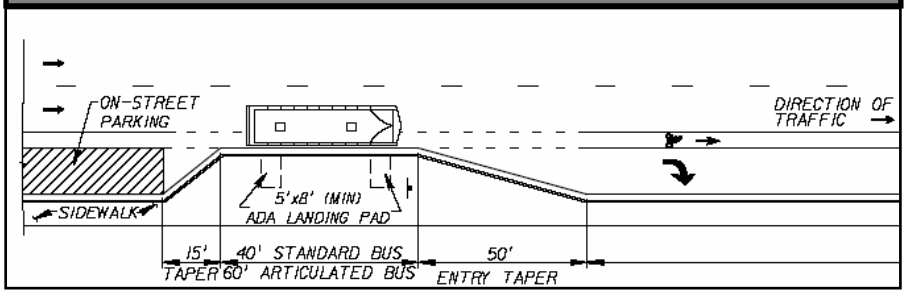
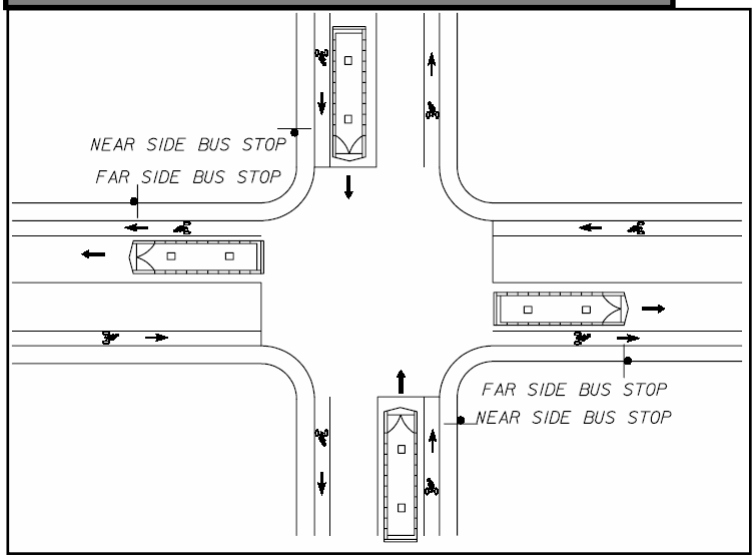
NEAR SIDE BULB WITH ON STREET PARKING PRECEEDING RIGHT TURN LANE



Source: Transit Facility Guidelines – Figure 1-12

NEAR SIDE AND FAR SIDE BUS STOPS WITH BIKE LANES



Source: Transit Facility Guidelines – Figure 1-2

8.1 General

Slide 3

Where there is a demand for pedestrian and bicycle facilities, there could also be a demand for public transit or public transportation facilities. The **connectivity between bicyclist and transit** is evidenced by the number of buses equipped with a rack to hold bicycles. Public transit street side facilities should be considered in all phases of a project, including planning, preliminary design and engineering, design, construction, etc. Coordination with the District Modal Development Office and/or the local public transit provider(s) will help determine the need for and justification of bus bays on a project by project basis. ***Continued →***

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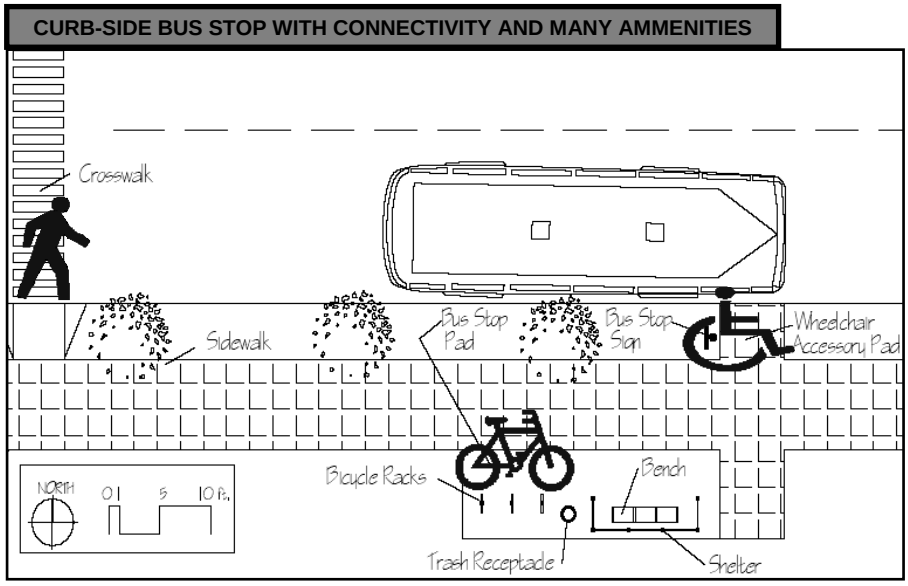
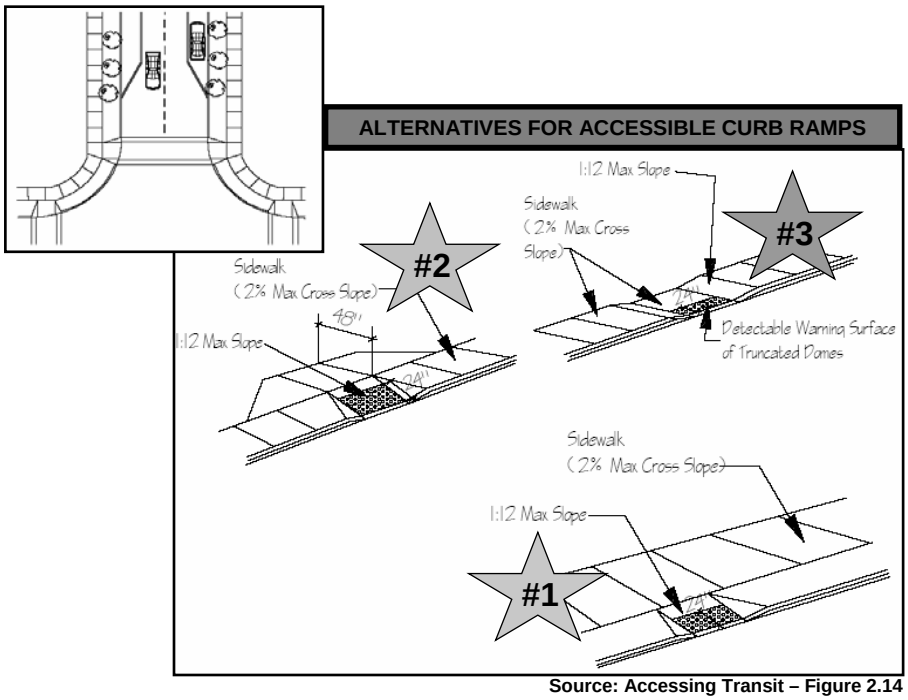


Source: Accessing Transit – Figure 3.2



Source: Accessing Transit – Figure 2.14

8.1 General

Slide 4

With the recent passing of various legislation, **multimodalism is the ultimate goal of the Department**. The integration of public transit street side facilities along with pedestrian and bicycle facilities furthers the implementation of this goal. ***Continued →***

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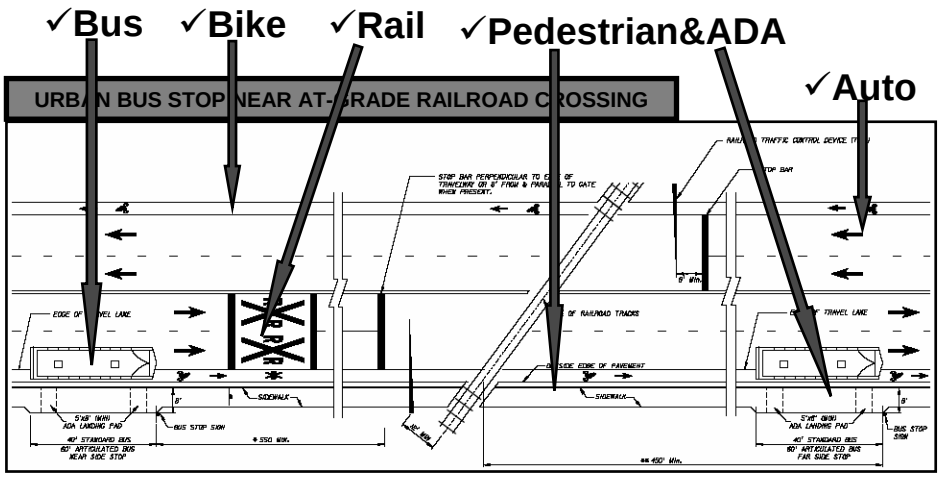
SHELTERED BIKE RACKS

Source: Accessing Transit – Figure 1.3



Source: Transit Facility Guidelines – Figure 1.4

Can you find the facilities for five different modes?

8.1 General

Slide 5

Federal and State legislation provide the stimulus for planning, designing, and constructing a **fully integrated transportation system** benefiting the traveling public and the environment. Examples of legislation include *The Safe, Accountable, Flexible, and Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU)*, *The Americans with Disabilities Act of 1990 (ADA)*, and *The Clean Air Act Amendment of 1990 (CAAA)*. In response to this legislation, the surface transportation system should provide for **concurrent use by automobiles, public transit and rail, and to the extent possible, bicycles and pedestrians**. Throughout the entire process, coordination with transit is essential.

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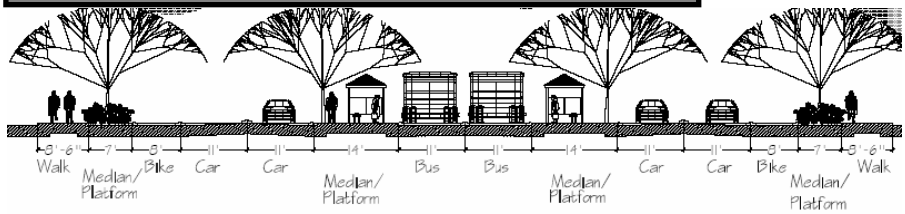
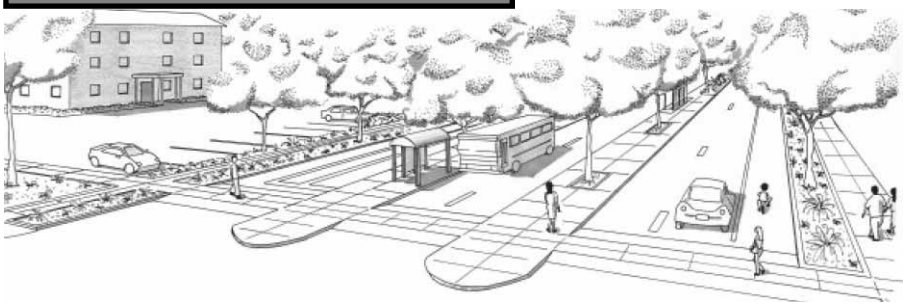
CROSS SECTION OF THE RIGHT OF WAY FOR A TRANSIT MALL



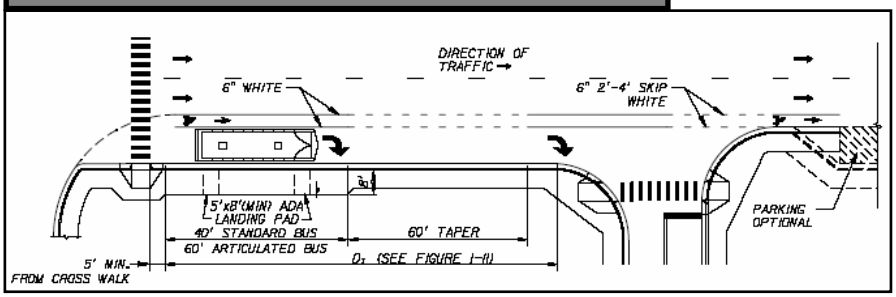
Source: Accessing Transit – Figure 3.9

A VIEW OF A PROTOTYPICAL TRANSIT MALL



Source: Accessing Transit – Figure 3.12

FAR SIDE OPEN BUS BAY SHARED WITH RIGHT TURN LANE



Source: Transit Facility Guidelines – Figure 1-18

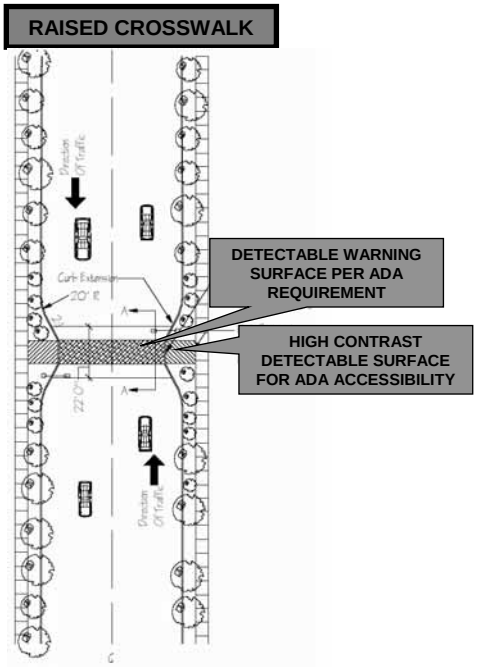
8.2 References

- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities
- Transportation Research Board (TRB). Guidelines for the Location and Design of Bus Stops adapted from TCRP Report 19. Washington D.C.: National Academy Press
- FDOT Accessing Transit: Design Handbook for Florida Bus Passenger Facilities

8.3.3 Marked Crosswalks at Uncontrolled Locations

8.3.3.1 Midblock Crosswalks

Note: No new specific transit information but crosswalks play a large role in transit design



Source: Accessing Transit – Figure 2.16

8.10.1. Curb-Side Facilities

Curb-side facilities are the most common, simplest and convenient form of facilities at a bus stop. These include bus stop signs, **passenger waiting shelters, bus stop wheelchair access pad, curb ramps**, benches, leaning rails, and shelter lighting. ***Chapter 1 of Accessing Transit*** provides additional details for each facility. Coordination with the District Modal Development Office and/or local public transit provider(s) is necessary in developing the plans.

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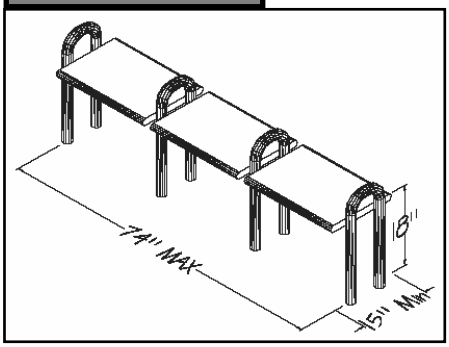
BENCH WITHIN A BUS SHELTER WITH CLEAR VIEWS

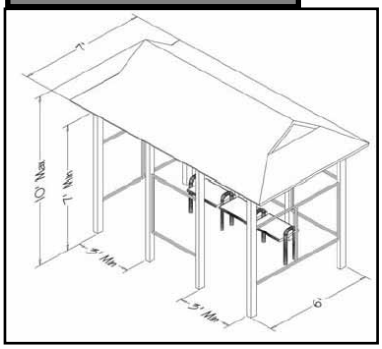
Source: Accessing Transit – Figure 1.17

DIVIDED BUS BENCH



Source: Accessing Transit – Figure 1.19

MID-SIZED BUS SHELTER



Source: Accessing Transit – Figure 1.44

8.10.2 Street-Side Facilities

Slide 1

Bus stop locations can be categorized as far-side, near-side and midblock stops. Bus stops may be designed with a bus bay or pullout to allow buses to pick up and discharge passengers in an area outside of the travel lane. **This design feature allows traffic to flow freely without the obstruction of stopped buses.** ***Continued →***

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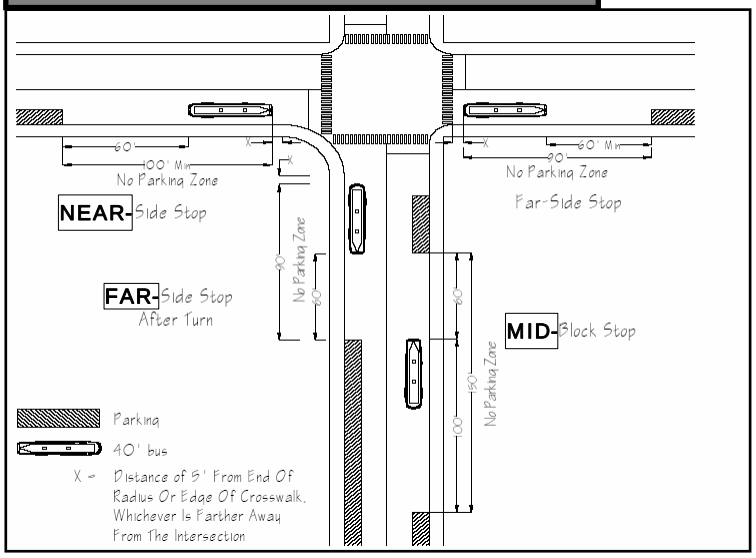
PHOTOGRAPH OF A NEARSIDE BUS BULB

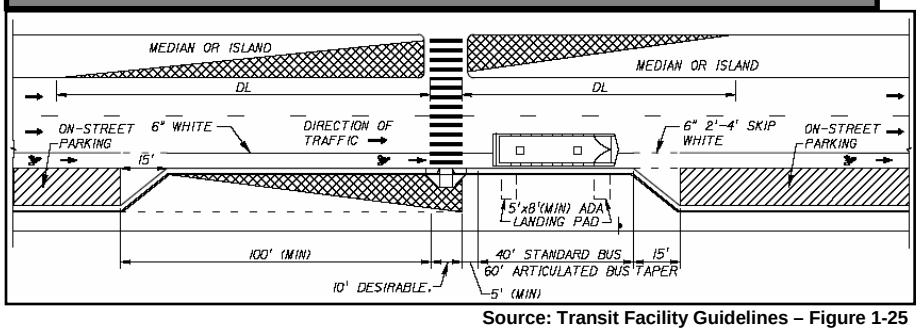
Source: TCRP 65

THREE DIFFERENT TYPES OF BUS STOP LOCATIONS



Source: Accessing Transit – Figure 2.7

MID-BLOCK NUB/BULB ON A DIVIDED ROADWAY WITH ON-STREET PARKING



Source: Transit Facility Guidelines – Figure 1-25

8.10.2 Street-Side Facilities

Slide 2

The greater distance placed between waiting passengers and the travel lane increases safety at a stop. **Bus bays are encouraged on roadways with high operating speeds, such as roads that are part of the Urban Principal Arterial System.** For a particular bus stop, a high frequency of crashes involving buses is a good indicator for the need of a bus bay. **Bus bays are classified as closed, open or bulbs.** See ***Figure 8.3*** for typical detail for the bus bay categories. Detailed standard drawings for various bus bay configurations are provided in the ***Transit Facilities Guidelines*** on the Public Transportation Office website: http://www.dot.state.fl.us/transit/ ***Continued →***

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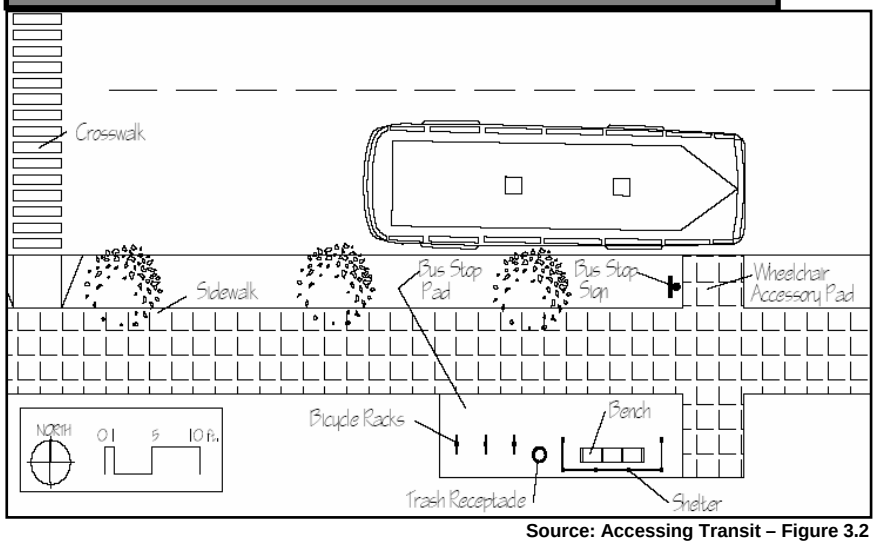
CURB-SIDE BUS STOP WITH CONNECTIVITY AND MANY AMMENITIES



Source: Accessing Transit – Figure 3.2

8.10.2 Street-Side Facilities

Slide 3

At a specific location, a balance must be obtained based on the designer's judgment and input from the applicable transit agencies. **In locations** where the traffic volumes exceed 1,000 vehicles per hour per lane, **it is difficult to maneuver the bus into the bay and back into the travel lane.** Incorporating an acceleration distance, signal priority, or a far-side (versus rather than near-side or midblock) **placement, are potential solutions** when traffic volumes exceed 1,000 vehicles per hour per lane. ***Continued →***

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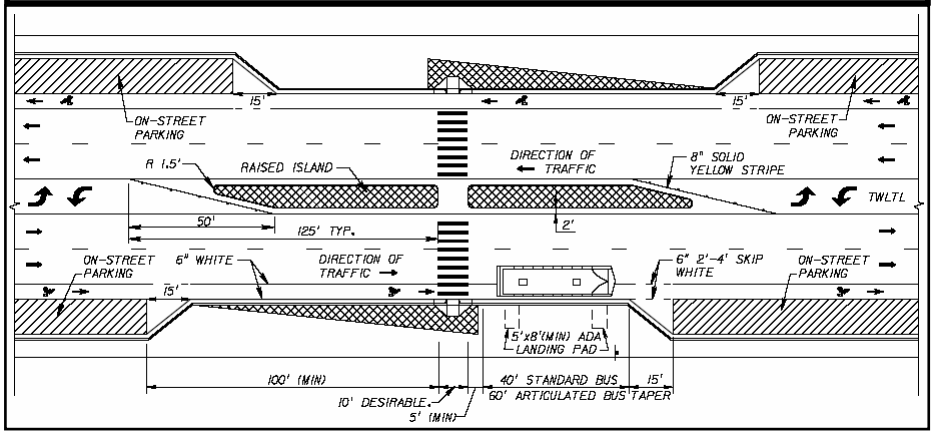
MID-BLOCK NUB/BULB WITH TWO-WAY-LEFT-TURN LANE, MEDIAN AND PARKING



Source: Transit Facility Guidelines – Figure 1-28

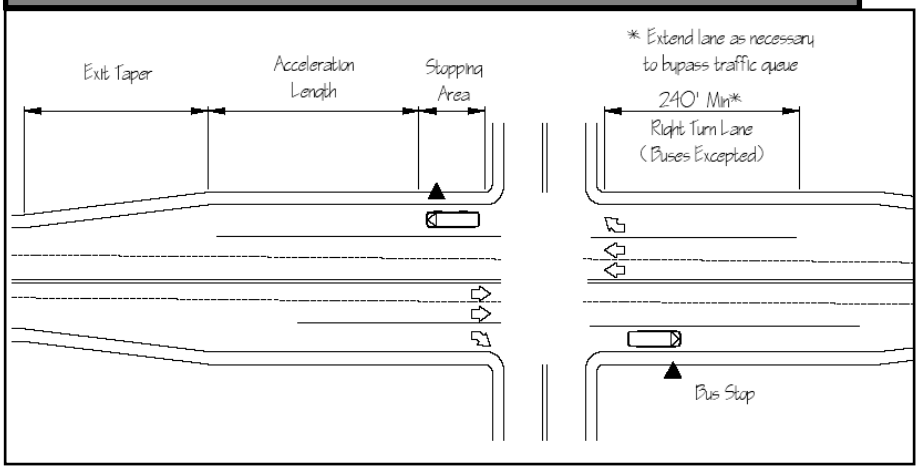
8.10.2 Street-Side Facilities

Slide 4

The total length of the bus bay should allow room for an **entrance taper, a stopping area, and an exit taper as a minimum.** However, in some cases it may be appropriate to consider providing acceleration and deceleration lanes depending on the volume and speed of the through traffic. This decision should be based upon site specific conditions. ***Accessing Transit*** provides detailed bus bay dimensions for consideration when right of way is unlimited and access points are limited.

PPM – January, 2006 revision

TYPICAL CONFIGURATION AND DIMENSION FOR A QUEUE JUMPER BUS BAY



Source: Accessing Transit – Figure 2.10

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